p-ISSN 2301-9123 | e-ISSN 2460-5441

Global Medical & Health Communication

Published by:
UPT Publikasi Ilmiah
Universitas Islam Bandung

APR 2022 VOL. 10 NO. 1

Global Medical and Health Communication

Editorial Team

Editor in Chief
Herry Garna

Editors
Arief Budi Yulianti
Badrul Hisham Yahaya
Caecielia Makaginsar
Ike Rahmawaty Alie
Jerico Franciscus Pardosi
Lisa Adhia Garina
Listya Hanum Siswanti
Mirasari Putri
Roy Rillera Marzo
Winni Maharani
Yuktiana Kharisma

Layout Editor
Yudi Feriandi

Administrative Staff
Agus Chalid
Deni Irawan
Evi Apriani

Editorial Address
Jalan Hariangbanga No. 2, Tamansari, Bandung 40116, West Java, Indonesia
Phone/fax: (022) 4321213
E-mail: gmhc.unisba@gmail.com
Website: https://ejournal.unisba.ac.id/index.php/gmhc

Accredited by:
Ministry of Research, Technology and Higher Education of the Republic of Indonesia (Kemenristekdikti) Number: 30/E/KPT/2019, 11th November 2019

This journal is indexed on:

Managed by:
Faculty of Medicine, Universitas Islam Bandung

Published by:
UPT Publikasi Ilmiah Universitas Islam Bandung

Publish Every 4 Months
April, August, December

Global Medical and Health Communication

pISSN 2301-9123 | eISSN 2460-5441

Volume 10 Number 1, April 2022

TABLE OF CONTENTS

RESEARCH ARTICLES

AUTHOR GUIDELINES

Global Medical and Health Communication is a journal that publishes medical and health scientific articles published every 4 (four) months. Articles are original research that needs to be disseminated and written in English.

The submitted manuscript must be an article that has never been published, and the author must ensure that all co-authors have agreed by signing a statement on the seal. For original research, we accept the study which is last then 7 (seven) years when the manuscript is submitted. The manuscript is an original article free from plagiarism. When the article is published in another journal then in the next journal, the article will be disallowed.

All articles will be discussed by experts in the field of scholarly concern (peer reviewer) and will be edited by the editor. The editor reserves the right to add or subtract sentences, both abstracts, and scripts without changing the meaning. Manuscripts that are accepted for publication will become the property of the publisher. It is not allowed to be published in other media. The needed revised manuscripts will be returned to the author. Research articles must be approved by the health research ethics committee or consider the ethical aspects of research accounted for.

Article Writing

Typed the article in Microsoft Word format with paper size A4 (21.0×29.7 cm), 4 cm left and top margin, 3 cm down and right, not back and forth. The font is black Georgia with 12 pt size, typed justified except for a title with a spacing of two spaces. Typing a new paragraph 6 taps from the left edge of the line, unless the first paragraph is not typed indented. In one manuscript only in English. Typed italic the untranslatable terms in a foreign language or regional language. It is recommended to use a professional translator who understands the health field or software such as Grammarly in writing English manuscripts. The maximum script length is 20 pages (including images, tables, and photos). Each page is numbered typed on the bottom right page, sequentially starting from the title page to the last page.

Table title is the typed center, font size 11 pt, bold, initial letter of each word written with a capital letter, except conjunctions. The titles are numbered and written on top of the table. Example: Table 3 *Neisseria gonorrhoeae* Resistance to 8 Types of Antimicrobials in 20 Specimens. Table, no vertical dividing line, and there are only three horizontal borderlines. Created tables in sequence two spaces from the text. Table descriptions and abbreviations are placed in the table description, not on the table title.

Typed center figure title with 11 pt font size, bold, numbered according to the appearance in the text and typed under the image. The source of the cited image and or table should be added to references if it is not the author's work.

Figures (graphs, diagrams, and photos) and tables besides being written in place, are also made separately on other text pages with sufficient sharpness and darkness. A maximum number of tables and or images are 6 (six) pieces. Figures are sent in black and white or colored format when required, uploaded to the Supplementary File(s) are in high-resolution jpeg, jpg, or png formats.

Write correspondence as to the footnote on the first page containing the full name of the author with degrees/academic degrees, institution, address, mobile phone, and e-mail.

Content and Format Articles

The article contains results of original research in the field of basic medical or applied, and health. The article format consists of Title, Introduction, Methods, Results, Discussion, Conclusion(s), Conflict of Interest, Acknowledgments, and References.

Articles Title

Maximum article title consists of 12 words (choose words and terms that are dense meaning and able to characterize the entire contents of the script). Typed with bold fonts, size 12 pt, one space, the initial letter of each word is written in capital letters (except the conjunctive), and center. The ownership row consists of 2 elements, the author name and origin institution. The author's name written with the initial fonts is capital and bold, size 11 pt, one space, and center. Institution name written with the initial fonts is capital, size 10 pt, one space, and center.

Abstract

The abstract is typed using 12 pt font size and one space. The abstract is written in one paragraph, one space, a maximum of 250 words, and should describe the entire contents of the article. The abstract should be suitable for the format of introduction, methods (contain method, place, and time of the study), results, discussion, and conclusion. Abstract be equipped with keywords consisting of 3–5 words.

Introduction

The introduction begins with the general background of the study in a brief maximum of one paragraph. Then, load the State of the Art (a brief review of literature or previous studies, 1–2 paragraphs) to justify/strengthen the statement of novelty or significance or scientific contribution or originality of this article and try to have references to articles from journals of the last 10 years that strengthen the justification for originality or contributions.

Before writing the purpose of the study, there must be a clear and explicit Gap Analysis or statement of gaps (originality) or a statement of the contribution of novelty (novelty statement), or the unique difference of this research compared to previous studies, also in

terms of the importance of whether or not the research was conducted.

Methods
Methods contain the material under study, and the way described briefly by the order of operation as well as the location and time of the study. Explain statistical methods in detail. Consideration of ethical issues is included. If the protocol has been approved then the ethical clearance/approval letter number and the health research ethics committee must be written.

Results
The result is the core of scientific writing. This section presents data and information that will be used as the basis of the conclusion and is even expected to get a new theory. In results, listed the tables and or images, graphics, photos to explain and abbreviate the description should be given; numbered according to their appearance in the text. Results of the study and discussion should be written separately.

Discussion
Discussion of the article reveals, explains, and discusses the results of the study with an analysis by the research design, interpretation, and explanation of its synthesis. Also, the results obtained are compared with the results of previous research of others. Suggestions are also written here.

Conclusion(s)
The conclusion is submitted by the results obtained by the researcher and written briefly and clearly in two or three sentences in one paragraph.

Conflict of Interest
All authors must make a formal statement at the time of submission indicating any potential conflict of interest that might constitute an embarrassment to any of the authors if it were not to be declared and were to emerge after publication. Such conflicts might include but are not limited to, shareholding in or receipt of a grant or consultancy fee from a company whose product features in the submitted manuscript or which manufactures a competing product.

Acknowledgment
Acknowledgments should be provided to research contributors without writing a degree.

References
Authors are recommended to use reference management software for citation and reference writing, such as Mendeley and EndNote.

References are written by the Vancouver system's writing rules, given the sequence number corresponding to appearing in the article. List all author names if no more than six people; when more than six authors write the first six authors followed by et al. The references cited in the article are the most important references. The minimum referral number of 20 (twenty) and maximum of 30 (thirty) copies of the most recent 10 (ten) years of journal article/book publishing. Reference should be sought from 80% primary literature and 20% secondary literature. Avoid referral in the form of personal communication except for the information that is not possible from a public source. Include source name, date of communication, written permission, and confirmation of the accuracy of the source of communication.

Example How to Write References
Journals
Theodoridou K, Vasilopoulou VA, Katsiaflaka A, Theodoridou MN, Roka V, Rachiotis G, et al. Association of treatment for bacterial meningitis with the development of sequelae. Intern J Infect Dis. 2013;17(9):e707–13.
Zhang B, Kunde D, Tristram S. *Haemophilus haemolyticus* is infrequently misidentified as *Haemophilus influenzae* in diagnostic specimens in Australia. Diagn Microbiol Infect Dis. 2014;80(4): 272–3.

Books and Other Monographs
Editor as Author
Nriagu J, editor. Encyclopedia of environmental health. Michigan: Elsevier BV; 2011.

Organization as Author
World Health Organization. Guideline: neonatal vitamin A supplementation. Geneva: WHO Press; 2011.

Chapter in Book
Miller LG. Community-associated methicillin resistant *Staphylococcus aureus*. In: Weber JT, editor. Antimicrobial resistance. Beyond the breakpoint. Basel: Karger; 2010. p. 1–20.

Conference Proceeding
Nicholai T. Homeopathy. Proceedings of the Workshop Alternative Medicines; 2011 November 30; Brussels Belgium. Brussels: ENVI; 2011.

Journal Article from Internet
King P. *Haemophilus influenzae* and the lung (*Haemophilus* and the lung). Clin Transl Med. 2012;1:10 [cited 2015 August 15]. Available from: https://clintransmed.springeropen.com/articles/10.1186/2001-1326-1-10.

Authors
Written equipped in the covering letter, containing the full name (with degrees/academic degrees), the area of expertise, institution, address, mobile phone, and e-mail.

Supplementary File(s)
In the Supplementary Files, upload the following document:
- ethics and plagiarism statement;
- scan results of ethical approval/clearance letters from the Health Research Ethics Committee;
- copyright statement
- pictures (graphs, diagrams, and photos) at a manuscript in high-resolution jpeg, jpg, or png format.

Article Submission
Submit article and correspondence with the editorial board online. Register at https://ejournal.unisba.ac.id/index.php/gmhc and follow the guidelines.

Manuscripts submitted not in accordance will be rejected.

Editorial Board of
Global Medical and Health Communication
Faculty of Medicine, Universitas Islam Bandung
Jalan Hariangbanga No. 2, Tamansari,
Bandung 40116, West Java, Indonesia

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8190

GMHC. 2022;10(1):1–5
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Correlations between a Smoking Habit and Teeth, Gums, and Lips Discoloration Issues on Active Smoker

Caecielia Makaginsar,[1] Yuniarti Yuniarti,[2] Siska Nia Irasanti,[3] Aliya Salsabila,[4] Tannia Kusumawardhani[4]

[1]Department of Medical Education, Bioethics, Humaniora and Islamic Insert, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [2]Department of Anatomy, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [3]Department of Public Health, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [4]Medical Undergraduate Study Program, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia

Abstract

According to the Central Statistics Agency, the percentage of smokers among Indonesians aged 15 years is relatively high. It was 32.20%, 29.03%, and 28.69%, in 2018, 2019, and 2020 respectively. Cigarettes contain tar that changes into a solid and builds up colored plaque when entering the mouth. Perpetual cigarette smoke causes brown pigmentation on the mucosa, known as smoker's melanosis. Smoker's melanosis is abundant in gums and lips. This study's objective was to analyze the correlations between a smoking habit with teeth, gums, and lips discoloration in an active smoker. This study was an observational analysis with a survey approach from January to May 2021 in Bandung. The sample was 100 males, consisting of 38 active smokers and 62 non-smokers as a comparison group. Data were analyzed by Pearson and Spearman test. This study shows a significant correlation between smoking habit and teeth discoloration (p=0.01), also shows a statistically significant correlation between a smoking habit and gum discoloration (p=0.00), and there is a significant correlation (p=0.00) between a smoking habit and lips discoloration. In conclusion, there is a correlation between a smoking habit and teeth, gums, and lips discoloration.

Keywords: Discoloration, gums, lips, smoking, teeth

Introduction

Data from Statistics Indonesia showed that smoking among Indonesians aged 15 years is relatively high.[1] Smoking harms almost every part of our body and increases our risk of many diseases. Dental stain and mucosa discoloration are the main issues in smokers.[2,3]

Cigarettes produce imperfect combustion building up in the body when inhaled. In general, cigarettes consist of two main parts; 92 % of gas and 8% solid or particles. Carbon monoxide, carbon dioxide, hydrogen cyanide, ammonia, oxidation of nitrogen, and hydrocarbon compounds are substances forming cigarette smoke components. Smoke particle components are tar, nicotine, benzantraccne, benzopiren, fenol, cadmium, indole, karbazol dan cresol. These substances are poisonous, irritating, and carcinogenic.[4] Additionally, tar contains thousands of chemicals in solid cigarette particles of smoke components, entering the oral cavity as solid vapor when inhaled. After it becomes cold, it becomes solid and builds up brown sediment on tooth surfaces, respiratory tract, and lungs.[5–8]

Cigarettes harm oral health since they can cause damage to hard and soft tissues in the oral cavity.[5] Tobacco on cigarettes produces liquid in the oral cavity, which penetrates to pit and tooth fissures and then sediments on teeth surfaces.[2]

Tooth discoloration or stain can cause esthetic issues that can impact psychologically, especially on anterior teeth.[9] Additionally, the stain can also cause rough tooth surfaces, making it easy to build up leftover food and bacteria that eventually form plaque. Chronic invasion of plaque bacteria into the gingival margin can cause gingivitis, leading to periodontitis. Severe periodontitis causes gingiva recession and also losing alveolar bone and teeth caused by chronic cell inflammation.[7,8]

Being exposed to cigarette smoke can continuously stimulate oral mucosa melanosis and produce excess melanin, leading to brown pigmentation on the known smoker's melanosis of the oral mucosa.[10] Smoker's melanosis often occurs in gums, palates, and lips.[11] Smoker's

Received: 14 July 2021; Revised: 19 April 2022; Accepted: 20 April 2022; Published: 30 April 2022

Correspondence: Dr. Caecielia Makaginsar, drg., Sp.Pros., M.M.R.S., M.H. Department of Medical Education, Bioethics, Humaniora and Islamic Insert, Faculty of Medicine, Universitas Islam Bandung. Jln. Tamansari No. 22, Bandung 40116, West Java, Indonesia. E-mail: caecielia@gmail.com

melanosis appears to be multifocal spots seen as grey to brown pigmentation with random distribution and patterns.[6]

This anomaly is not dangerous, but it has negative aesthetic appeal if untreated. Smoker's melanosis can be found in 25–35% of smokers and increase significantly in the first year. Pigmentation will spread when someone smokes longer.[12] The results also showed a relationship between the number of cigarettes smoked per year with the occurrence of smoker's melanosis, which causes staining of teeth, gums, and lips.[13]

The government has issued some regulations to control diseases caused by smoking and exposure to cigarette smoke. For example, regulation Number 36, in 2009, regarding health, and Government Regulation Number 109, in 2012, about safety measures for materials containing addictive substances in tobacco products that harm health. In that Government Regulation, all tobacco products issues have been suggested not to disturb and endanger the health of personal, family, and society. This cigarette control has been implemented by applying non-smoking zones in some areas.[14] The study area, a university in Bandung, is one of the universities that implement non-smoking zones after issuing University Regulation Number 187/L.03/SK/Rek/X/2018 about non-smoking zones in campus area officially implemented on 31 October 2018. However, data from previous studies show that university staff still have a smoking habit outside of campus areas. This leads to a negative impact on health and the possibility of building up a discoloration on teeth, gums, and lips.

This study's objectives were to analyze the correlation between a smoking habit and issues of teeth, gums, and lips discoloration on active smoker staff at a university in Bandung.

Methods

This study design was analytical observation research with a survey approach from January to May 2021 in Bandung. Data was primary data in a questionnaire which already been validated. The author conducted the socialization and informed consent before the study. This study has 100 samples of male staff consisting of 38 active smokers and 62 non-smokers as a comparison group. Inclusion criteria of this study were male staff and active smokers (who smoked every day for at least six months and still smoked at the time of the survey), and exclusion criteria were people who had diabetes mellitus, TBC, HIV, leukemia, hemophilia, and thalassemia. Each subject of the study was assisted during an online questionnaire. In this study, active smokers were not subgrouped based on a long time of smoking and the number of cigarettes smoked because of the small number of respondents who had a smoking habit. Therefore, even though the total population of male employees was taken, a minimum of 30 respondents was needed in each subgroup. Still, the number of active smokers in this study was only 38 people who have a smoking habit.

The independent variable was discoloration on teeth, gums, and lips. The dependent variable of this study was smoking habit. This study was not observed directly in the respondent's oral cavity by the researcher because this study was conducted during the COVID-19 pandemic. Subjects were asked to see the condition of their teeth, gums, and lips directly through a mirror whether there were black-brown stains on the surface of the teeth, which were the result of the tobacco burning residue.[15] Respondent asked to see staining on the gums in the form of a dark purplish color or spots—irregular light brown.[15] Respondent asked to see staining on the lips, which presents as a diffuse black-brown stain.[16] Respondents clicking on the option there is discoloration of teeth, gums, and lips if they get the discoloration condition on their teeth, gums, and lips.[17] Subjects can easily recognize the presence of discoloration of the teeth, gums, and lips because this discoloration affects the aesthetics of a person's face.[18] Primary data taken was then processed and analyzed. Since this study was correlation analytical research, data analysis used Pearson and Spearman correlation test.[19]

This study had received ethical approval from the Health Research Ethics Committee of Universitas Islam Bandung, number: 002/KEPK-Unisba/III/2021.

Results

The study results were analyzed by Pearson and Spearman correlation test shown in Table. Ten people had teeth with discoloration, with the most significant proportion being the active smokers' group (21%), exceeding the non-smokers' group (only 3%). There is a significant correlation between a smoking habit and teeth discoloration

Table Correlation of Smoking Habit with Teeth, Gums, and Lips Discoloration

Organs	Smoking Habit	No Discoloration		Discoloration		Total		p
		n	%	n	%	n	%	
Teeth	Non-smokers	60	97	2	3	62	100	
	Active smokers	30	79	8	21	38	100	0.01
	Total	90	90	10	10	100	100	
Gums	Non-smokers	59	95	3	5	62	100	
	Active smokers	32	84	6	16	38	100	0.00
	Total	91	91	9	9	100	100	
Lips	Non-smokers	55	89	7	11	62	100	
	Active smokers	21	55	17	45	38	100	0.00
	Total	76	76	24	24	100	100	

(p=0.01).

Gums discoloration was only found in 9 respondents, with the most significant proportion among the active smokers' group (16%). Statistically, there is a significant correlation (p=0.00), yet a further study is needed with a more substantial number of samples since p value approached determined alpha (0.05).

Respondent's proportion having lips discoloration was 24%, with the most significant proportion being in the active smokers' group (45%). A significant correlation was statistically (p=0.00) between a smoking habit and lips discoloration. Respondents who were non-smokers also found tooth staining (3%), gum staining (5%), and lip staining (11%).

The result can be caused because the respondent has a history of being an active smoker, but he no longer smokes when the data was collected.[20]

Discussion

Smoking is a bad habit that can cause long-term effects on body health and the oral cavity. Dental stain and mucosa discoloration in the oral cavity are common issues for smokers.[2]

In this study, active smokers also had a dental stain that caused teeth discoloration. This study follows the results of previous studies, which showed a significant correlation between a smoking habit and teeth discoloration.[15,21] Other studies also showed a correlation between a smoking habit and stain buildup. However, there was no correlation between smoking, types of smoke, the number of cigarettes inhaled daily, and stain buildup.[15] Discoloration (color change) is an extrinsic color change caused by tobacco in cigarettes. A substance causing stains in cigarettes is tar as a result of combustion. Tar consists of 6,000 chemicals that are cigarette solid vapor components. When inhaled, tar enters the oral cavity as a solid vapor that, after cold, becomes solid and builds up yellowish-brown sediment on tooth surfaces, skin, and nails.[17,22] This caused some aesthetic problems[18] that can cause a significant psychological and sociological impact, primarily when it builds upon anterior teeth.[3,9]

Additionally, thickening stain sediment can cause rough teeth surfaces that lead to plaque buildup, irritating gums that lead to gingivitis, which next can lead to periodontitis.[7,23]

There were issues on active smokers of gums and lips discoloration. The previous studies suggested that smoking could affect gingival pigmentation, periodontal tissues, and lips.[13]

Discoloration on gums and lips that is another effect of a smoking habit is smoker's melanosis, in which the characteristic is brown mucosa due to increased melanin production by melanocytes. However, pigmentation is reversible and can disappear if a smoking habit is stopped.[24,25] The previous studies suggested that the contribution of a smoking habit toward a smoker's melanosis was 94%.[22] The cause of smoker's melanosis is due to the effect of nicotine (polycyclic compound) on melanocyte cells located along with basal epithelial cells of oral mucosa tissues. Nicotine stimulates melanocytes to produce excess melanosome that increases melanin production.[2] Smoker's melanosis is an anomaly in the oral cavity, yet it is harmless. However, if it is untreated, it can harm aesthetics. Smoker's melanosis appears in 25–31% of smokers and

increases significantly during the first year of smoking. Pigmentation will spread widely if a person smokes for a more extended period. It shows that the longer a person smokes, the higher risk of causing smoker's melanosis.[12]

This study used patient perceptions to assess discoloration. It would have shown a better result if it had been completed with clinical examinations of respondents. However, due to the COVID-19 pandemic, the examinations were challenging to be done with a high risk of COVID-19 exposure.

Conclusion

Referring to the result of the study, we conclude that there is a significant correlation between a smoking habit and teeth, gums, and lips discoloration.

Conflict of Interest

There was no conflict of interest in this study.

Acknowledgments

The authors send the highest gratitude to all staff of Universitas Islam Bandung for their willingness to participate in this study.

References

1. Badan Pusat Statistik. Persentase merokok pada penduduk umur ≥15 tahun menurut provinsi (persen), 2019–2021 [Internet]. Jakarta: Badan Pusat Statistik: 2021 [cited 2021 August 28]. Available from: https://www.bps.go.id/indicator/30/1435/1/persentase-merokok-pada-penduduk-umur-15-tahun-menurut-provinsi.html.
2. Sari E, Salamah S, Said F. Penggunaan air larutan baking soda terhadap penurunan tobacco stain pada perokok. J Kesehat Gigi. 2019;6(2):109–12.
3. Kansal S, Jindal L, Garg K, Thakur K, Mehta S, Pachori H. Discoloration of teeth: literature review. IJHCR. 2020;3(2):58–62.
4. Oktanauli P, Heriaw NQ. Distribusi frekuensi perubahan warna email gigi pada perokok. Cakradonya Dent J. 2017;9(2):116–20.
5. Shah FY, Sehrawat P, Hussain AB. Smoking and its ramifications relating to oral mucosa. Int J Appl Dent Sci. 2020;6(3):742–4.
6. Sumerti NN. Merokok dan efeknya terhadap kesehatan gigi dan rongga mulut. J Kesehat Gigi. 2016;4(2):49–58.
7. Rohmawati N, Santik YDP. Status penyakit periodontal pada pria perokok dewasa. Higeia. 2019;3(2):286–97.
8. Sarumathi T, Mahalakshmi K, Jayesh SR, Prasanth BK, Poovannan S. Hostile tobacco and oral health–a review. Indian J Public Health Res Dev. 2019;10(3):123–7.
9. Kasihani NN, Budiarti R, Pudentiana RRE, Erwin, Mujahidad AF. Aktivitas risiko dan status stain ekstrinsik gigi pada masyarakat RT 004 RW 001 Kampung Bali Tanah Abang. JDHT. 2020;1(1):16–20.
10. Triza Y, Afriza D. Hubungan merokok dengan melanosis perokok di Rumah Sakit Gigi dan Mulut Baiturrahmah. B-Dent. 2014;1(2):90–6.
11. Taghizadeh S, Dinçer Z, Marakoğlu İ. Smokers melanosis: a case report. Tob Induc Dis. 2018;16(Suppl 3):A121.
12. Vieta C, Setiadhi R, Zubaedah C. Gambaran klinis smoker's melanosis pada perokok kretek ditinjau dari lama merokok. J Ked Gi Unpad. 2017;29(1):16–24.
13. Multani S. Interrelationship of smoking, lip and gingival melanin pigmentation, and periodontal status. Addict Health. 2013;5(1–2):57–65.
14. Rahajeng E. Pengaruh penerapan kawasan tanpa rokok terhadap penurunan proporsi perokok di Provinsi DKI Jakarta, Daerah Istimewa Yogyakarta dan Bali. J Ekol Kesehat. 2015;14(3):238–49.
15. Oktanauli P, Taher P, Andini NP. Distribusi frekuensi perubahan gingiva pada perokok. Jitekgi. 2017;13(2):10–3.
16. Shetty S, Pai S. Aesthetic correction of smoker's lip using 1064 nm Q-switched neodymium-doped yttrium aluminium garnet laser. J Cutan Aesthet Surg. 2017;10(2):118–9.
17. Khalisa E, Adhani R, Arifin S. Hubungan kebiasaan merokok dengan pembentukan stain (noda gigi) pada pasien di Poli Gigi RSUD Ratu Zalecha Martapura. Dentino. 2016;1(1):27–31.
18. Arsyad WA, Husain J. Tingkat pengetahuan perokok terhadap perubahan warna gigi. JIKI. 2018;6(2):119–4.
19. Tyastirin E, Hidayati I. Statistik parametrik untuk penelitian kesehatan. Surabaya: Universitas Islam Negeri Sunan Ampel; 2017.

20. Kanagaraj S, Thenmozhi MS. A short review on smoker's melanosis. Drug Invent Today. 2018;10(12):1–4.
21. Asiking W, Rottie J, Malara R. Hubungan merokok dengan kesehatan gigi dan mulut pada pria dewasa di Desa Poyowa Kecil Kecamatan Kotamobagu Selatan Kota Kotamobagu. Jkp. 2016;4(1):1–6.
22. Haiduc A, Zanetti F, Zhao X, Schlage WK, Scherer M, Pluym N, et al. Analysis of chemical deposits on tooth enamel exposed to total particulate matter from cigarette smoke and tobacco heating system 2.2 aerosol by novel GC–MS deconvolution procedures. J Chromatogr B. 2020;1152:122228.
23. Sinaga CPA, Lampus BS, Mariati NW. Gambaran pengetahuan stain gigi pada perokok di Kelurahan Bahu Lingkungan V. e-GiGi. 2014;2(2):5761.
24. Simbolon GJ, Sartini, Fauziah I. Hubungan kebiasaan merokok terhadap smoker melanosis pada siswa SMA HKBP Sidorame Medan. BioLink. 2016;3(1):37–43.
25. Pratiwi WO, Lestari C, Bakar A. Prevalensi dan distribusi smoker's melanosis pada buruh bangunan yang perokok di PT Trikencana Sakti Utama Ketaping. B-Dent. 2019;4(1):23–31.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8380

GMHC. 2022;10(1):6–12
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Factors Associated with the Prevalence of External Compression Headache Attributed to Personal Protection Equipment Usage

Restu Susanti, Yuliarni Syafrita
Department of Neurology, Faculty of Medicine, Universitas Andalas/RSUP Dr. M. Djamil, Padang, Indonesia

Abstract

Personal protective equipment (PPE) in the COVID-19 pandemic era is essential for healthcare workers to decrease the risk of infection. The PPE, such as N95 masks and goggles, can trigger external-compression headache (ECH). This study aimed to determine the factors associated with the prevalence of ECH attributed to PPE usage. It was an analytic-observational study with a cross-sectional design conducted at Dr. M. Djamil Hospital Padang in May 2020. The subjects were healthcare workers (doctors and nurses) who used level 3 PPE for a minimum of 4 hours. The diagnosis of ECH was determined by the International Classification of Headache Disorders (ICHD) 3rd edition criteria. The Headache Screening Questionnaire (HSQ) determined the pre-existing primary headaches. The association between variables was analyzed using chi-square and Kruskal-Wallis tests. P value<0.05 was considered statistically significant. A total of 113 healthcare workers participated in this study, consisting of 46 (40.7%) males and 67 (59.3%) females. The median age was 30 (23–46) years. ECH occurred in 102 (90.3%) respondents. Pre-existing primary headaches were present in 79 (69.9%) respondents, including migraine in 28 (23.6%) and tension-type headaches (TTH) in 46 (40.7%) respondents. The frontalis (69%) and temporalis (50.4%) were the most affected muscles. In this study, the significant factor associated with ECH was pre-existing primary headache (p=0.001, OR=7.795). There was a significant association between the pre-existing TTH (p=0.022) and ECH. There was a non-significant association between pre-existing migraine and ECH (p=0.284). In conclusion, the pre-existing primary headache was associated with the prevalence of ECH attributed to PPE usage.

Keywords: External-compression headache, PPE, primary headache

Introduction

Coronavirus disease-19 (COVID-19) is an acute respiratory syndrome caused by the SARS-CoV-2 and first appeared in Wuhan, China, at the end of 2019.[1] By January 2020, COVID-19 had spread rapidly from Wuhan to other countries. China has reported 80,955 confirmed cases of COVID-19, and more than 37,300 cases have been identified in 113 countries on March 11, 2020.[2,3] World Health Organization reported 1,184,226 confirmed cases with 545,481 deaths worldwide with CFR 4.6% on July 9, 2020. Indonesia declared its first case on March 2, 2020. The cases continue to increase and spread rapidly throughout Indonesia. The Ministry of Health Republic of Indonesia reported 70,736 confirmed cases of COVID-19 with 3,417 deaths (CFR 4.8%) on July 9, 2020.[4]

Healthcare workers are the front-liner in the COVID-19 pandemic. Healthcare workers in all sectors were mandated to wear personal protective equipment (PPE) and follow health protocols while treating patients with suspected or confirmed COVID-19. The PPE consisted of N95 masks, protective eyewear (goggles or face shield), gowns, surgical gloves, and powered air-purifying respirators (PAPR). The PPE usage for an extended period often causes discomfort or pain.[5,6]

The use of N95 masks and goggles can cause external-compression headache (ECH). The 3rd edition of the International Classification of Headache Disorders (ICHD-3) defined ECH as a headache caused by sustained external compression of the pericranial soft tissues due to tools that cause pressure on these areas, such as hats, helmets, and swimming goggles, including N95 masks and goggles.[3,7] ECH is a primary headache not associated with organic extracranial or intracranial disease. It does not require further investigation when the diagnostic criteria are met and the irregular pattern is evident. ECH diagnostic criteria based on ICHD-3 are:[3,7] (1) at least two episodes of headache fulfilling criteria 2–4, (2) brought on by and occurring within one

Received: 24 August 2021; Revised: 18 March 2022; Accepted: 20 April 2022; Published: 30 April 2022

Correspondence: Restu Susanti, dr., Sp.S.(K.), M.Biomed. Department of Neurology, Faculty of Medicine, Universitas Andalas. Jln. Perintis Kemerdekaan No. 94, Padang, West Sumatera, Indonesia. E-mail: restususanti@yahoo.com

hour during sustained external compression of the forehead or scalp, (3) maximal at the site of external compression, (4) resolving within one hour after external compression is relieved, (5) another ICHD-3 diagnosis does not better account for it.

There were still a few studies related to headaches due to the use of PPE, especially N95 masks and goggles are still rare. A previous study in 2003, during the SARS epidemic in Singapore, reported the prevalence of face mask–associated ECH was 37.3%.[8] Recently, research on the prevalence and risk factors of PPE-associated ECH was conducted in Singapore. In this study, the prevalence of ECH was 81.0%.[3] The second-highest prevalence was 51.6% in a study conducted in Spain by Ramirez-Moreno et al.[9] Another study in Morocco reported that PPE-associated ECH was found in 32.9% of healthcare workers.[10] This number was similar to the prevalence reported by Köseoğlu Toksoy et al.,[11] 30.9%. Zaheer et al.[12] concluded the prevalence of PPE-associated ECH in Pakistan was 28.2%, identical to the majority in Italy reported by Rapisarda et al.,[13] which was 26.50%.

Another study involving nurses working in intensive care units reported headache as one of the main factors leading to suboptimal N95 mask-wearing compliance.[14] Previous reports have highlighted pain or discomfort (headache, facial pain, and earlobe discomfort) arising from the tight-fitting of the N-95 mask and its elastic head strap, which confers limited tolerability when used for a long time.[15] This study aimed to determine the factors associated with the prevalence of ECH attributed to PPE usage.

Methods

It was an observational analytic study with a cross-sectional design conducted at Dr. M. Djamil Hospital Padang in May 2020. Research respondents were healthcare workers (doctors and nurses) who used level 3 PPE for at least 4 hours. The sampling was done by the consecutive sampling method. ECH diagnosis was established based on The International Classification of Headache Disorders, 3rd edition (ICHD-3), using a self-administered questionnaire.[7] The pre-existing primary headache was determined based on the Headache Screening Questionnaire (HSQ).[3] The variables examined by the questionnaire included age, gender, body mass index, pre-existing primary headache, the onset of ECH, and total tenderness score (TTS). HSQ has two scoring algorithms for migraine and tension-type headaches (TTH) based on ICHD-3 diagnostic criteria.

TTS was a scoring system used to assess the tenderness of pericranial tissues. The manual pressure was applied to 8 pairs of muscles and tendon insertions (m. masseter, m. temporalis, m. frontalis, m. pterygoideus lateralis, m. trapezius, m. sternocleidomastoideus, mastoid processes, and occipital muscle insertions). Palpation of the muscles or tendon insertions is done by applying finger pressure while making a small circular motion for 4–5 seconds. Tenderness was scored on a 4-point scale; 0: no visible reaction or verbal report of discomfort, 1: mild mimic reaction but no verbal report of discomfort, 2: verbal report and the mimic reaction of painful tenderness and discomfort, and 3: grimacing or withdrawal, verbal description of aching tenderness. TTS maximum score was 48 (8×2×3) (tender spots at each muscle/tendon insertions × right/left × maximum score).[16,17]

The association between variables was analyzed by chi-square and Kruskal-Wallis tests. The independent variables in this study were age, gender, BMI, and pre-existing primary headache and the dependent variable was the incidence of ECH. P value<0.05 was considered statistically significant.

The Research Ethics Committee of the Faculty of Medicine Universitas Andalas approved this study with letter number 297/KEP/FK/2020.

Results

This study was conducted on 113 healthcare workers, consisting of 46 (40.7%) males and 67 (59.3%) females (Table 1). The median age of the respondents was 30 (23–46) years. ECH occurred in 102 (90.3%) respondents. Pre-existing primary headaches were present in 79 (69.9%) respondents, including migraine in 28 (23.6%) and TTH in 46 (40.7%) respondents. Total tenderness score (TTS) is used to assess pericranial tenderness. The median TTS score was 4 (0–20). Based on the location, the frontal muscle was the most affected (69%), followed by the temporal (50.4%), occipital insertion muscles (25.7%), trapezius (20.4%), sternocleidomastoid (11.5%), muscles in mastoid processus (7.1%), masseter (3.5%), and lateral pterygoid (2.7%).

The bivariate analysis was performed to determine the factors associated with ECH

Table 1 Distribution of Respondents' Characteristics and Baseline Data

Variables	Value
Gender, n (%)	
Male	46 (40.7)
Female	67 (59.3)
Age, years, median (min–max)	30 (23–46)
Body-weight, kg, median (min–max)	60 (43–125)
Height, cm, median (min–max)	160 (145–188)
External-compression headache, n (%)	
Yes	102 (90.3)
No	11 (9.7)
Previous pre-existing primary headache, n (%)	
Migraine	28 (24.8)
Tension-type headaches	46 (40.7)
Migraine and tension-type headaches	5 (4,4)
No history	34 (30.1)
Total tenderness score scale, median (min–max)	4 (0–20)
External-compression headache location, n (%)	
M. masseter	4 (3.5)
M. temporalis	57 (50.4)
M. frontalis	78 (69.0)
M. trapezius	23 (20.4)
M. sternocleidomastoid	13 (11.5)
Occipital muscle insertion	29 (25.7)
Mastoid process	8 (7.1)
Pain intensity scale (visual analogue scale, VAS), n (%)	
Mild headache (1–4)	90 (79.6)
Moderate headache (5–6)	9 (8.0)
Severe headache (7–10)	3 (2.7)

Table 2 Bivariate Analysis of Factors Associated with the Prevalence of External-Compression Headache

Variables	ECH		OR	95% CI		p*
	Yes	No		Min	Max	
Age (years)						0.742
40	1	0				
<40	101	11				
Gender			0.923	0.254	3.359	0.903
Male	39	7				
Female	63	4				
Body mass index			0.411	0.116	1.458	0.159
Overweight 25	26	5				
Normoweight <25	76	6				
Pre-existing primary headaches			7.795	1.923	31.598	0.001
Yes	79	3				
Not	23	8				

Note: *chi-square, p<0.05 significant; ECH: external-compression headache

Table 3 Association between Pre-existing Tension-Type Headache and External-Compression Headache

Pre-existing Tension-Type Headache	External-Compression Headache				p*
	Yes		No		
	n=102	%	n=11	%	
Yes	49	43.3	1	0.8	0.022
No	53	46.9	10	8.8	

Note: *Fisher exact test, p<0.05 significant

Table 4 Association between Pre-existing Migraine and External-Compression Headache

Pre-existing Migraine	External-Compression Headache				p*
	Yes		No		
	n=102	%	n=11	%	
Yes	28	24.8	1	0.8	0.284
No	74	65.6	10	8.8	

Note: *Fisher exact test, p<0.05 significant

prevalence attributed to PPE usage. The statistical analysis showed that the factor significantly associated with ECH was the pre-existing primary headaches (p=0.001, OR=7.795) shown in Table 2.

There was a significant association between ECH prevalence and pre-existing TTH with a p value=0.022 (Table 3). In Table 4, an analysis was carried out to assess the association between ECH prevalence and pre-existing migraine. There was no significant association found with a p value=0.284.

One hundred two respondents who experienced ECH were examined and analyzed to assess the association between the onset of ECH after wearing PPE for several hours and the value of TTS. There was no correlation between the onset of ECH and the value of TTS (Table 5).

Table 5 Association between Onset of ECH and the Value of TTS

		Crossword Clue
Onset of ECH	R	−0.023
	P	>0.001*
	n	102

Note: *Spearman correlation test, p<0.05 significant

In addition, an analysis was conducted to assess the association between the onset of ECH and the type of pre-existing primary headache. There was no significant association found between these variables (Table 6).

Discussion

The increase in COVID-19 cases has caused the government to stipulate the mandatory usage of personal protective equipment (PPE)

Table 6 Association between Onset of ECH and Pre-existing Primary Headache

Variables	Severity of ECH				p*
	Migraine	TTH	MTTH	Non-MTTH	
Onset ECH, minutes, median (min–max)	30 (5–120)	30 (10–180)	15 (15–120)	60 (10–180)	0.110

Note: *Kruskal-Wallis test, p<0.05 significant; ECH: external-compression headache; TTH: tension-type headache; MTTH: Migraine and tension-type headaches

for healthcare workers. This PPE consists of protective clothing, surgical gloves, goggles, and masks. The type of mask used must be effective; the recommended types are FPP2 (in Europe), N95 (US), and KN95 (China).[18] There are other types of masks (surgical masks or FPP1) that are less effective and are used by healthcare workers with no direct contact with COVID-19 patients. Strict usage of PPE is essential because it can decrease viral transmission to healthcare workers and limit the spread of infection from healthcare workers to healthy patients.[9]

This study describes the factors associated with ECH prevalence in healthcare workers at Dr. M. Djamil Hospital Padang, who used level 3 PPE (N95 masks and goggles) during the COVID-19 pandemic. This study found that 90.3% of respondents experienced ECH attributed to PPE usage. Exposure to N95 masks and goggles for at least four hours a day and pre-existing primary headaches are risk factors for ECH. The results of this study are similar to the survey by Ong et al.[3] at the National University Hospital (NUH) Singapore, which found the prevalence of ECH was 77.8%. This ECH prevalence certainly has an impact on occupational health and safety of healthcare workers who work at the front lines in this COVID-19 pandemic.[3,17]

The pathogenesis of ECH attributed to PPE usage involves several causes other than mechanical factors due to compression on pericranial structures, the pain-sensitive organs. Pericranial tenderness also can be triggered by hypoxemia, hypercarbia, and stress due to work during the COVID-19 pandemic.[14,19,20] In this study, an analysis was conducted to determine the factors associated with ECH prevalence. The results showed that pre-existing primary headaches were significantly associated with ECH prevalence (p=0.001, OR=7.793). It was also in line with research by Ong et al.,[3] which stated that pre-existing primary headaches (migraine and TTH) were the most common conditions for ECH occurrence compared to other comorbidities such as asthma, diabetes, hypertension, and heart disease, and anxiety. Factors such as age, gender, and BMI were not significantly associated with the prevalence of ECH.[3,21,22]

The primary headache subtype analysis was conducted in this study. It was found that the association between pre-existing tension-type headache and the prevalence of ECH was more significant (p=0.022) compared to pre-existing migraine (p=0.284). This result differed from all previous studies that reported migraine as the most common pre-existing headaches. Ong et al.,[3] where the pre-existing migraine was more significant than a tension-type headache. We also analyzed the association between the ECH onset and pre-existing primary headache, but no significant association was found.

Anatomically, ECH that occurs due to the use of PPE, in this case, is an N95 mask and protective eyewear or goggles occurs due to pressure from the mask and goggles as well as traction due to the rope on the N95 mask and goggle, which irritates the superficial sensory nerves found on the face, head, and neck (trigeminal nerve, occipital nerve, zygomaticotemporal nerve, etc.). Peripheral sensitization can activate the trigeminocervical complex, sending nociceptive impulses to the trigeminal nerve, then to the brainstem and cortical areas, causing headaches. This reason might explain why respondents who had a previous history of tension headaches were more likely to experience ECH.[23–25]

A study by Ong et al.[3] in Singapore stated that during the COVID-19 pandemic, patients with pre-existing primary headaches experienced increased headaches attacks, for both migraines and TTH, predominantly due to PPE usage. Other factors that also increased headache intensity were the changes in sleep patterns, physical exhaustion, emotional stress, eating late, and dehydration. Further study is needed to investigate the increase of primary headaches attacks due to ECH attributed to PPE usage.[3,16,26]

Conclusions

This study found that personal protective equipment (PPE) in the COVID-19 pandemic era was associated with external-compression headache (ECH). The most significant factor related to ECH prevalence was a pre-existing primary headache. Tension-type headaches (TTH) prevalence was higher than migraine. The muscle most commonly affected were the frontalis and temporalis muscles.

Conflict of Interest

There is no conflict of interest in this study.

References

1. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical characteristics of

coronavirus disease 2019 in China. N Engl J Med. 2020;382(18):1708–20.
2. Zhu N, Zhang D, Wang W, Li X, Huang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med. 2020;382(8):727–33.
3. Ong JJY, Bharatendu C, Goh Y, Tang JZY, Sooi KWX, Tan YL, et al. Headaches associated with personal protective equipment – a cross-sectional study among frontline healthcare workers during COVID-19. Headache. 2020;60(5):864–77.
4. Kementerian Kesehatan Republik Indonesia. Pedoman pencegahan dan pengendalian coronavirus disease (COVID-19). 5th revision. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020.
5. Wong JEL, Leo YS, Tan CC. COVID-19 in Singapore—current experience: critical global issues that require attention and action. JAMA. 2020;323(13):1243–4.
6. Budianto P, Putra SE, Hafizhan M, Tyas FNI, Febrianty AF, Prabaningtyas HR, et al. Relationship between tension-type headache and quality of sleep, excessive daytime sleepiness, and fatigue syndrome among healthcare workers during COVID-19. GMHC. 2021;9(3):185–92.
7. Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018;38(1):1–211.
8. Lim ECH, Seet RCS, Lee KH, Wilder-Smith EPV, Chuah BYS, Ong BKC. Headaches and the N95 face-mask amongst healthcare providers. Acta Neurol Scand. 2006;113(3):199–202.
9. Ramirez-Moreno JM, Ceberino D, Gonzalez Plata A, Rebollo B, Macias Sedas P, Hariramani R, et al. Mask-associated 'de novo' headache in healthcare workers during the COVID-19 pandemic. Occup Environ Med. 2020;78(8):548–54.
10. Hajjij A, Aasfara J, Khalis M, Ouhabi H, Benariba F Jr, El Kettani C. Personal protective equipment and headaches: cross-sectional study among Moroccan healthcare workers during COVID-19 pandemic. Cureus. 2020;12(12):e12047.
11. Köseoğlu Toksoy C, Demirbaş H, Bozkurt E, Acar H, Türk Börü Ü. Headache related to mask use of healthcare workers in COVID-19 pandemic. Korean J Pain. 2021;34(2):241–5.
12. Zaheer R, Khan M, Tanveer A, Farooq A, Khurshid Z. Association of personal protective equipment with de novo headaches in frontline healthcare workers during COVID-19 pandemic: a cross-sectional study. Eur J Dent. 2020;14(S 01):S79–85.
13. Rapisarda L, Trimboli M, Fortunato F, De Martino A, Marsico O, Demonte G, et al. Facemask headache: a new nosographic entity among healthcare providers in COVID-19 era. Neurol Sci. 2021;42(4):1267–76.
14. Rebmann T, Carrico R, Wang J. Physiologic and other effects and compliance with long-term respirator use among medical intensive care unit nurses. Am J Infect Control. 2013;41(12):1218–23.
15. Shenal BV, Radonovich LJ Jr, Cheng J, Hodgson M, Bender BS. Discomfort and exertion associated with prolonged wear of respiratory protection in a health care setting. J Occup Environ Hyg. 2012;9(1):59–64.
16. Kolding LT, Do TP, Ewertsen C, Schytz HW. Muscle stiffness in tension-type headache patients with pericranial tenderness: a shear wave elastography study. Cephalalgia Rep. 2018;1:1–6.
17. Aaseth K, Grande RB, Lundqvist C, Russell MB. Pericranial tenderness in chronic tension-type headache: the Akershus population-based study of chronic headache. J Headache Pain. 2014;15(1):58.
18. Garcia Godoy LR, Jones AE, Anderson TN, Fisher CL, Seeley KML, Beeson EA, et al. Facial protection for healthcare workers during pandemics: a scoping review. BMJ Glob Health. 2020;5(5):e002553.
19. Szeinuk J, Beckett WS, Clark N, Hailoo WL. Medical evaluation for respirator use. Am J Ind Med. 2000;37(1):142–57.
20. Radonovich LJ Jr, Cheng J, Shenal BV, Hodgson M, Bender BS. Respirator tolerance in health care workers. JAMA. 2009;301(1):36–8.
21. Krymchantowski AV. Headaches due to external compression. Curr Pain Headache Rep. 2010;14(4):321–4.
22. Krymchantowski A, Barbosa JS, Cvaigman M, Lorenzatto W, Silva MT. Helmet-related, external compression headache among police officers in Rio de Janeiro. MedGenMed. 2004;6(2):45.
23. Ong JJY, Chan ACY, Bharatendu C, Teoh HL, Chan YC, Sharma VK. Headache related to PPE use during the COVID-19 pandemic.

Curr Pain Headache Rep. 2021;25(8):53.
24. Goadsby PJ, Holland PR, Martins-Oliveira M, Hoffmann J, Schankin C, Akerman S. Pathophysiology of migraine: a disorder of sensory processing. Physiol Rev. 2017;97(2):553–622.
25. Blake P, Burstein R. Emerging evidence of occipital nerve compression in unremitting head and neck pain. J Headache Pain. 2019:20(1);76.
26. Or PP, Chung JW, Wong TK. A study of environmental factors affecting nurses' comfort and protection in wearing N95 respirators during bedside procedures. J Clin Nurs. 2018;27(7–8):e147784.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8573

GMHC. 2022;10(1):13–17
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Religiosity and Stress on Nurses during COVID-19 Pandemic at a Hospital in Bandung

Siska Nia Irasanti,[1] Rizki Perdana,[2] Dhian Indriasari,[3] Yuniarti Yuniarti,[2] Ahmad Kamil,[4] Wellisna Merduani[4]

[1]Department of Public Health, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [2]Department of Anatomy, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [3]Department of Mental Health Science, Al-Ihsan Regional General Hospital West Java Province, Bandung, Indonesia, [4]Medical Undergraduate Study Program, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia

Abstract

The problem of the coronavirus disease 2019 (COVID-19) pandemic has resulted in changes in various aspects of life, primarily related to health services. All health workers involved in handling COVID-19 are likely to experience psychological pressure in treating COVID-19 patients with an increasing number of patients. The correlation between religiosity is expected to guide an individual in interacting in the work environment, including in health services and managing stress on nurses. This study aimed to analyze the correlation between religiosity and stress at work during the COVID-19 pandemic in nurses. This research is an observational analytic with a cross-sectional approach. Primary data was obtained from a questionnaire to 78 nurses in the COVID-19 ward at a hospital in Bandung in August 2021. The Pearson correlation test analysis results showed a significant correlation between religiosity and stress. Religious maturity can influence a person's level of mental maturity. It can give a feeling of peace in the heart so that a person can avoid feeling restless and anxious about the problems faced without stress.

Keywords: Nurse, religiosity, stress

Introduction

The problem of the 2019 coronavirus disease (COVID-19) pandemic is still unresolved and even confirmed cases of this virus are increasing. It resulted in changes in various aspects of life, primarily related to health services. All health workers involved in handling COVID-19 are likely to experience psychological pressure because they are overwhelmed in caring for the increasing number of COVID-19 patients.[1–3] Various types of psychological disorders have been found in the community, especially in medical personnel.[1–3] During the COVID-19 pandemic, one type of psychological disorder is stress. Many factors can cause a person to experience anxiety, including a heavy workload, excessive fear of being infected with COVID-19, worrying about the negative stigma of virus carriers in the community, and being away from family when exposed to COVID-19.[4–6] High levels of stress result in staff burnout and turnover and adversely affect patient care. Interventions targeted at sources of occupational stress seem to be required to support nurses.[7]

A person's health is not only related to physical health. Mental health also requires special attention because these mental health disorders have a broader and longer impact than physical health disorders.[4] Previous research results reported a significant psychological burden on health workers amid an infection outbreak similar to the COVID-19 pandemic. The psychological burdens include anxiety, depression, panic attacks, or psychotic symptoms.[6,8] Previous research has also reported that major disasters can result in mental disorders that have adverse effects. It is more significant and prolonged than physical conditions. However, attention to the prevention and treatment of mental disorders is still minimal in human resources planning and resources.[9]

According to Andriyani,[10] religious maturity can show a person's level of mental maturity. It can give birth to a feeling of peace in the heart so that a person can avoid feeling restless and anxious about the problems being faced or about the future that will be met later. Regarding the future, someone who has religious maturity, especially followers of Islam, will be sure about the

Received: 30 September 2021; Revised: 23 February 2022; Accepted: 20 April 2022; Published: 30 April 2022

Correspondence: Yuniarti, drg., M.Kes. Department of Anatomy, Faculty of Medicine, Universitas Islam Bandung. Jln. Tamansari No. 22, Bandung 40116, West Java, Indonesia. E-mail: candytone26@gmail.com

existence of *qadha* and *qadar*, so that whatever happens after someone makes a maximum effort is the best decision for him.

Religiosity must be applied in various aspects of life. It means that it is not only done by someone when carrying out worship activities to Allah Swt. alone but also when doing worldly work or when interacting socially with fellow human beings.[11] Religiosity is a religious belief of an individual as a basis for him to implement the good of spiritual values in all aspects of his life.[12] In other words, a Muslim with monotheism at least has a side of himself as *abdullah* (servant of Allah Swt.) and has a vertical attachment between creatures and their creators. It does not stop here. A Muslim must also be able to have social sensitivity and be able to read the surrounding environment so that he can act as *khalifatullah fil ard* (representative of Allah Swt. on earth) who uses the abilities given to prosper the world.[13]

The study hospital is a type B referral hospital in Bandung that, as of February 25, 2021, treated 8,373 confirmed cases of COVID-19. The rooms used for treating COVID-19 patients are six units with 191 treatment beds and have a total number of 177 nurses. These data indicate the possibility of a high workload and anxiety for health workers, especially nurses in the COVID-19 patient care room. This study aims to analyze the relationship between religiosity and stress at work during the COVID-19 pandemic in nurses.

Methods

This research is an analytic observational study with a cross-sectional research design that measures the independent and dependent variables simultaneously. The stress data taken is primary data in the form of a modified Chinese Health Questionnaire (CHQ) by Tayyib and Alsolami[14] and questionnaire religiosity from another research.[15] Socialization, informed consent, and questionnaire validation were carried out before the study was conducted. This study used the total population, but only 78 people met the inclusion and exclusion criteria. The inclusion criteria for research subjects were employees <40 years old, willing to be research subjects, having internet access, and being able to use Google Forms. Exclusion criteria for research subjects were having a history of mental illness such as schizophrenia and not being Muslim. Each research subject will be accompanied while filling out the online questionnaire. The independent variable of this research is stress. The dependent variable of this research is religiosity.

The stress level will group stress data, measured using a modified CHQ for use in the COVID-19 pandemic.[14] The questionnaire uses 14 questions and uses a Likert scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: always).

The religiosity data will be grouped based on the level of religiosity. Questionnaire questions are made based on four dimensions of religiosity, namely belief (*aqidah*), religious practice (worship), practice (morals), and appreciation (*ihsan*). The questions are 40 questions and each dimension consists of 10 questions and uses a Likert scale (1: strongly disagree1, 2: disagree, 3: disagree, 4: agree, 5: strongly agree). The final score varies from 0 to 100. Scores above the median will be classified into the high religiosity group, and those below and equal to the median will be classified as low religiosity.[15]

The primary data obtained were then processed and analyzed by the researcher—data analysis using the Pearson correlation test.

Results

Table 1 shows that the average value of religiosity at work during the COVID-9 pandemic for nurses was 85.74, and the median value was 89.37. It shows that the religiosity of nurses is still low because the average value of religiosity is below the median value.

Table 1 also seen that the average stress value at work during the COVID-9 pandemic for nurses at a hospital in Bandung was 44.16, and the median value was 42.85. It shows that nurses have stress because the average stress value is above 37.3.

The 95% CI result showed a significant correlation between the value of religiosity and stress at work during the COVID-19 pandemic on nurses with a p value=0.001 with a correlation strength of 0.62. It indicates a strong correlation with a negative direction, indicating that the higher value of religiosity makes the stress value lower at work during the COVID-19 pandemic in nurses thus otherwise.

Table 2 shows that nurses, 72% with high levels of religiosity mainly experienced no stress at work during the COVID-19 pandemic. While nurses with low levels of religiosity mainly experienced stress with high levels of 69%.

Table 1 Characteristics and Correlation between Religiosity and Stress of Research Subjects

Variables	Mean (SD)	Median (Min–Max)	p	Correlation Strength
Religiosity	85.74 (12.90)	89.37 (58.13–100)	0.001	0.62*
Stress	44.16 (17.77)	42.85 (10.71–100)		

Note: *with negative direction

Table 2 Correlation Religiosity Level with Stress at Work during Pandemic COVID-19 of Research Subjects

Religiosity	No Stress		Stress		Total		p
	n=42	%	n=36	%	n=78	%	
High	31	72	12	28	43	100	0.001
Low	11	31	24	69	35	100	

Note: *chi-square test, p<0.05 significant

The Chi-square test analysis results at a 95% CI show that statistically, there is a significant relationship between religiosity and stress during the COVID-19 pandemic on nurses with a p value=0.001.

Discussion

Religiosity is a comprehensive unity of elements, which makes a person called a religious person (being religious), not just claiming to have a religion (having religion). Religiosity includes spiritual knowledge, religious beliefs, the practice of religious rituals, religious experience, religious behavior (morality), and socio-religious attitudes. In Islam, religiosity is broadly reflected in the practice of *aqidah*, sharia, and morals, or in other words: faith, Islam, and *ihsan*.[16] Religiosity is a form of the human relationship with its creator through religious teachings internalized within a person and reflected in daily attitude and behavior.[17]

Table 1 shows that the average value of religiosity at work during the COVID-9 pandemic for nurses in Bandung is still low. Religiosity is a dynamic phenomenon in which individuals have a high level of religiosity and a low level of religiosity.[18] Two factors influence religiosity, including internal and external factors. Internal factors include heredity, age, personality, and psychological conditions, while external factors include family, school, and community.[19]

Stress is an uncomfortable condition experienced by individuals, and these conditions interfere with thoughts, emotions, actions, or behavior in everyday life or the job in question.[20] Stress that comes from and is related to everything in the work environment is usually called work stress. Individuals who experience work stress can affect the implementation of tasks and individual performance resulting from ineffective conditions and feeling required to complete work better.[21]

The results in Table 1 show that nurses at a hospital in Bandung experienced stress at work during the COVID-19 pandemic. COVID-19 has caused changes in various sectors of life. It has caused many problems, such as a decline in mental health.[22] Daily stress, compared to traumatic events, is a predictor factor affecting mental health more. A prolonged physiological stress response is a risk factor leading to disease. Psychological work stress during the COVID-19 pandemic that most of the respondents experienced was feeling pressured due to working in stressful situations, feeling insecure to complete work, feeling afraid of contracting COVID-19 at work, and feeling dissatisfied with the outcome.[23]

Health workers are at high risk of experiencing mental problems in the form of mild to severe stress due to the various pressures they have to face. Fear of the increased risk of being exposed, infected, and possibly infecting their loved ones is also a burden. Working amid intense media

and public attention, long, massive, and perhaps unprecedented work duration for some health workers has additional implications in triggering adverse psychological effects in the form of stress. Stigmatization in society that makes medical personnel look like carriers of the virus can also trigger stress for medical personnel.[24]

The results show that the higher the religiosity value, the lower the stress value during the COVID-19 pandemic on nurses. The study also indicates a statistically significant relationship between the level of religiosity and stress in the workplace during the COVID-19 pandemic on nurses. The results of this study are in line with the results of the research of Utama and Surya,[25] which stated that religiosity has a negative relationship with work stress. In other words, the higher the value of religiosity the lower the stress value at work. The results of this study are also in line with Bashori and Meiyanto's[26] research, which states that the higher the level of one's religiosity in dealing with problems, the lower the stress level in dealing with work problems. Since religiosity increases a person's ability to overcome tension due to the difficulties one faces, individuals who have a high level of religiosity will be able to take their religious values to be used in solving problems or managing unstable emotional conditions as a result of stressful events.[27]

Conclusion

There is a correlation between religiosity and stress at work during the COVID-19 pandemic on nurses in Bandung.

Conflict of Interest

There is no conflict of interest in this research.

Acknowledgments

The researcher would like to compliment all leaders and nurses at RSUD Kota Bandung.

References

1. Satuan Tugas Penanganan COVID-19. Situasi virus COVID-19 di Indonesia [Internet]. Jakarta: Satuan Satuan Tugas Penanganan COVID-19; 2020 [cited 2020 December 20]. Available from: https://covid19.go.id/situasi.
2. World Health Organization. Archived: WHO Timeline - COVID-19 [Internet]. Geneva: World Health Organization; 2020 [cited 2020 December 25]. Available from: https://www.who.int/news/item/27-04-2020-who-timeline---covid-19.
3. Hamdi I, Silaban MW. Rumah sakit rujukan overload, pemerintah diminta serius tekan penularan Covid-19. Tempo.co [Internet]. 2020 August 12 [cited 2021 January 31]. Available from: https://metro.tempo.co/read/1374996/rumah-sakit-rujukan-overload-pemerintah-diminta-serius-tekan-penularan-covid-19.
4. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, et al. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. Med Sci Monit. 2020;26:e924171.
5. Moghanibashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. Asian J Psychiatr. 2020;51:102076.
6. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. J Nurs Manag. 2020;28(5):1002–9.
7. Moustaka E, Constantinidis TC. Sources and effects of work-related stress in nursing. Health Sci J. 2010;4(4):210–6.
8. Huang C, Wang Y, Li X, Ren L, Zhao J, Zang L, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497–506.
9. Allsopp K, Brewin CR, Barrett A, Williams R, Hind D, Chitsabesan P, et al. Responding to mental health needs after terror attacks. BMJ. 2019;366:l4828.
10. Andriyani J. Terapi religius sebagai strategi peningkatan motivasi hidup usia lanjut. J Al-Bayan. 2013;19(2):31–42.
11. Umar M. Urgensi nilai-nilai religius dalam kehidupan masyarakat heterogen di Indonesia. J Civic Educ. 2019;3(1):71–7.
12. Manurung S. Islamic religiosity and development of zakat institution. QIJIS. 2013;1(2):197–210.
13. Saputro I.W. Konsep tauhid menurut Abdul Karim Amrullah dan implikasinya terhadap

tujuan pendidikan Islam. At-Ta'dib. 2016;11(2):259–84.
14. Tayyib NA, Alsolami FJ. Measuring the extent of stress and fear among registered nurses in KSA during the COVID-19 outbreak. J Taibah Univ Med Sci. 2020;15(5):410–6.
15. Prasetyo H, Anitra V. Pengaruh religiusitas terhadap kinerja karyawan: studi pada tenaga kependidikan Universitas Muhammadiyah Kalimantan Timur. BSR. 2020;2(1):705–13.
16. Fitriani A. Peran religiusitas dalam meningkatkan psychological well being. Al-Adyan. 2016;11(1):57–80.
17. Mayasari R. Religiusitas Islam dan kebahagiaan (sebuah telaah dengan perspektif psikologi). Al-Munzir. 2014;7(2):81–100.
18. Warsiyah. Pembentukan religiusitas remaja muslim (tinjauan deskriptif analitis). Cendekia. 2018;16(1):19–40.
19. Rahmawati HK. Kegiatan religiusitas masyarakat marginal di Argopuro. Community Dev. 2016;1(2):35–52.
20. Muslim M. Manajemen stress pada masa pandemi Covid-19. Esensi. 2020;23(2):192–201.
21. Yudra FO, Fikri, Hidayat A. Hubungan antara religiusitas dengan stres kerja pada anggota Brimob Polda Riau. An-Nafs. 2018;12(1):12–21.
22. Rajkumar RP. COVID-19 and mental health: a review of the existing literature. Asian J Psychiatr. 2020;52:102066.
23. Yupartini L, Rustiawati E, Sulastri T. Stres kerja dengan perilaku caring petugas kesehatan dalam penanganan pasien pada masa pandemi Covid-19. JKS. 2021;4(2):683–9.
24. Handayani RT, Kuntari S, Darmayanti AT, Widiyanto A, Atmojo JT. Faktor penyebab stres pada tenaga kesehatan dan masyarakat saat pandemi Covid-19. JKJ. 2020;8(3):353–60.
25. Utama IKAB, Surya IBK. Pengaruh religiusitas, adversity quotient dan lingkungan kerja non fisik terhadap stres kerja. E-J Manaj. 2019;8(5):3138–65.
26. Bashori MF, Meiyanto IJKS. Peran job insecurity terhadap stres kerja dengan moderator religiusitas. Gama JoP. 2017;3(1):25–36.
27. Darmawanti I. Hubungan antara tingkat religiusitas dengan kemampuan dalam mengatasi stres (coping stress). J Psikol Teori Terap. 2012;2(2):102–7.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8609

GMHC. 2022;10(1):18–27
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Validation of the Cadre's Satisfaction of the *Posyandu Lansia* Questionnaire

Shahla Trisa Aufa,[1] Sharon Gondodiputro,[2] Neneng Martini[2]
[1]Faculty of Medicine, Universitas Padjadjaran, Sumedang, Indonesia,
[2]Department of Public Health, Faculty of Medicine, Universitas Padjadjaran, Sumedang, Indonesia

Abstract

Integrated health post for elderly/*posyandu lansia* is one of the community empowerment actions in improving the quality of life of the elderly. The role of cadres in managing the *posyandu lansia* is significant and is influenced by motivational factors that will cause satisfaction or dissatisfaction at work. A qualitative study in Bandung succeeded in exploring the components of satisfaction based on Herzberg's theory. Until now, no questionnaires have been developed to measure the satisfaction of *posyandu lansia* cadres. This study aims to set up and validate the satisfaction questionnaire for *posyandu lansia* cadres. A cross-sectional study was conducted on 200 cadres taken by multistage sampling in Bandung, West Java, Indonesia, from October to November 2020. Fifty-four items consisting of 19 motivator factor items and 35 hygiene factor items were tested for validity using the Pearson product-moment correlation coefficient, exploratory factor analysis, and communalities test. In addition, a reliability test was carried out using Cronbach's alpha. The results showed that 16 of 54 items did not meet the requirements, consisting of 5 items from motivator factors and 11 from hygiene factors. The dimensions of the motivator factors changed from 6 dimensions to 4 dimensions, and the dimensions of hygiene factors changed from 8 dimensions to 9 dimensions. It concluded that a new questionnaire on the satisfaction of *posyandu lansia* cadres has been compiled and can be used to measure the level of satisfaction of cadres. However, further studies need to be carried out involving various regions in Indonesia.

Keywords: Herzberg's theory, *posyandu lansia*, satisfaction

Introduction

Integrated health post for the elderly (*posyandu lansia*) is community support to enhance the quality of life of the elderly.[1] It is developed by the local community and run by community health workers/cadres.[1] Cadre is selected from the community where the elderly live. They know the elderly well, the community cultures, and the languages used.[2] They have been trained some tasks and performed them as unpaid volunteers.[2] The roles of cadres include health promotion, health education, some basic health services, and the collection of health data.[2,3] They involve in activities both within the community and linked to the public health center/*puskesmas* they are connected.[2–4] In Indonesia, there are 100,740 *posyandu lansia* distributed in the provinces, mainly in West Java, Central Java, East Java, and South Sumatera.[5,6]

The cadre's satisfaction places an essential factor in the continuity of the *posyandu lansia*.[7] Herzberg[8] mentioned that motivator and hygiene factors are contributed to work satisfaction.[9] Motivator factors are factors that come from the person his/herself (intrinsic factors) that produce work satisfaction and consist of 5 dimensions: 1) achievement, 2) recognition, 3) the work itself, 4) possibility for growth, and 5) responsibilities. On the other hand, hygiene factors are factors that come from the work environment (extrinsic factors) that reduce dissatisfaction and consist of 7 dimensions: 1) policies and administration, 2) supervision, 3) interpersonal relationships, 4) incentives, 5) personal life, 6) working conditions, and 7) status.[8,9] A qualitative study conducted in Bandung city, Indonesia revealed two new dimensions from each Herzberg's two-factor theory. Practicing religious teachings was a new dimension of the motivator factors found in this study.[10] The respondents were Moslems and stated that they worked sincerely (*ikhlas*), believing that becoming a cadre was worship (*ibadah*), and made this work as a saving for the afterlife (*akhirah*).[10] Social relations emerged as a new dimension of hygiene factors. The

Received: 11 October 2021; Revised: 31 March 2022; Accepted: 20 April 2022; Published: 30 April 2022

Correspondence: Sharon Gondodiputro, dr., M.A.R.S., M.H. Department of Public Health, Faculty of Medicine, Universitas Padjajaran. Kampus Jatinangor. Jln. Ir. Soekarno km 21, Jatinangor, Sumedang 45363, West Java, Indonesia. E-mail: sharon_gondodiputro@yahoo.com

respondents stated that being cadres, they had more opportunities to meet their community, made new friends, and were very happy if they could help others, so that one day if they needed help, the community could help them.[10]

Policy generated from evidence needs to be carried out to improve the *posyandu lansia*. One of the pieces of evidence that should be collected is the measurement of the cadre's work satisfaction. In doing so, a questionnaire should be developed and validated. The study's objectives were to develop and validate the cadre's work satisfaction at the *posyandu lansia*.

Methods

A cross-sectional study was conducted in Bandung city, Indonesia, from October to December 2020. Bandung city is the capital of West Java province and is divided into six administrative regions and has 80 *puskesmas*. *Puskesmas* is one of the primary health facilities responsible for the health of the community they serve, among others, the health of the elderly. Moreover, *puskesmas* have the responsibility to enhance the skills of the cadres to perform some tasks they are expected to do. From each region, one *puskesmas* was selected by simple random sampling. The researchers collected data of the cadres from the *puskesmas* chosen that met the inclusion and exclusion criteria. The inclusion criteria were: (1) For more than one year, they were cadres and are still active as cadres; (2) They could operate a mobile phone; (3) They had Whatapps web; (4) Willing to participate in this study. Moreover, the exclusion criteria were cadres who did not fill out the questionnaire in Google Form. After the number of cadres who met the requirements was gathered, a proportionate sampling was carried out from each *puskesmas* to collect 200 participants.[11]

The six dimensions of the motivator factor were: (1) Achievement: the success in cadre work; (2) Recognition: obtaining an appreciation for the accomplishment of the work as a cadre; (3) The work itself: an activity or a task that gives a positive or negative feeling; (4) Possibility for growth: opportunities to develop themselves and improve knowledge/skills/expertise; (6) Responsibilities: the obligation to carry out the work.[10]

Moreover, hygiene factors consisted of eight dimensions and 26 categories.[10] The eight dimensions of hygiene factors were: (1) Policies and administration work from the *puskesmas* and local government: policies or rules and administrative system given by *puskesmas* and local government to cadres in providing services in the *posyandu lansia*; (2) Supervision: supervising and guiding the cadre in providing service in the *posyandu lansia*; (3) Interpersonal relationships: the communication bond between cadres and the supervisors from *puskesmas* and the local government; (4) Incentives: wages or salaries given to the cadre; (5) Personal life: the condition of the private life of cadres affecting their work as cadres; (6) Working conditions: an environment is affecting cadres in providing services in the *posyandu lansia*; (7) Status: cadre position in the community; (8) Social relations: help the community, socialize with the community, and make new friends.

The researchers set up a questionnaire from the theoretical construct and established that 54 items consisted of 19 items that contributed to motivator factors and 35 contributed to hygiene factors. Each item was scored with a Likert scale from 1 to 4 (strongly disagree, disagree, agree, and strongly agree). After establishing the questionnaire, a pre-testing was carried out on 23 cadres as the target population of this study. This pre-testing aimed to identify the clarity of the language used, the relevance to the theoretical construct revealed without changing the initial meaning of the concepts, and the possible suggestions to improve the question phrase. The researchers decided to perform the pre-testing twice. The first pre-testing was conducted on 13 cadres who came to the meeting location and met the inclusion and exclusion criteria. One of the researchers explained the aim of the study and the questionnaire. The cadres read each item carefully and gave inputs. From this first pre-testing, only two items from the motivator factors should be revised.

Those were

*"I can socialize with my fellow cadres and the community so that it can prevent my aging process (*Saya dapat bersosialisasi dengan sesama kader dan masyarakat sehingga dapat mencegah proses penuaan*)"*

to

*"I can socialize with my fellow cadres and the community so that it can delay my aging process (*Saya dapat bersosialisasi dengan sesama kader dan masyarakat sehingga dapat memperlambat

proses penuaan*)"*
and
*"I became smarter compare with other community members (*Saya menjadi lebih pintar dibanding dengan anggota masyarakat lainnya*)"*
to
*"I know better compare with other community members (*Saya menjadi lebih tahu dibanding dengan anggota masyarakat lainnya*)."*

The second pre-testing was held with ten cadres whose location and members differed from the first group. The second pre-testing was expected to reassure that the items were understood and could be answered easily. The cadres gave no inputs anymore since they understood the items very well. The proposed questionnaire was discussed among the researchers to obtain the final questionnaire. Due to the COVID-19 pandemic, the questionnaire was designed in a Google Form and linked via Whatsapp.

The reliability and validity testing was conducted on 200 cadres from 6 *puskesmas* in Bandung city. Every *puskesmas* had a different number of total cadres. The number of the cadres selected from each *puskesmas* was calculated proportionately. Every cadre who met the inclusion criteria was selected until the required sample size was achieved. Demographic data consisted of age, religion, education level, marital status, occupation, cadre status, and years being a cadre. The age category was divided into six categories: 20–30 years, 31–40 years, 41–50 years, 51–60 years, 61–70 years, and 71–80 years. Religion was divided into two categories: Moslem and non-Moslem. Education level was divided into three categories: junior high school and below, high school or equivalent, and higher education. Marital status was divided into four categories: unmarried, married, widow divorced, and widow partner had died. Occupation is divided into two categories, namely no and yes. Cadre status is divided into two categories: only as *posyandu lansia* cadres and as *posyandu lansia* and children cadres; and years being a cadre are divided into three categories: 1–5 years, 6–10 years, and >10 years. The collected data were processed and tested using SPSS version 22.0. Demographic data were presented in percentages. Pearson's correlation was employed to analyze the construct validity. This coefficient is a number between −1 and 1. The r values are distributed as follows: r=0.0–0.29, negligible correlation; r=0.3–0.49, low correlation; r=0.5–0.69, moderate correlation; r =0.7–0.89, high correlation; r=0.9–1.0, very high correlation.[12] To test the validity, the results were evaluated using the critical value table of the Pearson product-moment correlation coefficient. We used df 198 (200 samples minus 2), r count>0.138), p value<0.05.[13] The Kaiser-Meyer-Olkin (KMO) index for sampling adequacy and Bartlett's test for sphericity were used to verify the suitability of the application of exploratory factor analysis (EFA) for the collected data. The recommended value of the KMO index is equal to or above 0.6, and Bartlett's test of sphericity is significant at $\alpha<0.05$.[14] with exploratory factor analysis was conducted. It adopted the varimax rotation method in a correlation matrix composed of 19 items of motivator factors and 35 items of hygiene factors (a total of 54 items). The commonalities test was conducted to test the unidimensionality of the items. Communalities define that the items are well explained. The value should equal to or above 0.3–0.5.[14] However, according to the previous study, the dimensions had already been set up for six dimensions of motivator and eight dimensions of hygiene factors. The number of dimensions was confirmed by assessing the scree plot, employing question retention through the Kaiser-Guttman criterion of the components with eigenvalues higher than 1. The reliability test used in this study was Cronbach's alpha, which Lee Cronbach developed in 1951. It provides a measure that describes the extent to which all the items in a test measure the same concept or construct (internal consistency) or stable and consistent result.[15,16] It also describes the inter-relatedness of the items within the test.[15] No absolute rules exist for internal consistencies. Some experts suggest cut-off points for reliability are unacceptable: $\alpha<0.5$, poor: $0.5\leq\alpha<0.6$, questionable: $0.6\leq\alpha<0.7$, acceptable: $0.7\leq\alpha<0.8$, good: $0.8\leq\alpha<0.9$, and excellent: $\alpha\geq0.9$.[17] However, for a pilot study, it is suggested that reliability should be equal to or above 0.60.[16]

This study was approved by the Health Research Ethics Committee, Universitas Padjadjaran, Bandung, Indonesia, number: 776/UN6.KEP/EC/2020.

Results

The cadres comprised 200 subjects, and their backgrounds are described in Table 1. All cadres

Table 1 Characteristics of the Participants

Characteristics	n=200	%
Age group (years)		
20–30	5	2.5
31–40	23	11.5
41–50	76	38.0
51–60	64	32.0
61–70	27	13.5
71–80	5	2.5
Religion		
Moslem	199	99.5
Non-moslem	1	0.5
Education		
Junior high school and below	32	16
High school	120	60
Higher education	48	24
Marital status		
Single	1	0.5
Married	166	83.0
Widow (divorced)	5	2.5
Widow (partner died)	28	14.0
Occupation		
No	177	88.5
Yes	23	11.5
Cadre status		
Only as posyandu lansia cadre	58	29
As posyandu lansia and children cadre	142	71
Work as a cadre (years)		
1–5	101	50.5
6–10	58	29.0
>10	41	20.5

were female and of their productive age, although a small percentage of the elderly became cadres. Most of the cadres had a high school education, and they were housewives. This study discovered that they were not only *posyandu lansia* cadres but also *posyandu* for children cadres.

The Pearson correlation test was conducted on all items. This study discovered that 53 of 54 items (98.15%) had r count>r table. Moreover, 94.4% had equal to or above moderate correlation. Three items had a correlation coefficient below 0.5. Those were M6, H2, and H5 (Table 2).

The KMO index for motivator factors was 0.843, and Bartlett's test was significant at $\alpha<0.001$ (approx. chi-square=1468.746). This result was similar to the hygiene factors. The development of the KMO index for hygiene factors was 0.871, and Bartlett's test was significant at $\alpha<0.001$ (approx. chi-square=3465.747). Based on the KMO index and Bartlett's test, the unidimensionality test of the questionnaire was conducted through commonality, employing the principal component method. Table 3 exhibits the items and communality value for each item.

Items M6, M10, M11, M14, and H2, presented communality lower than 0.5. On the other hand, the others revealed a value higher than 0.5. After the commonality analysis, the component matrix was verified. Employing the principal component analysis as the extraction method and the varimax rotation method with Kaiser normalization, dimensions of the motivator factors went from 6 dimensions initially to 4 dimensions, and dimensions of the hygiene factors went from 8 dimensions to 9 dimensions. Moreover, the items of motivators elements have moderate to high correlation, but some themes of hygiene factors had low correlation (H2, H6, H11, H12, H21, H22, H23, H26, H27, and H34). Table 4 displays this analysis.

The internal consistency (Cronbach's alpha) ranged from −0.368 to 0.84 for the dimensions of the motivator factors, with the overall score being 0.841. Recognition, the work itself, and personal growth were the dimensions that did not meet the recommended 0.60 or higher. After M13 was deleted, the internal consistency of personal growth increased from 0.514 to 0.663. The internal consistency (Cronbach's alpha) ranged from −0.195 to 0.884 for the dimensions of the hygiene factors, with the overall score being 0.899. Policies and administration, incentives, and work conditions were the dimensions that did not meet the recommended of 0.60 or higher. After H2 was deleted, the internal consistency of policies and administration dimension increased from 0.434 to 0.609 (Table 5). After testing its validity and reliability, some dimensions and items were deleted from the questionnaire.

Table 6 displays the final dimensions and items. M6, M10, M11, M13, and M14 were deleted from the questionnaire. M6 did not meet the recommended value of the coefficient correlation and commonalities, and if deleted, the Cronbach's alpha of the recognition dimension increased from 0.306 to 0.402. M10, M11, and M14 did not meet the recommended value of commonalities (equal to or higher than 0.5). Moreover, if M13 was deleted, the Cronbach's alpha of the personal growth dimension increased from 0.514 to 0.663.

Table 2 Pearson Correlation Coefficient

Items	r	p
A Motivator factors		
1 Achievement		
M1 My *posyandu lansia* becomes a role model for other *posyandu lansia*	0.822	<0.001
M2 There are so many elderlies who come to my *posyandu lansia*	0.767	<0.001
M3 The elderly become healthy	0.693	<0.001
M4 My *posyandu lansia* joins a competition	0.751	<0.001
2 Recognition		
M5 Thank you note from the community makes me feel rewarded	0.729	<0.001
M6 I didn't expect any awards	0.462	<0.001
M7 I feel more motivated when I get an award in the form of goods such as uniforms	0.726	<0.001
3 The work itself		
M8 I am happy and proud to be able to help the community	0.598	<0.001
M9 Although being a cadre is a tiring job because there are many activities and many reports to do	0.698	<0.001
4 Possibility for growth		
M10 I can apply the knowledge and skills I have	0.603	<0.001
M11 I can socialize with fellow cadres and the community so it delays my aging process	0.710	<0.001
M12 I can improve my knowledge and skills	0.662	<0.001
M13 I know better compared to other members of the community	0.638	<0.001
5 Responsibilities		
M14 I am responsible for persuading the elderly to come to *posyandu lansia*	0.771	<0.001
M15 I want to help people to be healthy	0.810	<0.001
M16 A cadre has to carry out activities at the *posyandu lansia*	0.746	<0.001
6 Practicing religious teaching		
M17 I carry out activities at *posyandu lansia* sincerely	0.877	<0.001
M18 The job of the cadre is to worship	0.910	<0.001
M19 Helping the community is a saving for the life after	0.825	<0.001
B Hygiene factors		
1 Policies and administration work		
H1 Although the tasks and reports that I must do are a burden for me	0.592	<0.001
H2 Among cadres always share works so that the works and the reports that should be made can be finished quickly	0.304	<0.001
H3 Although the programs at *posyandu lansia* are constantly changing	0.770	<0.001
H4 Although the report formats change frequently	0.731	<0.001
2 Supervision		
H5 Although *puskesmas* staff rarely attend *posyandu lansia*	0.123	0.082
H6 *Puskesmas* officers guide the *posyandu lansia*	0.598	<0.001
H7 I can attend seminars or meetings to gain insight and exchange ideas	0.768	<0.001
H8 As a cadre, I have the opportunity to take part in various training	0.668	<0.001
H9 The head of the hamlet guides the *posyandu lansia*	0.625	<0.001
H10 Village officers guide the *posyandu lansia*	0.745	<0.001
3 Interpersonal relation		
H11 The relationship with the *puskesmas* staff is very close and good	0.745	<0.001
H12 Good support from the hamlet and village officers	0.664	<0.001
H13 I and other cadres always help each other	0.768	<0.001
H14 The cadres are very solid in their work	0.813	<0.001
H15 The relationship between cadres makes me comfortable to work at the *posyandu lansia*	0.810	<0.001
H16 The relationship between the cadres is very close	0.817	<0.001
H17 I know the character of each other cadre so I can communicate well	0.779	<0.001
4 Incentives		
H18 Although there aren't any incentives	0.669	<0.001
H19 Incentives can increase my motivation to work as a cadre	0.681	<0.001
5 Personal life		
H20 My family supports me to become a cadre	0.666	<0.001
H21 I can fill my daily activities as a cadre so I don't get bored at home	0.682	<0.001
H22 My health conditions are one of the factors that keep me as a cadre	0.722	<0.001
H23 I have a lot of free time to work as a cadre	0.674	<0.001
H24 Financial need is not my reason to stop being a cadre	0.667	<0.001
H25 Taking care of my family is not an excuse for me to stop being a cadre	0.688	<0.001
H26 Age is a consideration for me to remain as a cadre	0.520	<0.001
6 Working conditions		
H27 *Posyandu lansia* schedule does not burden me	0.715	<0.001
H28 The facilities at *posyandu lansia* are adequate for the success of my work as *posyandu lansia* cadre	0.881	<0.001
7 Status		
H29 I am more trusted by the community	0.805	<0.001
H30 I became more known by the community	0.867	<0.001
H31 I became a community leader in my environment	0.824	<0.001
8 Social relation		
H32 I can help the community, for example when someone is sick I can take her/him to the health center	0.694	<0.001
H33 I can chat, laugh together and share feelings both among cadres and the elderly	0.798	<0.001
H34 I get to know a lot of people	0.820	<0.001
H35 I can make new friends	0.822	<0.001

Note: M1–M19: code number of motivator factors; H1–35: code number of hygiene factors; r: correlation coefficient

Table 3 Communalities of 54 Items

Items of Motivators Factors	Communalities	Items of Hygiene Factors	Communalities
M1	0.649	H1	0.587
M2	0.714	**H2**	**0.453**
M3	0.596	H3	0.801
M4	0.502	H4	0.636
M5	0.517	H5	0.578
M6	**0.441**	H6	0.610
M7	0.692	H7	0.768
M8	0.543	H8	0.808
M9	0.617	H9	0.653
M10	**0.372**	H10	0.682
M11	**0.456**	H11	0.636
M12	0.552	H12	0.728
M13	0.536	H13	0.777
M14	**0.421**	H14	0.762
M15	0.613	H15	0.796
M16	0.659	H16	0.823
M17	0.704	H17	0.643
M18	0.642	H18	0.543
M19	0.709	H19	0.685
		H20	0.613
		H21	0.620
		H22	0.627
		H23	0.563
		H24	0.685
		H25	0.709
		H26	0.532
		H27	0.573
		H28	0.534
		H29	0.713
		H30	0.736
		H31	0.699
		H32	0.655
		H33	0.680
		H34	0.716
		H35	0.764

Hygiene factors had 11 items that were considered to be deleted, which are H2, H5, H6, H11, H12, H21, H22, H23, H26, H27, and H34. H2 did not meet the recommended value of the coefficient correlation and commonalities, and if deleted, increased the Cronbach's alpha of the policies and administration dimension from 0.434 to 0.609. H5 did not meet the recommended coefficient correlation value and, if deleted, can increase the Cronbach's alpha of the supervision dimension from 0.617 to 0.759. The item of H6, H11, H12, H21, H22, H23, H26, H27, and H34 did not meet the recommended value of the coefficient correlation.

Based on the results, the motivators factors consisted of four dimensions: achievement, recognition, the work itself, and responsibilities, with 14 items. Moreover, hygiene factors consisted of 9 dimensions: policies, administration work, supervision, interpersonal relation, incentives, personal life, working conditions, status, and social relation with 24 items.

Discussion

Millions of community health workers/cadres

Table 4 Principal Component Analysis of the Motivator and Hygiene Factors

Dimension of Motivators Factors					Dimension of Hygiene Factors									
Items	**1**	**2**	**3**	**4**	**Items**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
M1		0.751			H1				0.652					
M2		0.820			H2	**0.462**								
M3		0.562			H3									0.775
M4		0.671			H4				0.673					
M5		0.677			H5				0.697					
M6	0.518				H6							0.495		
M7			0.811		H7							0.695		
M8	0.586				H8							0.838		
M9				0.717	H9			0.747						
M10	0.569				H10			0.710						
M11	0.614				H11	**0.486**								
M12	0.717				H12			**0.480**						
M13			0.605		H13	0.731								
M14	0.562				H14	0.800								
M15	0.754				H15	0.765								
M16	0.588				H16	0.855								
M17	0.836				H17	0.707								
M18	0.801				H18				0.615					
M19	0.721				H19								0.772	
					H20						0.500			
					H21	**0.484**								
					H22					**0.412**				
					H23					**0.471**				
					H24					0.749				
					H25					0.758				
					H26		**0.452**							
					H27	**0.494**								
					H28			0.615						
					H29		0.767							
					H30		0.813							
					H31		0.742							
					H32						0.684			
					H33						0.704			
					H34	**0.496**								
					H35	0.644								

worldwide help people and communities become healthy and improve their quality of life.[18] The cadres are an important force for preventing diseases, promoting healthy behaviors, and extending the reach of health systems, especially in hard-to-reach areas, narrowing the health equity gap.[2] Most of the cadres work as unpaid volunteers.[2] According to other studies, volunteerism is defined as "a non-spontaneous aid activity, in which the individual providing the assistants is active in finding opportunities to help others, committing to sacrifice time, effort and material within a certain timeframe."[19,20] Being a volunteer has a positive advantage. Volunteer activities can improve volunteers' physical and mental health.[18] However, not every cadre has the same motivation when deciding to become a volunteer. Motivation to work has an essential role in contributing to satisfaction and dissatisfaction, which lead to retention.[21,22]

This study had succeeded in developing and validating the questionnaire as a new, self-administered measure of the cadre's satisfaction who volunteers at the *posyandu lansia*. Validity and reliability testing are the two most important tests to evaluate a measurement instrument or questionnaire. Validity represents what an instrument measures and the truthfulness of findings or "measure what is intended to be measured," whereas reliability means the stability and consistency of an instrument.[16,23]

This study excluded 16 of the 54 initial items

Table 5 Internal Consistency (Cronbach's Alpha)

No.	Dimensions	Cronbach's Alpha	Cronbach's Alpha if Item Deleted	Notes
A	Motivator factors	0.841	0.823	M6, M13, and M19 deleted
1	Achievement	0.751	0.751	No item deleted
2	Recognition	0.306	0.402	M6 deleted
3	The work itself	−0.368	−0.368	No item deleted
4	Personal growth	0.514	0.663	M13 deleted
5	Responsibilities	0.664	0.664	No item deleted
6	Practicing religious teachings	0.840	0.867	M19 deleted
B	Hygiene factors	0.899	0.893	H2, H5, H12, H26, and H32 deleted
1	Policies and administration	0.434	0.609	H2 deleted
2	Supervision	0.617	0.759	H5 deleted
3	Interpersonal relation	0.884	0.886	H12 deleted
4	Incentives	−0.195	−0.195	No item deleted
5	Personal life	0.780	0.793	H26 deleted
6	Work condition	0.434	0.434	No item deleted
7	Status	0.776	0.776	No item deleted
8	Social relation	0.788	0.808	H32 deleted

Table 6 Final Items and Dimensions of the Motivator and Hygiene Factors

No.	Dimensions	Items
A	Motivator factors (14 items)	
1	Achievement	M1, M2, M3, M4, M5
2	Recognition	M7
3	The work itself	M9
4	Responsibilities	M8, M12, M15, M16, M17, M18, M19
B	Hygiene factors (24 items)	
1	Policies	H3
2	Administration work	H1, H4, H18
3	Supervision	H9, H10, H28
4	Interpersonal relation	H13, H14, H15, H16, H17, H35
5	Incentives	H19
6	Personal life	H24, H25
7	Work conditions	H27, H8,
8	Status	H29, H30, H31
9	Social relation	H20, H32, H33

based on validity and reliability testing. Five from the motivator factors and 11 from hygiene factors. Those items had low correlation, r count<1.38, and were not well explained.[12–14] Although many items were excluded, the rest of the items were well defined in every dimension. This study revealed that the initial number of dimensions of the motivator and hygiene factors (6 and 8, respectively) that was set based on Herzberg's theory[21] and a study in Bandung city,[10] changed to four dimensions of the motivator factors and nine dimensions of the hygiene factors after employing the principal component analysis and the varimax rotation method with Kaiser normalization.

The final dimensions of the motivator factors are achievement, recognition, the work itself, and responsibilities. In this study, possibilities for growth and practicing religious teachings were either excluded or blended into other dimensions. Three items of possibilities for the growth dimension were excluded from the questionnaire since they did not meet the validity and reliability values criteria, and one item (M12) correlated to the responsibilities dimension according to the principal component analysis results. According to Herzberg's two-theory of motivation,

possibilities for growth are essential intrinsic factors that make a person satisfied in working. Still, the absence of this dimension does not make him/her dissatisfied.[8] Possibilities for growth are the opportunities for a person to learn new skills, gain new knowledge, and be promoted in the workplace.[9] Further exploratory studies should be conducted to explore new items correlated to the possibilities for the growth dimension. Practicing religious teachings identified as one of the motivator factors,[10] became part of the responsibilities dimension. A study in Bandung city revealed that as a Moslem, it is his/her responsibility to help other people taught in their religion.[24] Voluntary action driven by a sense of caring, sense of social responsibility, and part of worship.[24] This study revealed that hygiene factors consisted of nine dimensions. The new dimension is the policies dimension. Herzberg's theory of motivation stated that policies are part of the administration work dimension, nine, but this study discovered it is separated from that dimension. The statement that contributes to policies was, "Although the programs at *posyandu lansia* are constantly changing (H3)."

We found that the two-theory of motivation influence volunteering. Motivator factors as intrinsic factors cover Maslow's hierarchy needs related to achievement, recognition for accomplishment, and satisfaction with the job.[25,26] The absence of the motivation factors rarely causes dissatisfaction.[8,25,26] Hygiene factors as extrinsic factors can demotivate or cause dissatisfaction. Still, these factors do not necessarily create satisfaction.[8,25,26] Which factors contribute to satisfaction at the volunteering work vary around the world. Opportunities to learn new skills and gain experience; clear tasks and procedures; and recognition was the most factors that contributed to satisfaction and dissatisfaction.[25,27,28]

Several limitations of this study have been identified: (1) The study was conducted from only six *puskesmas* and one district, raising the generalizability of the results. To minimize this concern, 200 respondents were selected from a list of names of cadre and simple randomized selected based on the inclusion and exclusion criteria. (2) Test-retest reliability did not conduct in this study. However, this test has disadvantages if the respondents are familiar with the instruments and the period of the retest is narrow from the first test. (3) The study was conducted on cadres from one area, and they did not represent other ethnicities, religions, and cultures that exist in the Indonesian population.

The last limitation of this study was the collection of the data using the Google Form link to Whatsapps. Some of the disadvantages of using an online survey are the answers could be filled by another person, dishonest answers, misunderstanding, and misinterpretation.

Conclusions

The questionnaire demonstrates a promising performance after testing its validity and reliability. Therefore, this questionnaire can measure the *posyandu lansia* cadre's satisfaction. However, since Indonesia is a big country and its population has various demographic characteristics, a study should be conducted to represent those groups.

Conflict of Interest

The authors affirm no conflict of interest in this study.

Acknowledgment

We would like to thank the respondents from posyandu lansia in Bandung city who eagerly participated in this study.

References

1. Pratono AH, Maharani A. Long-term care in Indonesia: the role of integrated service post for elderly. J Aging Health. 2018;30(10):1556–73.
2. Olaniran A, Smith H, Unkels R, Bar-Zeev S, van den Broek N. Who is a community health worker? - a systematic review of definitions. Glob Health Action. 2017;10(1):1272223.
3. Scott K, Beckham SW, Gross M, Pariyo G, Rao KD, Cometto G, et al. What do we know about community-based health worker programs? A systematic review of existing reviews on community health workers. Hum Resour Health. 2018;16(1):39.
4. Rahmawati R, Bajorek B. A community health worker-based program for elderly people with hypertension in Indonesia: a qualitative study, 2013. Prev Chronic Dis. 2015;12:E175.
5. Roza Y, Magriasti L. Efektivitas penyelenggaraan program posyandu lansia

di wilayah kerja Puskesmas Jua Gaek Kecamatan Gunung Talang Kabupaten Solok. J-TRAP. 2020;4(1):26–32.
6. Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia. Situasi dan analisis lanjut usia [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2014 [cited 2021 November 10]. Available from: https://pusdatin.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin-lansia.pdf.
7. Hastuti D. Pengaruh motivasi, kompetensi dan kepuasan terhadap kinerja kader kesehatan dengan komitmen kerja sebagai variabel intervening (studi Puskesmas Pagiyanten Kabupaten Tegal). Magisma. 2018;6(1):23–34.
8. Herzberg F. One more time: how do you motivate employees? Harv Bus Rev. 2003;81(1):87–96.
9. Alshmemri M, Shahwan-Akl L, Maude P. Herzberg's two-factor theory. Life Sci J. 2017;14(5):12–6.
10. Ramadhania N, Gondodiputro S, Wijaya M, Didah, Mandiri A. Cadres of the integrated health post for elderly and their satisfaction: Herzberg theory approach. Sosiohumaniora. 2020;22(3):309–18.
11. Martin CR, Martin CJH. Minimum sample size requirements for a validation study of the Birth Satisfaction Scale-revised (BSS-R). J Nurs Pract. 2017;1(1):25–30.
12. Mukaka MM. Statistics corner: a guide to appropriate use of correlation coefficient in medical research. Malawi Med J. 2012;24(3):69–71.
13. Walker DA. JMASM 48: the Pearson product-moment correlation coefficient and adjustment indices: the fisher approximate unbiased estimator and the Olkin-Pratt adjustment (SPSS). JMASM. 2017;16(2):540–6.
14. Chan LL, Idris N. Validity and reliability of the instrument using exploratory factor analysis and Cronbach's alpha. Int J Acad Res Bus Soc Sci. 2017;7(10):400–10.
15. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53–5.
16. Taherdoost H. Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. IJARM. 2016;5(3):28–36.
17. Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. Res Sci Educ. 2018;48(6):1273–96.
18. Stukas AA, Snyder M, Clary EG. Understanding and encouraging volunteerism and community involvement. J Soc Psychol. 2016;156(3):243–55.
19. Clary EG, Snyder M, Ridge RD, Copeland J, Stukas AA, Haugen J, et al. Understanding and assessing the motivations of volunteers: a functional approach. J Pers Soc Psychol. 1998;74(6):1516–30.
20. Musabiq SA, Adisya, Shabrina AK, Lutfiana A, Widyani BR, Rahmatia DA, et al. Volunteering: a study of psychological attribute related to Indonesian emerging adult volunteer motivation. JEHCP. 2020;9(3):400–25.
21. Bohm J. Two-factor theory – at the intersection of health care management and patient satisfaction. Clinicoecon Outcomes Res. 2012;4:277–85.
22. Chatio S, Akweongo P. Retention and sustainability of community-based health volunteers' activities: a qualitative study in rural Northern Ghana. PLoS One. 2017;12(3):e0174002.
23. Mohajan HK. Two criteria for good measurements in research: validity and reliability. Ann Spiru Haret Univ Econom Ser. 2017;17(4):59–82.
24. Herawati E. Budaya, agama dan makna volunterisme bagi kader warga peduli AIDS di Kota Bandung. JANTRO. 2019;21(2):132–41.
25. Kenyatta GN, Zani AP. An evaluation of the motives behind volunteering and existing motivational strategies among voluntary organizations in Kenya. Res Humanit Soc Sci. 2014;4(23):84–96.
26. Chaddha M, Rai RS. Understanding what motivates volunteering in people. ABR. 2016;17(1):110–20.
27. Alrawahi S, Sellgren SF, Altouby S, Alwahaibi N, Brommels M. The application of Herzberg's two-factor theory of motivation to job satisfaction in clinical laboratories in Omani hospitals. Heliyon. 2020;6(9):e04829.
28. Mohiuddin M, Dulay MG. Employee motivation in non-profit: evidence from a community based voluntary organization. Int J Bus Manag. 2015;10(11):74–82.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8789

GMHC. 2022;10(1):28–34
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Sleep Disorder Prevalence and Influencing Factors in Children with Cerebral Palsy

Uni Gamayani,[1] Milda Aryani,[2] Nushrotul Lailiyya,[1] Iin Pusparini[1]

[1]Department of Neurology, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, Indonesia, [2]Department of Neurology, Regional General Hospital Cilegon, Cilegon, Indonesia

Abstract

Children with cerebral palsy are considered a population at risk for sleep disturbance. Various factors can cause sleep disorders in children with cerebral palsy. This study investigates the relationship between endogenous factors and sleep disorders in children with cerebral palsy. It was a cross-sectional analytical study using randomized sampling on children with cerebral palsy who met the inclusion criteria for the period of May–August 2017. The location of the study was special schools in the Bandung area, Indonesia. All participants were screened with the Sleep Disturbances Scale for Children (SDSC) questionnaire to determine the prevalence of period of sleep disorders. Data analysis was then performed using the unpaired t test to compare the characteristics of two variables with a p value≤0.05 considered statistically significant. Sixty-six subjects aged 8–14 years were recruited. The results showed that the prevalence of sleep disorders was 67% (32 children), with insomnia as the most common type of sleep disorder (39%). There was a significant association between motor disabilities type and sleep disorders (p≤0.05). The most common type of sleep disorder in children with cerebral palsy is insomnia. In conclusion, there is a relationship between motor disability type and sleep disorders in cerebral palsy children.

Keywords: Cerebral palsy, children, sleep disorders

Introduction

Sleep is a state of reduced responses and interactions with the environment that is reversible and takes place quickly. Sleep serves as a means to improve the metabolic processes of the body regularly, which are indispensable in the physical growth and intellectual development of a child. Sleep disorders are a collection of symptoms characterized by disturbances in the number, quality, and duration of sleep that a person experiences. Approximately 25% of children suffer from sleep disorders, and it is one of the most common problems faced by parents.[1,2]

Children with neurological developmental disorders such as cerebral palsy are included in the population with a high risk for sleep disorders.[2,3] Cerebral palsy is a group of movement and posture disorders that cause limited movement due to non-progressive disorders in the brains of developing fetuses or infants. In developing countries, including Indonesia, cerebral palsy is estimated to occur in 1.5–2.5 children per 1,000 live births and is the most common cause of physical abnormalities in children.[4] Approximately 23–46% of cerebral palsy children suffer from sleep disorders.[5–7] In a study on cerebral palsy children, Munyumu et al.[8] stated that 27% of these children suffer from sleep disorders, such as the difficulty of starting and maintaining sleep, sleep-wake transition disorder, sleep hyperhidrosis, and obstructive sleep apnea.

Many factors influence changes in the state of awake and sleep in cerebral palsy children. Factors that can cause sleep disorders may include internal anomalies in sleep regulation and comorbidity disorders due to cerebral palsy, such as spasticity, pain, severe motor disabilities, epilepsy, mental retardation, and primary sensory disorders gastroesophageal reflux disease (GERD), and other comorbidities.[6,9] Other factors include environmental factors, individual/family habits before bed, parental roles, parental education, family economic status, social circumstances, culture, nutrition, and so on.[10,11]

Research on sleep disturbances in children with cerebral palsy in Indonesia is minimal. Based on this issue, the researchers want to study the features and kinds of sleep problems and what factors are related to sleep disorders in children with cerebral palsy aged 8 to 14 years. In addition,

Received: 28 October 2021; Revised: 17 April 2022; Accepted: 20 April 2022; Published: 30 April 2022

Correspondence: Dr. Uni Gamayani, dr., Sp.S.(K). Department of Neurology, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital. Jln. Pasteur No. 38, Bandung 40161, West Java, Indonesia. E-mail: gamayani@yahoo.com

this study aimed to determine the characteristics of sleep disorders in children of that age. Thus subsequent focused treatments can be carried out to ensure that children's development is optimal.

Methods

It was an analytical study on cerebral palsy children who attended special schools (*sekolah luar biasa*, SLB) in the Bandung area, Indonesia (State SLB Cileunyi, SLB Yayasan Suryakanti, and Special School for Children with Physical Disability (SLB D) Yayasan Pembinaan Anak Cacat (YPAC)) who met the following inclusion criteria: a) SLB students with cerebral palsy aged 8–14 years with good health, b) had parents/guardians/caregivers living with the child for at least the last six months, and c) parents/guardians and children were willing to participate in the study. In addition, students were excluded if they were identified as having an acute disease during an examination. This study was performed from May to August 2019 and approved by the Faculty of Medicine, Universitas Padjadjaran Health Research Ethics Committee by issuing ethical clearance number: 650/UN6.C.10/PN/2017.

The Sleep Disturbance Scale for Children (SDSC) questionnaire is commonly used to screen for sleep disorders among elementary school-age children.[12] This scale consists of 26 questions, with a 5-point Likert scale of 1=never, 2=rarely (1–2× nights/month), 3=sometimes (1–2× nights/week), 4=often (3–5× nights/week), and 5=always (every day). The total score of this questionnaire ranges from 26 to 130, with a cut-off point of 39, where a score of <39 reflects normal sleep (no sleep disorder) while a score of >39 means that there are abnormalities in the sleep (sleep disorder).[13]

Univariate data analysis was used to characterize the dependent and independent variables to assist in more detailed bivariate analysis. Furthermore, it is utilized to ascertain the features and clinical state of the study subjects. Univariate data statistic depicts the proportions of each variable, which were presented descriptively. Before statistical tests on numerical data, normality was assessed using the Kolmogorov Smirnov. Next, statistical analysis for categorical data was tested with the chi-square at a significance level of 0.05. The unpaired t test was used to compare the characteristics of the two study groups. Finally, multivariable data analysis was conducted using binary logistic regression analysis to determine the relationship between factors associated with sleep disorders. The analysis tool is the statistical software SPSS 21.0 version for windows.

Results

This study included 66 children with cerebral palsy, as described in Table 1. The average age of the subjects was 12.8 years, with an almost balanced gender proportion (53%, n=35 male). Most parents graduated from senior high school (47%) with an income of 2.5–5 million/month (moderate socioeconomic level) (58%). The prevalence of cerebral palsy in children with sleep disorders was 67% (44 children). Most subjects in this study had spastic cerebral palsy (73%) and were generally quadriplegic (61%), with a quadriplegic motor disability as the most common type (67%). In terms of mobilization capability, most subjects had Gross Motor Function Classification System (GMFCS) I–II (58%). Subjects suffered from one comorbidity (35%), with mental retardation as the most common comorbid (100%).

The types of sleep disorders experienced by the subjects are listed in Table 2. Difficulties in starting and maintaining sleep are the most prominent type of sleep disorder in this group (39%).

Table 3 presents a significant relationship between motor disabilities and sleep disorders ($p<0.05$). In the analysis of variable data on types of motor disabilities, the more motor disabilities suffered by a child, the more likely he or she would suffer from sleep disorders. Data analysis of other variables, i.e., cerebral palsy, GMFCS type, and several comorbidities, did not significantly correlate with sleep disorders ($p>0.05$).

Table 4 reflected the lack of relationship between the type of comorbidity, quadriplegic motor disability status, and sleep disorders ($p>0.05$).

Discussion

In this study, the prevalence of sleep disorders among cerebral palsy children was 67%. The average age of subjects who experienced sleep disorders was 12.8 years, with difficulty starting and maintaining sleep as the most common disorder. These results complement the data on

Table 1 Subject Characteristics

Variables	n=66 (%)
Average age	
12.8 years old	66 (100)
Gender	
Male	35 (53)
Female	31 (47)
Parents' education	
Elementary school	15 (23)
Junior high school	9 (14)
Senior high school	31 (47)
Diploma	3 (4)
University	8 (12)
Parents' income (million)	
<2.5 (low)	18 (27)
2.5–5 (medium)	38 (58)
>5 (high)	10 (15)
SDSC value	
>39 (sleep disorders)	44 (67)
≤39 (no sleep disorders)	22 (33)
Type of cerebral palsy	
Spastic	48 (73)
Dyskinetic	4 (6)
Ataxic	3 (4)
Mixture	11 (17)
Type of motor disability	
Monoplegia	7 (10)
Diplegia	9 (14)
Hemiplegia	9 (14)
Triplegia	1 (1)
Quadriplegia	40 (61)
Quadriplegic motor disability	
Quadriplegia	44 (67)
Non-quadriplegia	22 (37)
Type of GMFCS	
GMFCS I–II	38 (58)
GMFCS III	28 (42)
Number of comorbidities	
1 comorbid	23 (35)
2 comorbid	20 (30)
3 comorbid	16 (24)
4 comorbid	4 (6)
5 comorbid	3 (5)
Concomitant disorder (comorbidity)	
Eating-drinking disorders	21 (32)
Pain disorders (scale>4)	2 (3)
Mental retardation	66 (100)
Urinary bladder dysfunction	22 (33)
Severe visual disorder	8 (12)
Epilepsy	5 (8)

Note: SDSC: Sleep Disturbance Scale for Children, GMFCS: Gross Motor Function Classification System

Table 2 Sleep Disorder Characteristics based on Sleep Disturbance Scale for Children

Type of Sleep Disorder	n=44 (%)
Disorder of starting and maintaining sleep/Insomnia	17 (39)
Disorder of sleep and awake transition	10 (23)
Hyperhidrosis during sleep	8 (18)
Excessive somnolence disorder/ hypersomnia	4 (9)
Respiration disorder during sleep	4 (9)
Consciousness disorder/Parasomnia	1 (2)

the prevalence of sleep disorders in cerebral palsy children based on the age range stated by previous studies. The prevalence of sleep disorders in cerebral palsy children is 96% in a study by Selina et al.[14] and 40% in Romeo et al.'s[5] study. Both studies also suggested that the most common type of sleep disorder in this group is starting and maintaining sleep, which is in line with the result of this study. This difference in prevalence is likely due to differences in research methods. Selina et al.[14] used a descriptive approach on 50 cerebral palsy children in a younger age range of 4–12 years. The instrument used for data collection in their study is the Child's Sleep Habits Questionnaire (CSHQ). Of all subjects in their research, 82% suffered from spastic cerebral palsy. It is different from the study conducted by Newman et al.,[9] conducted on 173 cerebral palsy children aged 6–12 years old in physiotherapy clinics using the SDSC questionnaire. Their finding demonstrated that most subjects had diplegia type of disability (48%), and only 10.4% had a quadriplegic disability.

Nevertheless, all GMFCSs were identified with GMFCS I found in most of the subjects (42.2%). However, this present study involves an older population of children with cerebral palsy. In addition, most had quadriplegic-type of motor disability (67%) and only affected those with GMFCS I, II, and III, which may contribute to the different results.

Table 2 shows that the most frequent type of sleep disorder in this study was difficulties in starting and maintaining sleep or insomnia, seen in 39% (17 children) of the subjects, followed by sleep and awake transition disturbance in 23% (10 children). This result corresponds to the literature that stated that insomnia's prevalence in cerebral palsy children is relatively high.[6,7]

Atmawidjaja et al.[15] said that insomnia's prevalence in children with cerebral palsy in Malaysia is 37%, almost similar to this study's

Table 3 Relationship between Subject Characteristics and Sleeping Disorder

Variables	Groups		p Value
	No Sleep Disorder (n=22)	Sleep Disorder (n=44)	
Type of cerebral palsy			0.231
Spastic	15	33	
Dyskinetic	0	4	
Ataxic	2	1	
Mixture	5	6	
Type of motor disability			0.042
Monoplegia	1	6	
Diplegia	2	7	
Hemiplegia	7	2	
Triplegia	0	1	
Quadriplegia	10	30	
Type of GMFCS			0.738
GMFCS I–II	15	23	
GMFCS III	7	21	
Number of comorbidities			0.613
1 comorbid	9	19	
2 comorbid	8	12	
3 comorbid	3	9	
4 comorbid	1	2	
5 comorbid	1	2	

Note: GMFCS: Gross Motor Function Classification System

Table 4 Relationship between Comorbidity and Sleep Disorder

Variables	Groups		p Value
	No Sleep Disorder n=48 (%)	Sleep Disorder n=81 (%)	
Comorbidity/concomitant disorder			0.765
Eating-drinking disorders	5 (11)	16 (20)	
Pain disorders (scale>4)	3 (6)	2 (3)	
Mental retardation	26 (54)	40 (49)	
Urinary bladder dysfunction	8 (17)	16 (20)	
Severe visual disorder	2 (4)	6 (7)	
Epilepsy	4 (8)	1 (1)	

finding of 38.6%. In another study by Munyumu et al.,[8] cerebral palsy patients in Uganda also presented starting and maintaining sleep or insomnia (27%) as the most prevalent sleep disorder. External and internal factors influence the etiology of insomnia.[6,16] The environmental factors (exogenous) include the habit of long-duration television watching until late at night, a bright and noisy environment, stress, or poor sleep hygiene. The internal factors include the activity of the hypothalamus-pituitary-adrenal (HPA) axis, which affects the amount of blood cortisol, causing circadian rhythm disturbances of the sleep and wake cycle, body temperature, craving bedtime and wakefulness time, and the spasticity and severity of motor disabilities.[17–19]

The other sleep disorder widely experienced by subjects in this study was the sleep and awake transition disturbance, which was identified in 23% of the subjects. The prevalence rates of sleep and awake transition disturbance in studies by Newman et al.[9] and Atmawidjaja et

al.[15] were 17.9% and 13.2%, respectively. Based on the 2014 International Classification of Sleep Disorders-3 (ICSD-3), this type of sleep disorder is categorized into the sleep motion disorders, such as restless leg syndrome (RLS), bruxism, and periodic limb movement disorder (PLMD), and head and neck movements during sleep. These disorders can be caused by genetic abnormalities, brain immaturity, and psychological stress. The condition is commonly found in children <6 years of age and decreases with age.[20]

Table 3 describes the relationship between subject characteristics (cerebral palsy type variables, motor disability type, GMFCS type, and several comorbidities) and sleep disorders. The statistical tests showed a significant relationship between types of motor disabilities and sleep disorders. However, no significant relationship was found with sleep disorders for cerebral palsy type, GMFCS type, and several comorbidity variables. The significant relationship between motor disability type and sleep disorders found in this study corroborates with the results of a previous.[20–22] Another study found that motor disabilities involving more body components have a greater risk for sleep disorders.[23] The absence of a significant relationship between the GMFCS type and sleep disorders was also stated by Newman et al.[9]

In contrast, Munyumu et al.[8] discovered that GMFCS V or IV and epilepsy link to sleep disorders. Romeo et al.[5] showed that 48% of subjects with GMFCS V experience sleep disorders. These differences may be due to the difference in the patient population because patients in Uganda have a more severe form of cerebral palsy than those in other countries.[8] In addition, the absence of a significant relationship between the cerebral palsy type, GMFCS type, and the number of comorbidity in this study may also be since this study only involved subjects with GMFCS I, II, III, i.e., subjects who can still move around independently, with or without aids. Therefore, the degree of comorbidity experienced by the subjects was also not assessed in this present study.

Table 4 describes the characteristic relationships of subjects (concomitant disorder/ comorbidity variables) between the group without sleep disorders and with sleep disorders. The statistical tests showed no significant or statistically significant relationship between comorbid disorders and the occurrence of sleep disorders. This contrasts with Munyumu et al.8, demonstrating that epileptic comorbidity is associated with sleep disorders. It can be due to unknown differences in the degree of concomitant disorder experienced. The subjects involved in this study are only those with GMFCS I, II, and III, which is different from their research. No cerebral palsy patients with GMFCS IV and V were recruited in this study. Patients with GMFCS IV and V generally have a higher number and more severe comorbidities, which may contribute to the Munyumu et al.'s[8] study. This present study did not assess the degree of eating disorders or mental retardation suffered by the patients, so it is likely to cause no significant relationship between concomitant disorders or comorbidities and sleep disorders. Quadriplegic can describe the presence of bilateral lesions and more extensive lesions than in the non-quadriplegic type.[24] The division of people with quadriplegic and non-quadriplegic disabilities is not related to sleep disorders. Instead, it can be caused by differences in the severity of quadriplegic experienced by the subject. The quadriplegic condition can also occur in cerebral palsy children with independent mobilization abilities that do not require aids. In this study, 58% of subjects had a quadriplegic disability and had independent mobilization capability (GMFCS I–II).

This study has several limitations because no division in the degree of comorbidity severity was applied, and no objective measuring instruments, such as actigraphy or polysomnography were used. Thus, the results should be interpreted accordingly.

Conclusions

There is a relationship between motor disabilities and sleep disorders in cerebral palsy children. The most common sleep disorder experienced by children with cerebral palsy is difficulties in starting and maintaining sleep (insomnia). Further studies are required to understand sleep disorders in light of external factors that also affect sleep disorders in cerebral palsy children. In addition, more variety in the severity of cerebral palsy as specified with GMFCS I–V should also be included in future studies.

Conflict of Interest

The authors declared that there is no conflict of

interest.

Acknowledgments

Thank you to all authors for providing the opportunity to carry out this research.

References

1. Sandella DE, O'Brien LM, Shank LK, Warschausky SA. Sleep and quality of life in children with cerebral palsy. Sleep Med. 2011;12(3):252–6.
2. Wayte S, McCaughey E, Holley S, Annaz D, Hill CM. Sleep problems in children with cerebral palsy and their relationship with maternal sleep and depression. Acta Paediatr. 2012;101(6):618–23.
3. Hutson JA, Snow L. Sleep assessments for children with severe cerebral palsy: a scoping review. Arch Rehabil Res Clin Transl. 2020;2(4):100087.
4. Oskoui M, Shevell MI, Swaiman KF. Cerebral palsy. In: Swaiman KF, Ashwal S, Ferriero DM, Schor NF, Finkel RS, Gropman AL, et al., editors. Swaiman's pediatric neurology: principles and practices. 6th Edition. New York: Elsevier; 2017. p. 734–45.
5. Romeo DM, Brogna C, Quintiliani M, Baranello G, Pagliano E, Casalino T, et al. Sleep disorders in children with cerebral palsy: neurodevelopmental and behavioral correlates. Sleep Med. 2014;15(2):213–8.
6. Dutt R, Roduta-Roberts M, Brown CA. Sleep and children with cerebral palsy: a review of current evidence and environmental non-pharmacological interventions. Children (Basel). 2015;2(1):78–88.
7. Horwood L, Li P, Mok E, Shevell M, Constantin E. A systematic review and meta-analysis of the prevalence of sleep problems in children with cerebral palsy: how do children with cerebral palsy differ from each other and from typically developing children? Sleep Health. 2019;5(6):555–71.
8. Munyumu K, Idro R, Abbo C, Kaddumukasa M, Katabira E, Mupere E, Kakooza-Mwesige A. Prevalence and factors associated with sleep disorders among children with cerebral palsy in Uganda; a cross-sectional study. BMC Pediatr. 2018;18(1):26.
9. Newman CJ, O'Regan M, Hensey O. Sleep disorder in children with cerebral palsy. Dev Med Child Neurol. 2006;48:564–8.
10. Chellappa SL, Steiner R, Oelhafen P, Lang D, Götz T, Cajochen C. Acute exposure to evening blue-enriched light impacts on human sleep. J Sleep Res. 2013;22(5):573–80.
11. van Kamp I, Persson Waye K, Gidlöf-Gunnarsson A. The effects of noise disturbed sleep on children's health and cognitive development. J Child Adolesc Behav. 2015;3(1):179.
12. Petersen S, Francis KL, Reddihough DS, Lima S, Harvey A, Newall F. Sleep problems and solution seeking for children with cerebral palsy and their parents. J Paediatr Child Health. 2020;56(7):1108–13.
13. Bruni O, Ottaviano S, Guidetti V, Romoli M, Innocenzi M, Cortesi F, et al. The Sleep Disturbance Scale for Children (SDSC). Construction and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. J Sleep Res. 1996;5(4):251–61.
14. Selina H, Priambodo WS, Sakundarno M. Gangguan tidur pada anak palsi serebral. Med Hosp. 2012;1(2):108–12.
15. Atmawidjaja RW, Wong SW, Yang WW, Ong LC. Sleep disturbances in malaysian children with cerebral palsy. Dev Med Child Neurol. 2014;56(7):681–5.
16. Lélis A, Cardoso M, Hall WA. Sleep disorders in children with cerebral palsy: an integrative review. Sleep Med Rev. 2016;30:63–71.
17. Ropper AH, Samuels MA, Klein JP, Prasad S, editors. Adams and Victor's principles of neurology. 11th Edition. New York: McGraw Hill; 2019.
18. Gamayani U. Neurology in daily practice. 1st Edition. Bandung: Bagian Ilmu Penyakit Saraf Fakultas Kedokteran Universitas Padjadjaran Rumah Sakit Hasan Sadikin Bandung; 2010.
19. Adiga D, Gupta A, Khanna M, Taly AB, Thennarasu K. Sleep disorders in children with cerebral palsy and its correlation with sleep disturbance in primary caregivers and other associated factors. Ann Indian Acad Neurol. 2014;17(4):473–6.
20. Grigg-Damberger MM. Sleep and sleep disorders in epilepsy. In: Sheldon SH, Ferber R, Kryger MH, Gozal D, editors. Principles and practice of pediatric sleep medicine. New York: Elsevier; 2014. p. 353–61.
21. Löwing K, Gyllensvärd M, Tedroff K.

Exploring sleep problems in young children with cerebral palsy - a population-based study. Eur J Paediatr Neurol. 2020;28:186–92.
22. Hulst RY, Gorter JW, Voorman JM, Kolk E, Van Der Vossen S, Visser-Meily JMA, et al. Sleep problems in children with cerebral palsy and their parents. Dev Med Child Neurol. 2021;63(11):1344–50.
23. Simard-Tremblay E, Constantin E, Gruber R, Brouillette RT, Shevell M. Sleep in children with cerebral palsy. J Child Neurol. 2011;26(10):1303–10.
24. Lagunju IA, Adedokun BO. A comparison of quadriplegic and hemiplegic cerebral palsy. J Pediatr Neurol. 2008;6(1):25–30.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8942

GMHC. 2022;10(1):35–42
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Knowledge Level towards Breast Cancer and Breast Self-Examination among Medical Students of Indonesia

Andri Rezano,[1] Marhendra Satria Utama,[2] Hesti Lina Wiraswati,[1] Savira Ekawardhani,[1] Melia Juwita Adha,[3] Nurul Mufliha Patahuddin,[4] Veronica Oladitha Siagian,[4] Siti Silvia Nur Shofa Shamantri,[4] Erlangga Ing Geni Bisma Pratama,[4] Liana Awalia Lutfunnisa,[4] Asep Wiryasa,[4] Hansen Wangsa Herman[4]

[1]Department of Biomedical Sciences, Faculty of Medicine, Universitas Padjadjaran, Sumedang, Indonesia, [2]Department of Radiology, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, Indonesia, [3]Obstetric and Gynecology Specialist Study Program, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, Indonesia, [4]Medical Undergraduate Study Program, Faculty of Medicine, Universitas Padjadjaran, Sumedang, Indonesia

Abstract

Breast cancer is a life-threatening disease among Indonesian women. The etiology of breast cancer is still uncertain, and therefore adequate primary prevention is difficult. Early diagnosis improves cancer prognosis while also reducing medical costs, substantially reducing mortality rates. Knowledge and awareness of breast cancer risk factors and their screening may help women take preventive measures. The community service program aimed to assess the level of understanding of undergraduate medical students on breast cancer and breast self-examination (BSE). It was a one-group pretest-postest quasi-experimental study to measure the level of knowledge of 100 medical students in Indonesia from August 20th, 2020, to February 27th, 2021. The participants were asked 36 questions, which was an adaptation of previous questionnaires. A mini-lecture managed the program that focuses on risk factors and early detection. Furthermore, pretest and post-test were conducted to analyze the knowledge level before and after the dissemination. The participants included in this study were mostly 20 years and above (62%). The average recognition of breast cancer and its early detection was not high. The knowledge of breast cancer among medical students was found to be moderate. The efficacy of dissemination among medical students was apparent in knowledge change. However, good cancer awareness, especially breast cancer, needs to be established and integrated through effective cancer educational programs in the medical curricula. Hence, modification of the medical curriculum through extensive training on breast cancer preventive measures and early diagnosis is required.

Keywords: Cancer awareness, cancer education, dissemination, early detection, screening

Introduction

Breast cancer is a malignant tumor that develops within the breast tissue.[1] Breast cancer is one of the foremost common sorts of cancer in women.[1] Breast cancer can happen in any region, but the incidence rate is higher in developed areas.[2] In Southeast Asia, there are 137,514 new breast cancer cases, with Indonesia as the most significant contributor with 58,256 new cases and cause of death for 22,692 women.[3] Various factors contribute to its occurrences, such as population structure, lifestyle, genetics, and environment.[4] From the data presented above, efforts are needed to prevent and control breast cancer. Early detection with proper management can significantly reduce mortality in breast cancer.[5]

Cancer is usually due to disruption of the molecular activity of genes so that abnormalities in cell division occur. Breast cancer also happens in some patients with hormonal anomalies that initiate cellular modification and tumor advancement.[6] Approximately 5% to 10% of the cases are innate, and most of the cases were related to the BRCA1 or BRCA2 gene mutation.[7] However, some studies found breast cancer cases in non-BRCA mutation patients.[8,9] The breast cancer cases in these patients tend to be caused by other causes that can initiate cancer development.[8] The risk factors are separated into individual, family history, reproductive, and modifiable environmental factors.

Breast cancer can be detected by breast self-examination (BSE).[10] BSE is a vital screening measure for breast cancer detection which is easy,

Received: 20 November 2021; Revised: 22 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Andri Rezano, dr., M.Kes., Ph.D. Department of Biomedical Sciences, Division of Cell Biology, Faculty of Medicine, Universitas Padjadjaran. Jln. Ir. Soekarno km 21, Jatinangor, Sumedang 45363, West Java, Indonesia. E-mail: andri.rezano@unpad.ac.id

inexpensive, and simple to perform and does not depend on a health practitioner's assistance.[10–12] In Indonesia, a study of 1967 women in Surabaya showed that 44.4% of women had performed BSE at least once, and 55.6% of women had never performed BSE. This study also shows that older women with high educational backgrounds and breast cancer history in family members were more likely to perform BSE practice.[13] This indicates BSE is still rarely done by women due to a lack of education regarding breast cancer.[10,14] By educating the young generation on breast cancer and BSE will increase awareness among their family and friends so that the morbidity and mortality of the breast cancer incidence may be reduced.[10]

A medical student is a person enrolled in medical school so that they have a high awareness of health. However, the National Standard Competencies of Indonesian Medical Doctors contain only 5% cancer topics of the overall competency assigned to Indonesian medical doctors. Moreover, cancer is in the advanced stage of the specialist program. Thus, undergraduate medical students can not imagine simple modalities to detect breast cancer earlier.

The objective of this study was to assess the level of knowledge of undergraduate medical students on breast cancer and BSE after dissemination and input for stakeholders to address BSE concepts in medical curricula.

Methods

This study used a quasi-experimental one-group pretest-posttest research design on medical students of Indonesia. Undergraduate medical students aged 18–24 years were included in this study. We conducted a self-administered electronic survey to collect information on respondents' knowledge of breast cancer and BSE. The online survey was developed through Google Forms and distributed on social media messaging apps (WhatsApp) and social platforms (Instagram and Facebook). The survey was spread through colleagues, acquaintances, and personal contacts with an indication to send randomly. Data collection was set by limiting the number of possible responses to 1 per participant.

All participants provided consent to participate and received an electronic link via Google Form, accompanied by a cover letter stating study, privacy, anonymity, confidentiality, possible risks and benefits, voluntary rights, length of the survey, and the primary investigator's name and contact. All collected data were kept anonymous, de-identified, and exported to Microsoft Excel for analyses, protected by passwords, and only the primary investigator and statistician had access to the data.

The questionnaire's items were designed to obtain information on sociodemographic characteristics, knowledge of symptoms, risk factors, BSE, management, and perceptions of breast cancer. It was adapted and modified from the United Kingdom Breast Cancer Awareness Measure[15] and a study by Grunfeld et al.[16] The questionnaire was delivered in Bahasa and was revalidated in a smaller sample (not included in the final sample). The final validated questionnaire was used in this study.

The method used in the study was carried out as previous study[17] using a pre-and post-survey method to assess the knowledge of online information literacy (dissemination) on breast cancer and BSE. The research was conducted from August 20th, 2020, to February 27th, 2021. The measurement of knowledge used the Guttman scale, in which the number of true and false answers to the item was identified.[18] Each true answer was scored one mark, and an incorrect answer was zero. The total score obtained by each information in this study was converted to a percentage. Interpretation of the level of knowledge is arbitrarily measured through the cumulative number of valid scores to the total score. A higher cumulative score signifies a higher level of knowledge, with the interpretation of the percentage scale of >75%, 50–75%, and <50% as good, sufficient, and evil, respectively.

All data were analyzed using SPSS version 22 (SPSS Inc., U.S.A.) and Microsoft Excel. The t test was used to distinguish the proportions of the pretest and posttest. The level of statistical significance was set at $p<0.05$.

This study has received ethics approval from the Health Research Ethics Committee of Universitas Padjadjaran Bandung, number 614/UN6.KEP/EC/2020. Furthermore, respondents had received informed consent regarding their participation in this study.

Results

Two hundred and twelve respondents filled in the study registration. However, only 100

respondents filled out all the required forms completely. Therefore, we excluded respondents who did not fill out, complete, or send the research questionnaire. Data on the characteristics of the respondents who participated in the study were obtained through the information filled by respondents in the Google Form. The data taken includes the respondents' gender, age, religion, family income, family history of having breast cancer, scholarship recipients, exposure to information about breast cancer, and the respondent ethnicity, which can be seen in Table 1. The majority of respondents were women (87%) aged 20 years old (37%), Islam and Javanese tribes dominated the religion and ethnicity of respondents (83% and 34%, respectively), and family income mainly was above 5 million per month (79%), most of the respondent did not have any history of familial breast cancer (90%), and no scholarship was owned by the majority of respondents (74%). In addition, most respondents heard of breast cancer (94%).

Table 1 Respondent Characteristics

Characteristics	n=100 (%)
Gender	
Men	13 (13)
Women	87 (87)
Age (year)	
<18	1 (1)
18	10 (10)
19	27 (27)
20	37 (37)
21	16 (16)
22	2 (2)
23	3 (3)
≥24	4 (4)
Religion	
Islam	83 (83)
Protestant	6 (6)
Catholic	6 (6)
Hinduism	5 (5)
Family income (IDR)	
<5,000,000	21 (21)
5,000,000–10,000,000	38 (38)
10,000,000–15,000,000	14 (14)
15,000,000–20,000,000	13 (13)
20,000,000–25,000,000	4 (4)
>25,000,000	10 (10)
Family history of breast cancer	
Yes	10 (10)
No	90 (90)
Scholarship grantee	
Yes	26 (26)
No	74 (74)
Tribes	
Sundanese	22 (22)
Javanese	34 (34)
Bataknese	3 (3)
Buginese	3 (3)
Minangnese	7 (7)
Betawis	3 (3)
Balinese	6 (6)
Lampungnese	2 (2)
Banjarnese	1 (1)
Chinese	3 (3)
Padang	1 (1)
Palembang	1 (1)
Sumatera	1 (1)
Papua	1 (1)
Aceh	1 (1)
Others (Madurese, Dayak, Bantenese, Lampung, Gorontaloan, Torajan, Butonese, Sangirese, and Bungku)	11 (11)
Exposed to information	
Yes	94 (94)
No	6 (6)

Table 2 shows the data regarding the sources of previous information exposure received by the respondents. Of the 100 respondents, 94 respondents had heard about breast cancer through various sources. Most sources of information exposure were through online video platforms such as YouTube (73.95%), followed by social media Instagram (15.62%). Meanwhile, other sources such as journals, webinars, e-books, online, and Twitter are the sources which information has the minor exposure to the respondents (under 5%).

The assessment of the level of knowledge of different symptoms of breast cancer before and after the dissemination can be seen in Table. Table 3 showed that regarding symptoms, meaningful changes were recorded in the understanding of breast size similarity, breast injury healing speed, nipple size and position change, nipple rash, abnormal discharge from

Table 2 Previous Information Source

Media	n=100 (%)
Online video platforms (YouTube, etc.)	71 (71)
Instagram	15 (15)
Journal	3 (3)
Webinar	2 (2)
E-book	1 (1)
Line	1 (1)
Twitter	1 (1)
No prior information exposure	6 (6)

Table 3 Knowledge of Breast Cancer

Knowledge of Breast Cancer	Pretest Score (%)	Posttest Score (%)	Asymp. Sig.
Symptoms			
A lump or thickening in the breast that can spread to the armpit area and surrounding	100	96	0.046
Discharge from nipple even though not breastfeeding	58	90	0.000
Similar breast size	4	87	0.000
A lump in the breast is a definite symptom	23	1	0.000
Injury at the breast heals rapidly	4	80	0.000
Puckering or dimpling of breast skin	56	85	0.000
Swelling and lesion that does not heal on breast	78	94	0.028
The nipple became inward to the breast	42	90	0.000
Change of nipple position	55	91	0.000
Pain in the armpit area	75	91	0.007
Nipple rash	48	95	0.000
Redness of breast skin	48	92	0.000
Change in size of breast or nipple	72	87	0.000
Changes in the shape of the breast or nipple	83	94	0.012
Age-related and lifetime risk			
A 70-year-old woman is more likely to get breast cancer than a woman in their thirty or fifty	33	59	0.000
Every 1 in 8 women will develop breast cancer in their lifetime	64	96	0.000
Risk factors			
Breastfeeding lowers the risk of breast cancer	65	86	0.000
Smoking	89	97	0.021
Birth control pill consumption	34	95	0.000
Having a close relative with breast cancer	85	94	0.003
A married woman with no child has a higher risk of breast cancer	31	89	0.000
Having menopause at the age of 50 years old	35	87	0.000
Consuming grilled food prevents breast cancer	13	85	0.000
Alcohol consumption prevents breast cancer	6	88	0.000
Exercise prevents breast cancer	94	99	0.059
Excessive work prevents breast cancer	6	93	0.000
First menstruation happened >13 years old is one of the factors in breast cancer	14	80	0.000

the nipple, and abnormality of breast skin symptoms of breast cancer. Interestingly, most respondents correctly identified breast lumps and the alteration of breast or nipple shape as breast cancer symptoms. Moreover, a significant increase in knowledge was not recorded ($p>0.05$) on questions about the non-healing lesion on the breast, and pain in the armpit area, suggesting a good prior understanding of breast cancer symptoms. Meanwhile, only one respondent was aware that a breast lump is a definite symptom of breast cancer after dissemination.

Knowledge of age-related and lifetime risk of breast cancer was well-aware among respondents, as seen in the second section of Table 3. After dissemination, respondents correctly recognized one-eighth of all women having a lifetime risk of developing breast cancer (96%) and the susceptibility of senior women to get breast cancer compared to a woman in their 30s or 50s (59%).

The percentage of women who identified breast cancer risk factors was also shown in Table 3. Understanding risk factors may help women in taking preventive measures. Most respondents believed smoking (97%), genetic inheritance (94%), and a sedentary lifestyle (93%) lead to breast cancer. However, knowledge of important biological risk factors like alcohol consumption (6%), workaholic (6%), age of menstruation

Table 4 Knowledge of Breast Self-examination

Question about Breast Self-examination	Pretest Score (%)	Posttest Score (%)	Asymp. Sig.
Breast self-examination prevents breast cancer	4	100	0.000
Breast self-examination is an observation that one does to her breast every month	89	95	0.109
Regular monthly breast self-examination will not help in detecting changes in the breast	11	92	0.000
The shape and density of the breast can not change	8	88	0.000

(14%), grilled food (13%), married women without children (31%), birth control pill consumption (34%), premature menopause (35%) were low prior dissemination, although they had heard of breast cancer.

Of all 100 respondents, before dissemination, only 4% knew that BSE prevents breast cancer (Table 4). Around eleven out of one hundred said breast cancer could be detected through BSE. Our results showed that most of the respondents have good knowledge that BSE should be done monthly. However, most of the respondents (92%) think that BSE may change the shape and density of the breast, but after dissemination, they were aware that it is not altered (88%).

Good knowledge of breast cancer management was understandable by respondents, as seen in Table 5. First, they had heard modalities for breast cancer management was chemotherapy. Subsequently, their knowledge was significantly increased regarding light therapy and surgery to manage breast cancer.

Our results showed the good knowledge of respondents on curative activities to recognize the first symptom that initiates medical consultation (Table 5). But the level of respondents' insecurity about telling the doctor about their changes was quite prominent (67%).

Table 6 indicates medical students of Indonesia had good knowledge of breast cancer and BSE. T test results show that p=0.000. Hence, it can be concluded that there was a significant

Table 5 Knowledge of Breast Cancer Management and Behavior in Seeking Medical Help

Management Knowledge and Behavior in Seeking Medical Help	Pretest Score (%)	Posttest Score (%)	Asymp. Sig.
Questions about breast cancer management			
Light therapy is one of the treatments for breast cancer	74	93	0.000
The only treatment for breast cancer is surgery	11	92	0.000
Chemotherapy is one of the treatments for breast cancer	94	97	0.257
Questions about seeking medical help			
If I find any sign of changes in my breasts, I will immediately consult a doctor	95	98	0.180
I feel there are obstacles for me to telling the doctor about changes in my breasts such as lack of confidence, fear, etc.	46	67	0.015

Table 6 Analysis of Knowledge Level before and after Dissemination

	n	Average±s.b.	Average Difference±s.b.	95% CI	p*
Pretest score	100	51.08±32.23	40±30.02	0.29529–0.50582	0.000
Posttest score	100	84.81±22.17			

Note: *Paired t test; CI: confidence interval

increase in knowledge among medical students after breast cancer and BSE dissemination.

Discussion

Breast cancer incidence and mortality are rapidly growing worldwide, including in Indonesia.[2,3,19] The etiology of breast cancer is still uncertain, and therefore, adequate primary prevention is uneasy. Moreover, breast cancer in Indonesia has mainly been diagnosed much later.[20] Early diagnoses improve cancer outcomes while also reducing the cost of various treatments such as chemotherapy and radiotherapy, which could substantially reduce mortality rates.[21] Therefore, early cancer detection programs are essential in Indonesia.

Knowledge of breast cancer and BSE is one strategy for early breast cancer detection, especially in low- and middle-income countries. In contrast, resources for early detection methods, such as mammography and ultrasonography, are unavailable.[22] Indonesia National Movement for Prevention and Early Detection of Breast and Cervical Cancer Program was launched in 2015. This program encourages women aged 20 and older to visit primary health care centers once a month.[23] Public education and awareness is the basic level of resources to develop cultural sensitivity for target populations to convey the value of early detection, breast cancer risk factors, and breast health awareness.[24]

Over half of the participants in our study were aged 20 and older. Although early screening and diagnosis would not decrease the incidence of breast cancer, it may improve the prognosis and treatment outcomes.[21] A study in Turkey of women in various age groups showed that BSE is unfamiliar and insufficiently practiced.[25] Our results showed that breast cancer knowledge among medical students was poor. Health education significantly improves knowledge levels on breast cancer and BSE among participants. The rate of correct answers increases between 51.1% and 84.8%. Similarly, a previous study on nursing students demonstrates a good level of knowledge after training.[26]

It is the first study conducted on medical students in Indonesia. Our study reveals valuable insight to address the knowledge gap on breast cancer and screening using the Breast Cancer Awareness Measure.[15] It contains 36 questions with five domains, including signs and symptoms, risk factors, BSE, management, and seeking medical health for breast cancer in female medical students in Indonesia.

Our result shows a lack of knowledge in all domains questioned before intervention in this study. The incidence of breast cancer increases past the age of 35, while the prognosis of the disease acquired at an earlier age is markedly worse due to late screening. Therefore, developing awareness of breast health and BSE among young women in their twenties, such as medical students, is very significant.[27]

Different published reports highlight an increased risk in the numerous type of cancer, including breast cancer. Although the relationship between breast cancer and alcohol consumption or smoking has not been clearly explained, some studies on the two are reported.[28,29] Low awareness of these risk factors was also found in the studies among female health care professionals in Saudi Arabia.[30]

The risk for a woman with familial history of breast cancer is reported to be 1.7–2.5 fold in a first-degree relative, while the bilateral involvement in a mother or sister's history of breast cancer increases the risk to 5–6 fold.[29] Familial breast cancer was present in 10% of our sample population. Therefore, enhancing students' awareness of the familial history of this disease is essential for early detection and prevention.

Among the subjects in our study who were aware of routine BSE practice, only four indicated BSE was a preventive measure, and eleven recognized BSE as a screening method. Moreover, a study in Malaysia showed prevalence rate for regular BSE practice among female medical students aged 20 was 24.4%.[31] These results emphasize that even if they were aware of the existence of BSE from an online video platform, they lacked sufficient knowledge and needed additional information through their medical curricula.

Conclusions

This study revealed a poor level of knowledge regarding breast cancer among medical students. However, after being given health education about breast cancer and BSE and assessed using the Breast Module of the Cancer Awareness Measure, correct answers were increased. Thus, it is necessary to address this gap on an educational level by modifying the medical curriculum to

include extensive training on breast cancer preventive measures and early diagnosis.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This study was supported by the Grant of the Ministry of Research and Technology/National Research and Innovation Agency.

References

1. Angrainy R. Hubungan pengetahuan, sikap tentang SADARI dalam mendeteksi dini kanker payudara pada remaja. J Endurance. 2017;2(2):232–8.
2. Momenimovahed Z, Salehiniya H. Epidemiological characteristics of and risk factors for breast cancer in the world. Breast Cancer (Dove Med Press). 2019;11:151–64.
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394–424.
4. Hortobagyi GN, de la Garza Salazar J, Pritchard K, Amadori D, Haidinger R, Hudis CA, et al.; ABREAST Investigators. The global breast cancer burden: variations in epidemiology and survival. Clin Breast Cancer. 2005;6(5):391–401.
5. Wang L. Early diagnosis of breast cancer. Sensors (Basel). 2017;17(7):1572.
6. Thompson PA, Ambrosone C. Molecular epidemiology of genetic polymorphisms in estrogen metabolizing enzymes in human breast cancer. J Natl Cancer Inst Monogr. 2000;(27):125–34.
7. Kwong A, Shin VY, Ho JC, Kang E, Nakamura S, Teo SH, et al. Comprehensive spectrum of BRCA1 and BRCA2 deleterious mutations in breast cancer in Asian countries. J Med Genet. 2016;53(1):15–23.
8. Lakhani SR, Reis-Filho JS, Fulford L, Penault-Llorca F, van der Vijver M, Parry S, et al. Prediction of BRCA1 status in patients with breast cancer using estrogen receptor and basal phenotype. Clin Cancer Res. 2005;11(14):5175–80.
9. Rezano A, Kuwahara K, Yamamoto-Ibusuki M, Kitabatake M, Moolthiya P, Phimsen S, et al. Breast cancers with a high DSS1 expression that potentially maintains BRCA2 stability have poor prognosis in the relapse-free survival. BMC Cancer. 2013;13:562.
10. Shalini, Varghese D, Nayak M. Awareness and impact of education on breast self examination among college going girls. Indian J Palliat Care. 2011;17(2):150–4.
11. Rahman SA, Al-Marzouki A, Otim M, Khalil Khayat NEH, Yousuf R, Rahman P. Awareness about breast cancer and breast self-examination among female students at the University of Sharjah: a cross-sectional study. Asian Pac J Cancer Prev. 2019;20(6):1901–8.
12. Koc G, Gulen-Savas H, Ergol S, Yildirim-Cetinkaya M, Aydin N. Female university students' knowledge and practice of breast self-examination in Turkey. Niger J Clin Pract. 2019;22(3):410–5.
13. Dewi TK, Massar K, Ruiter RAC, Leonardi T. Determinants of breast self-examination practice among women in Surabaya, Indonesia: an application of the health belief model. BMC Public Health. 2019;19(1):1581.
14. Rızalar S, Avcı İA, Żołądkiewicz P, Altay B, Moraczewska I. University students' awareness of breast and cervical cancers: a comparison of two countries and two different cultures. J Breast Health. 2017;13(2):77–82.
15. Linsell L, Forbes LJ, Burgess C, Kapari M, Thurnham A, Ramirez AJ. Validation of a measurement tool to assess awareness of breast cancer. Eur J Cancer. 2010;46(8):1374–81.
16. Grunfeld EA, Ramirez AJ, Hunter MS, Richards MA. Women's knowledge and beliefs regarding breast cancer. Br J Cancer. 2002;86(9):1373–8.
17. Nurdiawan W, Odillia C, Priyas MR, Radinda YR, Ahmad NA, Ningsih NA, et al. Knowledge level towards cervical cancer among students of Baabul Kamil Vocational High School. GMHC. 2020;8(3):226–32.
18. Camiz S. The Guttman effect: its interpretation and a new redressing method. Data Anal Bull. 2005;5:7–34.
19. International Agency for Research on Cancer. GLOBOCAN 2020: estimated cancer incidence, mortality, and

prevalence in Indonesia in 2018 [Internet]. Lyon: International Agency for Research on Cancer; 2020 [cited 2021 November 20]. Available from: https://gco.iarc.fr/today/online-analysis-map?v=2020&mode=population&mode_population=continents&population=900&populations=900&key=crude_rate&sex=2&cancer=20&type=1&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&nb_items=10&group_cancer=0&include_nmsc=1&include_nmsc_other=1&projection=natural-earth&color_palette=default&map_scale=quantile&map_nb_colors=5&continent=4&show_ranking=0&rotate=%255B10%252C0%255D.
20. Ng CH, Pathy NB, Taib NA, Teh YC, Mun KS, Amiruddin A, et al. Comparison of breast cancer in Indonesia and Malaysia – a clinico-pathological study between Dharmais Cancer Center Jakarta and University Malaya Medical Centre, Kuala Lumpur. Asian Pac J Cancer Prev. 2011;12(11):2943–6.
21. McPherson K, Steel CM, Dixon JM. ABC of breast disease. Breast cancer epidemiology, risk factors, and genetics. BMJ. 2000;321(7261):624–8.
22. Lauver D. Theoretical perspectives relevant to breast self-examination. Adv Nursing Sci. 1987;9(4):16–24.
23. Kementerian Kesehatan Republik Indonesia. Panduan program nasional gerakan pencegahan dan deteksi dini kanker leher rahim dan kanker payudara [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2015 April 21 [cited 2021 December 2]. Available from: http://p2ptm.kemkes.go.id/uploads/2016/10/Panduan-Program-Nasional-Gerakan-Pencegahan-dan-Deteksi-Dini-Kanker-Kanker-Leher-Rahim-dan-Kanker-Payudara-21-April-2015.pdf.
24. Anderson BO, Yip CH, Smith RA, Shyyan R, Sener SF, Eniu A, et al. Guideline implementation for breast healthcare in low-income and middle-income countries: overview of the breast health global initiative global summit. Cancer. 2008;113(8 Suppl):2221–43.
25. Erdem Ö, Toktaş İ. Knowledge, attitudes, and behaviors about breast self-examination and mammography among female primary healthcare workers in Diyarbakir, Turkey. Biomed Res Int. 2016;2016:6490156.
26. Erkoç A, Oran F, Yorulmaz H. The effect of training on nursing students' knowledge about the breast self-examination (BSE). J Breast Health. 2011;7(2):101–5.
27. Alpteker H, Avci A. Determine the knowledge of the women about breast cancer and their practice about breast self examination. J Breast Health. 2010;6(2):74–9.
28. Jones ME, Schoemaker MK, Wright LB, Ashworth A, Swedlow AJ. Smoking and Risk of Breast Cancer in Generation Study Cohort. Breast Cancer Res. 2017;19:118.
29. Güner İC, Tetik A, Gönener HD. Determination of women's knowledge, attitude and behaviours about the self examination of breast. Gaziantep Med J. 2007;13(2):55–60.
30. Heena H, Durrani S, Riaz M, AlFayyad I, Tabasim R, Parvez G, et al. Knowledge, attitudes, and practices related to breast cancer screening among female health care professionals: a cross sectional study. BMC Womens Health. 2019;19(1):122.
31. Chee H, Rashidah S, Shamsuddin K, Intan O. Factors related to the practice of breast self examination (BSE) and Pap smear screening among Malaysian women workers in selected electronics factories. BMC Womens Health. 2003;3(1):3.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8961

GMHC. 2022;10(1):43–48
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Immunization Coverage and Associated Factors in Aceh Indonesia

Iin Nurlinawati, Mukhlissul Faatih
National Research and Innovation Agency, Jakarta, Indonesia

Abstract

Few studies have looked into why global immunization coverage has plummeted, particularly in Indonesia. The Indonesian government had a childhood immunization program including in Aceh. This study aimed to learn more about immunization coverage in Aceh, Indonesia, and the factors that influence it. This cross-sectional study relied on data from the National Basic Health Surveys conducted in 2013 and 2018. The children in this study ranged in age from 12 to 23. The coverage of vaccines in Aceh fell by 50% between 2013 and 2018. (38.3% to 19.5%, the lowest in Indonesia). The number of children in Aceh who did not receive immunizations increased by 100%. (19.8% to 40.9%). While the percentage of children who have not received their complete vaccination has decreased by 5% (41.9% to 39.56%). The characteristics of the head of household with unvaccinated children were largely poor education, and the majority came from the poorest quartile of wealth. The most common reasons for refusal were families' refusal to allow immunization (43%) and fear of post-immunization fever (32%). Unvaccinated children come from low-income, low-educated families who refuse immunization.

Keywords: Immunizations, National Basic Health Survey

Introduction

Comprehensive basic immunization for infants aged 0–12 months can prevent roughly 3 million children from dying each year from vaccine-preventable infectious illnesses. Immunization can prevent about one-third of all fatalities in children under five. Vaccines were the most cost-efficient and effective technique for reducing disease, paralysis, and death caused by infectious illnesses. In 2012, the World Health Organization (WHO) suggested that the global action plan for 2011–2020 include a requirement that national immunization coverage achieves at least 90%. A district/city must have a vaccination coverage of at least 80%. The Indonesian government had a childhood immunization program. According to the Ministry of Health, tuberculosis, diphtheria, pertussis, measles, polio, tetanus, and hepatitis B are just a few diseases that can be averted by immunization. BCG immunization was given to babies under three months; polio immunization was given to newborns, with the following three doses given in four weeks at the earliest. DPPT-BH immunization was given to babies aged two months, three months, and four months with a minimum interval of four weeks. Measles immunization was given to babies aged two months, three months, and four months with a minimum interval of four weeks, and the measles vaccine was given to babies as soon as they were nine months old.[1]

Few researchers have addressed the fact that global immunization coverage has declined dramatically.[2–5] Simultaneously, public concern about perceived vaccine safety issues has grown. This increased level of concern frequently leads to an increase in parents refusing vaccines for their children. There were various reasons why parents refused, postponed, or were hesitant to vaccinate their children.[3] Reduced parental immunization coverage has been linked to an increased risk of vaccine-preventable disease in children and an increased community risk of contagious disease outbreaks.[5]

Indonesia's National Institute of Health Research and Development (NIHRD) has conducted community-based health research known as Basic Health Research (*Riset Kesehatan Dasar*/*Riskesdas*). With a large number of samples, *Riskesdas* data represented the public health situation at the national, provincial, and city/district levels. It was founded in 2007 to collect basic data and health indicators that depict health conditions. Data for *Riskesdas* 2013 and 2018 were collected at the household and individual levels. The data covers a wide range of topics, one of which was

Received: 23 November 2021; Revised: 17 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Mukhlissul Faatih, M.Biotek. National Research and Innovation Agency. Jln. M.H. Thamrin No. 8, Central Jakarta 10340, Special Capital Region of Jakarta, Indonesia. E-mail: mukhlissulfaatih@gmail.com

immunization coverage.

Aceh was one of Indonesia's provinces designated as a special territory. There was a severe lack of research on declining immunization coverage in Aceh. As a result, it was critical to monitor immunization coverage and understand its associations. This study aimed to provide information on immunization coverage in Aceh and the factors that influence it in Aceh, Indonesia.

Methods

This study was a secondary data analysis of the Ministry of Health's Basic Health Research (*Riskesdas*), conducted in 2013 and 2018 with a cross-sectional study design. *Riskesdas* is community-based research that used household and member-of-household samples to represent the population in each of the 34 provinces' districts or cities. Trained enumerators or field officers used structured and standardized questionnaires to collect data. This study's population included all of the children and their parents. The study's inclusion criteria were children aged 12 to 23 months. Children who did not have immunization records or whose immunization status could not be determined were excluded from the study (missing). Because of incomplete/blank records in the Weighing Control Card/the Health of Mother and Child Book, parents or family members may forget whether their children have been immunized or may be unable to accept certain types of immunization.

Immunization data were gathered from the mother or other household members aware of this information. Data supported by immunization records from the Health of Mother and Child Book (*Buku Kesehatan Ibu dan Anak*, KIA), records from the Weighing Control Card (*Kartu Menuju Sehat*, KMS), or records from other child health book records. A child was considered to have "complete" basic immunization if he or she has received the following immunizations: one HB-0 immunization, one BCG immunization, three DPT-HB/DPT-HB-HiB immunizations, four polio immunizations or three IPV immunizations, and one measles immunization, as recommended by the Indonesian government.[1] As a result, when a child failed to receive one of the vaccines recommended by the Indonesian government, the child was declared to have "incomplete" immunization. If the children had no immunizations, "no immunization" was declared. Data immunization is being analyzed with SPSS. For several reasons, the analysis was limited to children aged 12–23 months: (1) the results of the analysis may be close to the estimate of "validity immunization"; and (2) potential bias, as the memories of the mothers interviewed at the time of data collection were less than those of the age groups above.

This study has received ethics approval from the Health Research Ethics Committee, National Institute of Health Research and Development, number LB.02.01/2/KE.024/2018.

Results

The data analyzed in 2013 was 15,727, while there were 18,165 respondents in 2018. Aceh's immunization coverage in 2013 was 38.3 % lower in 2018, falling to 19.5 %, making Aceh the province with the most inadequate immunization coverage in 2018. Between 2013 and 2018, the number of children in Aceh who did not receive vaccines increased significantly, from 19.8 % to 40.9%. While the percentage of people who have not received all of their vaccines has decreased from 41.9 % in 2013 to 39.56 % in 2018.[6–9]

Almost all districts/cities in Aceh experienced a decline in immunization coverage. Only three of the twenty-three districts have increased immunization coverage. The characteristics of the head of a household with unimmunized children were mainly from the low education group: mostly elementary school graduates (2013 data) in Table 1, an elementary school dropout (2018 data) in Table 2. The majority came from low-income families with occupations such as farmers/laborers/fishermen. The main reasons for refusing immunization were family refusal (43%), fear of post-immunization fever (32%), being busy/troublesome (15%), children being frequently sick (8.3%), immunization points being too far away (6%) and immunization points were unknown (2.1%). The lower the education level, the more households refuse to immunize their children. In contrast, the higher the level of parental education, the higher the level of immunization coverage.

Discussion

In 2018, Indonesian immunization coverage fell by 1.3% to 57.9%,[7,9] falling short of the WHO-mandated national target of 90% coverage. Some Indonesian provinces had decreased

Table 1 Proportion of Complete Basic Immunizations for Children 12–23 Months by Respondent Characteristics, Aceh 2013

Characteristics	Basic Immunization		
	Complete	Not Complete	No Immunization
Sex			
Male	39.4	40	20.6
Female	37.3	43.9	18.8
Education			
Never attending school	35.7	53.8	10.5
Not graduate elementary school	31.4	45.9	22.7
Graduate elementary school	26.7	41.6	31.7
Graduate junior high school	37	49.2	13.8
Graduate high school	42.2	41.1	16.8
Graduate diploma/bachelor	61.7	25.1	13.3
Professions			
Unemployed	33.6	49.4	17
Employees	57.8	30.5	11.7
Entrepreneurs	31.9	49.1	19
Farmers/laborer/fisherman	35.2	41.7	23.2
Others	51.5	29.2	19.3
Residence			
Urban	42.8	38.6	18.6
Rural	36.5	43.3	20.2
Wealth quantile index			
Lowest	21.7	36.9	41.4
Middle-low	35.6	48.6	15.8
Middle	32.7	52.6	14.7
Middle-high	52.6	34.8	12.6
Highest	50.6	35.5	13.9

Note: *Riskesdas* 2013

immunization coverage, with Aceh becoming the province with the lowest coverage (19.5%).[9] Lack of immunization for children or parental refusal of vaccines was becoming increasingly common in Aceh. According to Ministry of Health regulations, more children were not immunized, and fewer children received complete immunizations in recent years. Almost all districts/cities in Aceh had refusals to vaccinate their children. Previous research has found that underimmunization increased in children born between 2000 and 2011, while another study discovered that lack of immunization increased in children born between 2004 and 2008.[5] According to the Romanian National Centre for Infectious Disease Control and Prevention (CNSCBT), immunization coverage has decreased from 95% in 2008 to 80% in 2013. According to the CNSCBT, refusal of immunizations increased from 22.4% to 33.2% in 2009 and 2011, respectively, with the most significant increase occurring in urban areas.[10]

According to *Riskesdas* 2013, most parents who oppose immunizations have a low level of education, which denotes elementary school graduates and below. Meanwhile, parents who provided complete immunizations to their children came from a higher level of education, which was a graduated junior high school or higher (Table 1). In 2018, more parents with higher education refused to give their children vaccines or gave them incomplete immunizations (Table 2). The parents' professional backgrounds also determined this. In 2018, more parents were working as employees who refused the vaccine. The current findings contradict a previous study conducted in Aceh in 2013 by Thaib et al.,[11] who discovered that immunization coverage was relatively high in Aceh, and there was no significant relationship between father education and employment. Still, there was a relationship between maternal education and immunization coverage.[11] Another study found that mothers with less education were more likely to give their children incomplete immunizations.[12] Another

Table 2 Proportion of Complete Basic Immunizations for Children 12–23 Months by Respondent Characteristics, Aceh 2018

Characteristics	Basic Immunization			
	Complete	Not Complete	No Immunization	n
Sex				
Male	18.97	40.81	40.2	444
Female	20.11	38.31	41.6	442
Education				
Never attending school	23.05	29.82	47.1	17
Not graduate elementary school	8.89	32.34	58.8	101
Graduate elementary school	16.26	40.38	43.4	179
Graduate junior high school	20.47	38.63	40.9	175
Graduate high school	22.36	41.43	36.2	299
Graduate diploma/bachelor	24.74	42.68	32.6	115
Professions				
Unemployed	21.52	33.6	44.9	70
Government employees	28.66	44.72	26.6	69
Employees	35.9	45.1	19	44
Entrepreneurs	16.04	40.39	43.6	226
Farmers/laborer	18.89	38.15	43	320
Fisherman	25.34	27.8	46.9	40
Drivers/maids	13.28	46.38	40.3	66
Others	12.94	41.68	45.4	51
Residence				
Urban	17.14	42.53	40.3	270
Rural	20.59	38.26	41.1	616

Note: *Riskesdas* 2013

study found that the mother's age, educational level, marital status, occupation, and place of residence had no significant relationship with complete immunization coverage in Central Ethiopia in 2011.[13] It was necessary to educate parents and improve the knowledge of the health workforce. To change parents' attitudes toward immunization, it is essential to educate them about the importance of vaccination in preventing contagious diseases in children.

Not only did a health worker provide information about complete immunizations, but it also required a unique approach to reduce vaccine hesitancy among parents. According to William's[14] research, a solution would be to categorize parents based on their vaccine beliefs, adjust communication styles based on their categories, and finally guide parents to discuss their motivations for vaccination while avoiding persuasive language and arguments. In addition to the alleged discussion style, paramedics can use a participatory discussion style strategy. Another strategy was to use storytelling methods instead of scientific information about the importance of vaccines, as was customary. This method of storytelling was similar to the system employed by the well-known anti-vaccine website.[14] In Aceh, it was also necessary to have an approach from community leaders and respected religious leaders and use a discussion approach. Other research in Aceh found that maternal knowledge, the role of community leaders/religious leaders, and mother participation all affected the completeness of immunizations in children.[15]

Aceh had the most significant decline in immunization coverage compared to other provinces in Indonesia. The main reasons for refusing immunization were family refusal and fear of post-immunization fever. According to Marlina et al.,[15] mothers who have supporting families have more complete immunization coverage than mothers who do not have supporting families. The chi-square test results yielded a p value of 0.03, indicating a significant relationship between family support and infant immunization completeness.[15] Recently, anti-immunization sentiment has grown in Indonesia, particularly in Aceh, an Islamic-ruled province. The most influential news was that the main component of the vaccine maker's product was

not permissible or haram for Muslim families.[16] A positive perception of the utility of immunization will lead to the widespread acceptance of vaccines. It occurs in some Muslim countries worldwide, including Afghanistan, Malaysia, and Pakistan.[2] This finding was consistent with the results of Harapan et al.[17] in Aceh, who found that the main reason for receiving the vaccine was complete disease protection (25.2%), and the vaccine must be halal or not contain unclean ingredients (22.5%). In Muslim countries, educated parents, were becoming more hesitant and unwilling to have their children immunized. It was critical to understand why parents hesitate or refuse to vaccinate their children to provide appropriate solutions. It was forbidden under Islamic law to use drugs or ingredients containing illegal substances, such as pork products and derivatives from pigs. They refused to give a vaccine to their children. There is currently no halal certification for vaccines worldwide. Parents in Aceh were hesitant to immunize their children due to uncertainty about the halal status of basic immunization.[15] Vaccine refusal was not limited to Muslim countries; according to a separate study conducted in the United States, religious reasons were the most common reason parents refuse immunizations for their children. Other factors include safety concerns, personal beliefs, and a desire for more information about the vaccine.[3] There was a misunderstanding among parents, making it difficult for them to provide complete immunization to their children. They would instead risk contracting a contagious disease than receiving a vaccination because they believe that immunity from disease is superior to the exemption from vaccination. Furthermore, there was evidence from the media, the internet, and anti-vaccine groups that some vaccines can cause permanent disability in children, such as the MMR vaccine causing autism and hepatitis B causing chronic fatigue syndrome or multiple sclerosis. As a result, they were concerned about the vaccine's safety.[18]

This study had some limitations because some factors could not be quantified. Because of the limited data from the Indonesian Basic Health Research, only a few variables could be elaborated on. In addition, there is potential bias because the memories of the mothers or other family members interviewed about immunization history may have faded at the time of data collection if there is no data in the KIA book or KMS. Despite these limitations, policymakers needed to know what occurred in Aceh. Authorities in the Philippines declared a highly contagious measles virus outbreak in January 2019 (1,813 measles cases and 26 deaths). There has been a 74% increase since 2018. Unvaccinated children in the Philippines have risen to 2.4 million due to parents' reluctance to immunize their children at government health centers.[19,20] Learning from the Philippines, Indonesia must be concerned about widespread anti-immunization resistance in Aceh and other provinces. It was feared that an infectious disease outbreak would occur in Indonesia if immunization refusal continued and were not addressed correctly. In this case, the Ministry of Health, the government must act immediately to ensure that the refusal to provide basic immunization to children did not cause future harm.

Conclusions

From 2013 to 2018, complete immunization coverage in Aceh tended to decline and became the lowest immunization coverage In 2018. In 2013, the head of a household with children who were not immunized mainly had low education. Meanwhile, in 2018 were primarily from higher education. They refused immunization because their families did not permit it, and they were afraid of post-immunization fever.

Conflict of Interest

All author declares that there was no conflict of interest in this article.

Acknowledgment

We are grateful to the Indonesia Ministry of Health's National Institute of Health Research and Development (NIHRD) for allowing us to use their valuable work on Indonesia Basic Health Research.

References

1. Peraturan Menteri Kesehatan Republik Indonesia Nomor 12 Tahun 2017 tentang Penyelenggaraan Imunisasi.
2. Ahmed A, Leee K, Bukhsh A, Al-Worafi Y, Sarker MMR, Ming L, et al. Outbreak of vaccine-preventable diseases in Muslim majority countries. J Infect Public Health. 2018;11(2):153–5.

3. McKee C, Bohannon K. Exploring the reasons behind parental refusal of vaccines. J Pediatr Pharmacol Ther. 2016;21(2):104–9.
4. Smith TC. Vaccine rejection and hesitancy: a review and call to action. Open Forum Infect Dis. 2017;4(3):ofx146.
5. Lieu TA, Ray GT, Klein NP, Chung C, Kulldorff M. Geographic clusters in underimmunization and vaccine refusal. Pediatrics. 2015;135(2):280–9.
6. National Institute of Health Research and Development, Ministry of Health of Republic of Indonesia. Basic health research (Riskesdas) 2013 [Internet]. Jakarta: National Institute of Health Research and Development, Ministry of Health of Republic of Indonesia; 2013 [cited 2021 December 15]. Available from: https://labmandat.litbang.kemkes.go.id/ccount/click.php?id=10.
7. Kementerian Kesehatan Republik Indonesia. Riskesdas Provinsi Aceh 2013. Jakarta: Lembaga Penerbitan Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia; 2013.
8. Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia. Laporan Nasional Riskesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019.
9. Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia. Laporan Provinsi Aceh Riskesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019.
10. Barbacariu CL. Parents' refusal to vaccinate their children: an increasing social phenomenon which threatens public health. Procedia Soc Behav Sci. 2014;149:84–91.
11. Thaib TM, Darussalam D, Yusuf S, Andid R. Cakupan imunisasi dasar anak usia 1–5 tahun dan beberapa faktor yang berhubungan di Poliklinik Anak Rumah Sakit Ibu dan Anak (RSIA) Banda Aceh. Sari Pediatri. 2013;14(5):283–7.
12. Suryawati I, Bakhtiar, Abdullah A. Cakupan imunisasi dasar anak ditinjau dari pendekatan health belief model. JIK. 2016;4(1):114–25.
13. Etana B, Deressa W. Factors associated with complete immunization coverage in children aged 12–23 months in Ambo Woreda, Central Ethiopia. BMC Public Health. 2012;12:566.
14. Williams SE. What are the factors that contribute to parental vaccine-hesitancy and what can we do about it? Hum Vaccin Immunother. 2014;10(9):2584–96.
15. Marlina, Usman S, Marzuki. Faktor kelengkapan imunisasi dasar pada bayi di Puskesmas Sawang Kabupaten Aceh Utara. Jukema. 2017;3(1):212–8.
16. Yufika A, Wagner AL, Nawawi Y, Wahyuniati N, Anwar S, Yusri F, et al. Parents' hesitancy towards vaccination in Indonesia: a cross-sectional study in Indonesia. Vaccine. 2020;38(11):2592–9.
17. Harapan H, Anwar S, Setiawan AM, Sasmono RT; Aceh Dengue Study. Dengue vaccine acceptance and associated factors in Indonesia: a community-based cross-sectional survey in Aceh. Vaccine. 2016;34(32):3670–5.
18. Esposito S, Principi N, Cornaglia G; ESCMID Vaccine Study Group (EVASG). Barriers to the vaccination of children and adolescents and possible solutions. Clin Microbiol Infect. 2014;20(Suppl 5):25–31.
19. Dyer O. Philippines measles outbreak is deadliest yet as vaccine scepticism spurs disease comeback. BMJ. 2019;364:l739.
20. Ochani RK, Yasmin F, Tariq A, Shaikh A. Philippines hit by deadly measles outbreak – a wakeup call? Infez Med. 2019;27(3):353–4.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8893

GMHC. 2022;10(1):49–55
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Brixia Score for Predicting Mortality and Length of Stay in COVID-19 Confirmed Patients at the Hospital in Bandung

Dede Setiapriagung,[1] Cice Tresnasari,[2] Fajar Awalia Yulianto[3]

[1]Department of Radiology, RS Al Islam/Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [2]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia, [3]Department of Public Health, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia

Abstract

On March 11, 2020, the World Health Organization declared the COVID-19 pandemic. This disease damages the lung and resulting mild to severe pneumonia. This study aimed to determine the value of the Brixia score for predicting mortality and length of stay of COVID-19 confirmed patients. The study design was case-control with secondary data from digital medical records of COVID-19 confirmed patients (December 2020 to February 2021). All patients' chest x-rays (CXR) were scored using the Brixia score. Logistic regression and the Spearman rank correlation test were used to identify mortality and length of stay predictors. There were 636 subjects included in this study, with the proportion of deceased patients (case group) being 20.3% (95% CI=17.33, 23.59%). Most CXR findings had signs of pneumonia (95.1%), including ground-glass opacities (GGOs) mixed with consolidation. The distribution of GGOs and consolidation were most frequent in the peripheral of survived patients (83.9%), while the deceased group had peripheral involvements mixed with medial (45.0%) and bilateral (22.2%). The mean Brixia score in the group of decease patients was significantly higher than the group of survived patients (11.95 vs 6.73, p=0.00). Brixia score had an OR of 1.14, 95% CI=1.07, 1.21 after adjusting by age, SpO_2 level, and comorbid. The chance of dying was higher than 50% if the Brixia score reached to score of 15 (probability=49%, 95% CI=41, 56%). However, the Brixia score has no significant correlation with length of stay (rho=0.05, p=0.24). In conclusion, the CXR Brixia score can predict mortality, but it can not predict the length of stay of hospitalized COVID-19 confirmed patients.

Keywords: Brixia score, COVID-19, length of stay, mortality

Introduction

On March 11, 2020, the World Health Organization declared the COVID-19 pandemic. The disease began in Wuhan, China, and spread to various parts, including Indonesia. The first cases in Indonesia were announced on March 2, 2020. On March 14, 2020, the Indonesian government declared the Coronavirus pandemic a national disaster.[1] Until January 31, 2021, reaching 175,095 active cases with 29,998 cases died.[2]

Clinical symptoms of COVID-19 patients can vary from asymptomatic, mild, moderate, and severe pneumonia symptoms and critical conditions such as multi-organ failure. The current diagnosis of COVID-19 is based on the results of the real-time reverse transcriptase-polymerase chain reaction (RT-PCR) examination. Still, this examination has limitations such as scarcity, time consumption, and various sensitivities (30–60%).[3,4]

This disease damages the lung and resulting mild to severe pneumonia. Therefore, radiological examination becomes essential to support the diagnosis. A chest CT scan is a more sensitive radiological examination to assess lung abnormalities.[4] However, it has limitations from the hassle of becoming a serial examination tool because of increased risk of x-ray radiation and difficulties of transporting a patient to the CT-scan room. Lastly, this device was not easy to find in all health facilities in Indonesia. Thus, a chest x-ray (CXR) examination is still a reasonable method to detect the damage.

However, CXR examination is less sensitive than CT-scan in detecting lung abnormalities, especially in the early stages of the disease. Therefore, CXR can be a diagnostic tool for serial tests monitoring the development of lung abnormalities of COVID-19 patients in the current emergency.

Borghesi and Maroldi[5] in May 2020, introduced the Brixia score, a CXR assessment system to measure lung abnormalities in pneumonia due to COVID-19. Brixia scores assess

Received: 16 November 2021; Revised: 29 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Dede Setiapriagung, dr., Sp.Rad., M.H.Kes. Department of Radiology, RS Al Islam. Jln. Soekarno-Hatta No. 644, Bandung 40286, West Java, Indonesia. E-mail: d2setiapriagung@gmail.com

pulmonary parenchymal abnormalities based on the degree of consolidation of lung tissue.

We found several studies that connect the association between Brixia score with a worse outcome to date. However, the probability (risk) of mortality and length of stay (LOS) predicted by the Brixia score was not found. Therefore, the purpose of the study was to analyze the value of the Brixia Score for predicting mortality and LOS of COVID-19 confirmed patients.

Methods

A case-control study from 636 COVID-19 confirmed patients were presented to the Al Islam Hospital, Bandung, between December 2020–February 2021. The case was deceased patients, while control was those discharged from the hospital. Inclusion criteria were hospitalized COVID-19 patients confirmed by RT-PCR, over 17 years old, and performed a CXR when admitted to the hospital. Exclusion criteria were poor quality of CXR and patients with comorbid such as chronic lung diseases (e.g., pulmonary tuberculosis).

All CXR were reexamined to assess the presence of ground-glass opacities (GGOs) or consolidated lesions and their distribution pattern. In addition, the severity of the opacities was evaluated using the Brixia score by an experienced radiologist.

The CXR Brixia score of COVID-19 confirmed patients used in this study is the score developed by Borghesi and Maroldi.[5] There are two steps to make this score:

The first step, a posteroanterior or anteroposterior CXR, was divided into six zones (A, B, C, D, E, F), zones A, B, and C in the right zone D, E, and F in the left lobe. Zones A and D are the upper zones positioned above the inferior wall of the aortic arch. Zones B and E are the middle zones set below the upper zone and above the right inferior pulmonary vein (hilar structure). Zones C and F are the lower zones, positioned below the right inferior pulmonary vein (lung base).

Each zone is given a score in the second step based on the lung opacities found. For example, score 0 for no lung abnormalities, score one is an interstitial infiltrate, and score two is interstitial and alveolar infiltration (interstitial dominant). While score 3: there is interstitial and alveolar infiltration (alveolar dominant). Brixia score is the result of accumulated scores from six lung zones.

Predictors of mortality and length of stay were identified among age, sex, comorbidities, and duration of illness before treatment. It is also based on measured SpO_2, calcium level, sodium, potassium, and CXR findings (laterality, type of parenchymal opacity, lung zones involved, Brixia score). The analysis used was logistic regression and the Spearman rank correlation test.

This study was approved by the Health Research Ethics Committee of Al Islam Hospital Bandung, number 007/KEPPIN-RSAI/05/2021. The ethical aspect of this study is to respect the life of the research subject, confidentiality of the identity information of the research subject/patient, justice, and not cause harm to the research subject.

Results

Of the 636 COVID-19 confirmed patients, 355 (55.8%) of them are male, with an age range of 17 to 88 years. The deceased patients was 129 people (20.3%, 95% CI=17.33, 23.59%), and survived patients were 507 people (79.7%, 95% CI=76.4, 82.67%).

The decease group did not have a significant proportion difference in sex (p=0.11). However, male patients who died had a slightly higher percentage (27.4%) with a p value of 0.001 than patients who did not have comorbid (16.7%).

The Brixia score system was created as a semi-quantitative assessment of the severity and progression of lung abnormalities in COVID-19 confirmed patients.

Radiologically, the CXR Brixia score describes the severity of pneumonia in COVID-19 confirmed patients. Most of them (92.1%) had pneumonia with interstitial lesions, i.e., ground-glass opacities mixed with consolidated lesions (Table 1 and Figure).

Table 2 shows that Brixia scores in the upper, middle, and lower lung zones are always higher in the deceased group than in the survival group. In addition, the Brixia score in the lower lung zone is higher than in the other zones, both in the decease and the survived group.

To analyze whether a CXR Brixia score could be a predictor of mortality, we included some variables that might affect mortality, as seen in Table 3.

Table 1 Distribution of Pneumonia Lesions in COVID-19 Confirmed Patients

Characteristics	Outcome			p
	Survived n (%)	Deceased n (%)	Total n (%)	
Distribution 1				0.002
None	31 (100)	0 (0)	31 (100)	
Peripheral	416 (83.9)	80 (16.1)	498 (100)	
Peripheral-medial	60 (55)	49 (45)	109 (100)	
Total	507 (79.7)	129 (20.3)	636 (100)	
Distribution 2				0.000
None	31 (100)	0 (0)	31 (100)	
Unilateral	35 (92.1)	3 (7.9)	38 (100)	
Bilateral	441 (77.8)	126 (22.2)	567 (100)	
Total	507 (79.7)	129 (20.3)	636 (100)	

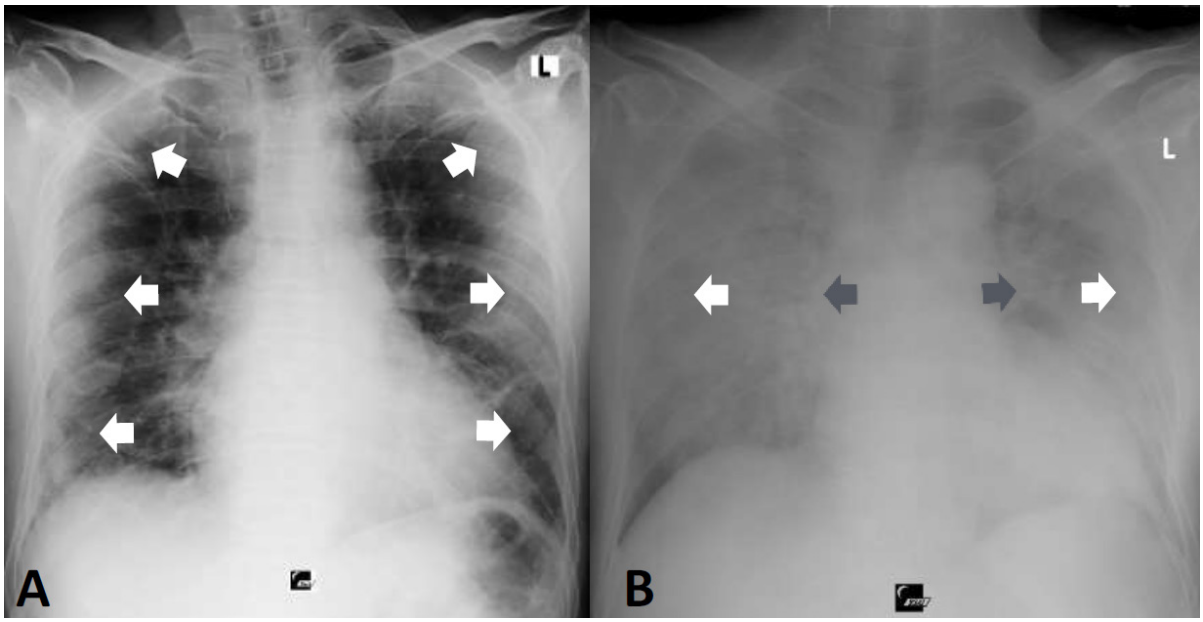

Figure Lung Abnormalities of CXR COVID-19 Patients at Al Islam Hospital Bandung
Chest x-ray (CXR) findings show ground glass opacities (GGOs) admixed with consolidation. (**A**) Mostly peripheral (white arrow) and bilateral, Brixia score of 9. (**B**) Peripheral (white arrow)-medial (black arrow) and bilateral, Brixia score of 18

Discussion

In this study, 95.1% of CXR findings of COVID-19 confirmed patients had signs of pneumonia. The abnormalities on CXR were dominated by ground-glass opacities mixed with consolidated lesions. Several studies on radiological images of CXR and CT scans of COVID-19 patients showed similar results. In the study of Yoon et al.,[6] Smith et al.,[7] and Wong et al.,[8] radiological images of pneumonia is a ground glass opacities or mixed with consolidated lesions.

Ground glass opacities are a slight increase in the opacity of lung tissue with the pattern of pulmonary blood vessels that are still visible.[9,10] Consolidation is a pathological process of filling the alveoli with fluid, pus, blood, cells, or other substances that can give opacities of lobar, diffuse or multifocal.[11]

SARS-CoV-2 attacks the lungs because the epithelial cells of alveolus type II express ACE-2 a lot.[12] ACE-2 is a functional receptor for SARS-

Table 2 Distribution of Brixia Score in COVID-19 Confirmed Patients According to Lung Zone

Brixia Score	Outcome	
	Survived	Deceased
Upper zones		
Median	0	2
IQR	0–2	1–4
Mean	0.92	2.63
SD	1.35	1.19
Skewness	1.6	0.29
Kurtosis	5.1	1.94
Middle zones		
Median	2	5
IQR	1–4	3–6
Mean	2.38	4.39
SD	2.02	1.82
Skewness	0.44	−0.89
Kurtosis	1.97	2.58
Lower zones		
Median	3	6
IQR	2–5	4–6
Mean	3.45	4.88
SD	1.88	1.53
Skewness	−0.13	−1.25
Kurtosis	1.91	3.51

CoV-2. Once SARS-CoV-2 binds to the epithelial cell of type II alveolus, it will continue its life cycle and penetrate the host cell through endocytosis or membrane fusion. It replicates inside the host cell nucleus and produces and releases new viral particles into the host cell's cytoplasm.[13,14]

Replicated viruses in alveolus epithelial cells cause inflammation of the alveolus wall. The alveolus wall thickens, thus giving a picture of increased pulmonary opacity. The process of widespread inflammation causes an exudation of fluid that fills the alveolus in both lung fields, causing the opacity of the lung field to increase, and pulmonary vascularization is no longer visible so that the CXR appears as a picture of consolidation.[10,11,13]

In Table 1, the distribution of lung abnormalities on the CXR most occurred on the peripherals in the survival group (83.9%). In the deceased group, most were peripheral mixed with medial lesions. The CXR image showed a significant difference in damage between the dead and the survived groups. The most dominant lung abnormalities in the deceased group were peripheral mix with medial lesions (45.0%) and bilateral (22.2%).

In Table 2, the mean Brixia score is higher in the lung's lower zone than in other zones in both groups. Similarly, the mean Brixia score was higher in all lung zones in the deceased

Table 3 Frequency Distribution of Observation Variables

Observation Variables	Outcome	
	Survived	Deceased
Age		
Median	54	62
IQR	45–63	57–69
Mean	53.13	62.61
SD	13.94	11.15
Skewness	−0.27	−0.39
Kurtosis	2.67	3.56
Length of stay		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
Duration of illness before treatment	7	4
Median	6–10	3–6
IQR	8.11	5.11
Mean	3.01	3.66
SD	1.07	1.4
Skewness	4.27	4.87
Kurtosis		
SpO_2 level		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
Brixia score		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
Calcium		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
Sodium		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
Potassium		
Median	7	4
IQR	6–10	3–6
Mean	8.11	5.11
SD	3.01	3.66
Skewness	1.07	1.4
Kurtosis	4.27	4.87
INR		
Median	48	50
IQR	40–56	40–60
Mean	45.74	48.83
SD	15.37	16.98
Skewness	−0.77	−0.35
Kurtosis	3.68	2.78

Table 4 Influencing Factors of Confirmed COVID-19 Mortality

Deceased	OR	95% CI		p (z)	p Chi-square	Pseudo R Square
Brixia scores	1.14	1.07	1.21	0.00	0.00	0.32
Age	1.04	1.03	1.07	0.00		
Duration of illness before treatment	0.98	0.94	1.04	0.61		
SpO_2 level	0.0002	0.00	0.003	0.00		
Comorbid	1.61	0.99	2.61	0.05		
Constant	7.15	0.37	138.41	0.19		

group than in the survived group. It means that the Brixia score describes the severity of lung tissue damage that has the potential to increase mortality. Autopsy studies of patients who had died from severe SARS-CoV-2 infection revealed alveolar wall injuries and diffuse alveolar damage consistent with ARDS. However, compared to classical ARDS, autopsy studies also showed a higher presence of thrombus in pulmonary capillaries, suggesting a more significant pathogenic role of thrombotic vasculopathy and microangiopathy in COVID-19-related ARDS. Studies collectively show that thromboembolic occurs more frequently and is associated with higher mortality in COVID-19 confirmed patients.[15]

The mortality rate was 129 people (20.3%), with the subjects' age range of 17–88 years. It is more significant when compared to a meta-analysis conducted by Macedo et al.[16] on 33 articles with the subject of 13,398 COVID-19 patients, the most subjects (45%) from China. The percentage of patient mortality was 11.5%, with the subject's age range from less than one year to 107 years.

In Table 3, the median of LOS of COVID-19 confirmed patients of the survived group was seven days, and the median of LOS of the deceased group was four days. The mean duration of illness before treatment in the survived group was 11.36 days and in the deceased group was 11.35 days. In the times of pandemic that it becomes essential to predict the LOS of COVID-19 confirmed patients to ensure the availability of sufficient bed capacity without the need to reduce care for patients with other diseases.[17]

From Table 3, variables of age, LOS, duration of illness before treatment, SpO_2 levels, calcium, sodium, potassium, and INR are not distributed normally based on differences in mean, median, standard deviation, skewness, and kurtosis. The normal distribution assumptions are only for Brixia scores. The mean Brixia score in the deceased group was 11.95, more significant than the survived group (6.73).

The median age of the deceased group was older than the survived group, but LOS (four days) was three days shorter than the survived group (seven days). There was no difference in the median duration of illness before treatment between the survived group (13 days) and the deceased group (13 days). The median of SpO_2 levels in the deceased group was lower (83%) than in the survived group (94%). There was no significant difference in the median of blood electrolytes in the deceased group and survived group and INR.

The mean Brixia score in the deceased group (11.95) was statistically higher (5.22 95% CI=4.34,

Table 5 Possible Mortality of Confirmed COVID-19 Patients based on Brixia Score

Brixia Score CXR	Possibility of Death	95% CI	
0	0.03	0.01	0.04
1	0.03	0.02	0.05
2	0.04	0.02	0.06
3	0.05	0.03	0
4	0.06	0.04	0.09
5	0.08	0.05	0.11
6	0.1	0.07	0.13
7	0.12	0.09	0.16
8	0.15	0.12	0.19
9	0.19	0.15	0.22
10	0.22	0.19	0.26
11	0.27	0.23	0.31
12	0.32	0.27	0.37
13	0.37	0.32	0.43
14	0.43	0.36	0.49
15	0.49	0.41	0.56
16	0.55	0.47	0.63
17	0.61	0.52	0.69
18	0.66	0.57	0.75

6.1) compared to the survived group (6.73) with a p value of 0.00 (t test). This difference has not shown a possible relationship between Brixia scores with mortality, so it needs to be continued into the logistic regression analysis in Table 4.

In Table 4, it is seen that all the variables that are likely to affect mortality, except comorbid, are all continuous variables. The variable of the duration of illness before treatment is further excluded due to a p value of 0.61. Based on the measure of association used (odds ratio, OR), the risk factors that play the most role in mortality are comorbid with OR=1.61 (95% CI=0.99, 2.61), followed by a CXR Brixia score with OR=1.14 (95% CI=1.07, 1.21). It means that the higher the value of these variables, the greater the mortality risk. Conversely, OR of SpO_2 levels are below one (OR=0.0002, 95% CI=0.00, 0.003), which means the higher the level of SpO_2, the lower the risk of mortality.

A chi-square p value of 0.00 indicates that Brixia scores, age, SpO_2, and comorbid levels are responsible for the 32% mortality variable (pseudo r square). Next, we analyzed OR crude and OR adjusted to see any changes in or initial Brixia score of treatment to find out the presence of interaction variables or confounds with multiple logistic regression.

There was no difference in OR crude CXR Brixia score compared to OR adjusted with the variable of age, SpO_2, and comorbid levels. Therefore, the CXR Brixia score is used to predict mortality. Brixia score prediction analysis of a score of 0 is analyzed to see the possibility of mortality in Table 5. The higher the Brixia score will increase the chances of mortality. The probability of mortality is higher than survival on a Brixia score ≥15 (49%, 95% CI=41.56% chance).

The study results conducted by Setiawati et al.,[18] Maroldi et al.,[19] and Munirathnam et al.[20] showed that the Brixia score correlated significantly with the severity of COVID-19 patients clinically. Maroldi et al.[19] and Munirathnam et al.[20] also found that Brixia scores were external predictors of hospitalized COVID-19 patients, whether surviving or dying.

According to Borghesi et al.,[21] Brixia's high score plus at least one other predictive factor has an increased risk of death while in treatment. In his research, the predictive factors are age and immunosuppressant therapy.

The correlation between Brixia scores with the LOS is calculated statistically, and because the data is not distributed normally, the Spearman rank correlation test (rho=0.05, p=0.24) is used. Unfortunately, there was no significant correlation between Brixia scores and LOS, so Brixia scores cannot be predictors for LOS.

The drawback of this study is that only one radiologist assessed diseased severity based on the Brixia score.

Conclusion

The CXR Brixia score can predict mortality, but it can not predict the length of stay of hospitalized COVID-19 confirmed patients.

Conflict of Interest

The authors do not declare.

References

1. Keputusan Presiden Republik Indonesia Nomor 12 Tahun 2020 tentang Penetapan Bencana Nonalam Penyebaran Corona Virus Disease 2019 (COVID-19) sebagai Bencana Nasional.
2. Kementerian Kesehatan Republik Indonesia. Pedoman pencegahan dan pengendalian corona virus disease (COVID-19). 4th revision [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 March 27 [cited 2021 November 20]. Available from: https://infeksiemerging.kemkes.go.id/download/REV-04_Pedoman_P2_COVID-19__27_Maret2020_TTD1.pdf.
3. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA. 2020;323(11):1061–9.
4. Ai T, Yang Z, Hou H, Zhan C, Chen C, Lv W, et al. Correlation of chest CT and RT-PCR testing for coronavirus disease 2019 (COVID-19) in China: a report of 1014 cases. Radiology. 2020;296(2):E32–40.
5. Borghesi, A, Maroldi R. COVID-19 outbreak in Italy: Experimental chest x-ray scoring system for quantifying and monitoring disease progression. Radiol Med. 2020;125(5):509–13.
6. Yoon SH, Lee KH, Kim JY, Lee YK, Ko H, Kim KH, et al. Chest radiographic and CT findings of the 2019 novel coronavirus disease

(COVID-19): analysis of nine patients treated in Korea. Korean J Radiol. 2020;21(4):494–500.
7. Smith DL, Grenier JP, Batte C, Spieler B. A characteristic chest radiographic pattern in the setting of the COVID-19 pandemic. Radiol Cardiothorac Imaging. 2020;2(5):e200280.
8. Wong HYF, Lam HYS, Fong AHT, Leung ST, Chin TWY, Lo CSY, et al. Frequency and distribution of chest radiographic findings in patients positive for COVID-19. Radiology. 2020;296(2):E72–8.
9. Sánchez-Oro R, Torres Nuez J, Martínez-Sanz G. Radiological findings for diagnosis of SARS-CoV-2 pneumonia (COVID-19). Med Clin (Barc). 2020;155(1):36–40.
10. Chen A, Huang JX, Liao Y, Liu Z, Chen D, Yang C, et al. Differences in clinical and imaging presentation of pediatric patients with COVID-19 in comparison with adults. Radiol Cardiothorac Imaging. 2020;2(2):e200117.
11. Smithuis R, van Delden O, Schaefer-Prokop C. HRCT - basic interpretation [Internet]. Leiden: The Radiology Assistant; 2021 [cited 2021 December 20]. Available from: https://radiologyassistant.nl/chest/hrct/basic-interpretation.
12. Balbi M, Caroli A, Corsi A, Milanese G, Surace A, Di Marco F, et al. Chest x-ray for predicting mortality and the need for ventilatory support in COVID-19 patients presenting to the emergency department. Eur Radiol. 2021;31(4):1999–2012.
13. Yuki K, Fujiogi M, Koutsogiannaki S. COVID-19 pathophysiology: a review. Clin Immunol. 2020;215:108427.
14. Shang J, Ye G, Shi K, Wan Y, Luo C, Aihara H, et al. Structural basis of receptor recognition by SARS-CoV-2. Nature. 2020;581(7807):221–4.
15. Attaway AH, Scheraga RG, Bhimraj A, Biehl M, Hatipoğlu U. Severe covid-19 pneumonia: pathogenesis and clinical management. BMJ. 2021;372:n436.
16. Macedo A, Gonçalves N, Febra C. COVID-19 fatality rates in hospitalized patients: systematic review and meta-analysis. Ann Epidemiol. 2021;57:14–21.
17. Vekaria B, Overton C, Wiśniowski A, Ahmad S, Aparicio-Castro A, Curran-Sebastian J, dkk. Hospital length of stay for COVID-19 patients: data-driven methods for forward planning. BMC Infect Dis. 2021;21(1):700.
18. Setiawati R, Widyoningroem A, Handarini T, Hayati F, Basja AT, Putri ARDS, et al. Modified chest x-ray scoring system in evaluating severity of COVID-19 patient in Dr. Soetomo General Hospital Surabaya, Indonesia. Int J Gen Med. 2021;14:2407–12.
19. Maroldi R, Rondi P, Agazzi GM, Ravanelli M, Borghesi A, Farina D. Which role for chest x-ray score in predicting the outcome in COVID-19 pneumonia? Eur Radiol. 2021;31(6):4016–22.
20. Munirathnam M, Mohan CN, Mohammadi J, Gowda SS, Ramaiah M. Determining COVID-19 disease severity and outcome using sequential chest radiograph in a new designated COVID-19 hospital. Int J Adv Med. 2021;8(1):98–102.
21. Borghesi A, Zigliani A, Golemi S, Carapella N, Maculotti P, Farina D, et al. Chest x-ray severity index as a predictor of in-hospital mortality in coronavirus disease 2019: a study of 302 patients from Italy. Int J Infect Dis. 2020;96:291–3.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8882

GMHC. 2022;10(1):56–62
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

The Role of Midwives and Information Media in Knowledge, Attitude, and Behavior of Postpartum Mothers about COVID-19 Health Protocol

Ratih Kusuma Wardhani,[1] Luluk Susiloningtyas,[2] Eva Nur Azizah[1]
[1]Diploma III of Midwifery Study Program, STIKES Pamenang, Kediri, Indonesia,
[2]Health Administration S1 Study Program, STIKES Pamenang, Kediri, Indonesia

Abstract

Transmission of COVID-19 in pregnant women and postpartum mothers is potentially high risk. Postpartum mothers implement health protocols influenced by predisposing, enabling, and need factors. This study aimed to analyze the role of midwives and information media in postpartum mothers' knowledge, attitude, and behavior regarding the COVID-19 health protocol. This research was conducted in RSUD Kabupaten Kediri, in August–October 2021. The study used a correlational analytic method. The sample was postpartum mothers using a simple random sampling technique where 100 respondents included in inclusion criteria were given a questionnaire to complete. This study employed Kendall's tau correlation test to analyze the data. The result showed that the role of midwives is mainly in the good category (66%) while the media information is also in the good category (58%). Most of the respondents had sufficient knowledge (37%), the attitude of respondents in implementing the COVID-19 health protocol had a positive category (52%), and the behavior of the respondents mostly had a good category (54%). This study concludes that there is a significant correlation between the role of midwives to knowledge (p=0.009), attitudes (p=0.003), and behavior (p=0.000) of postpartum mothers. There is a significant correlation between information media and knowledge (p=0.042) and behavior (p=0.012) of postpartum mothers. However, there is no significant correlation between information media and the attitude (p=0.756) of postpartum mothers regarding the COVID-19 health protocol.

Keywords: Attitudes, behavior, information media, knowledge, role of midwives

Introduction

Some people infected by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) will have mild to moderate respiratory illness before recovering (COVID-19). The virus can aggravate the disease of the elderly and have health problems such as diabetes, chronic respiratory disease, cardiovascular disease, and cancer. Since March 11, 2020, it has declared COVID-19 a global pandemic with more than 500 million cases in 114 countries, and more than 6 million people have died. Since March 14, 2020, COVID-19 has become a national disaster in Indonesia.[1] As of April 2022, the Ministry of Health reported 6 million confirmed cases of COVID-19 with 150 thousand deaths.[2]

Transmission of COVID-19 that occurs in pregnant women and postpartum mothers is considered high risk. It means that pregnant women and postpartum women have physiological and physical changes that can increase their susceptibility to infection. The research in America stated that pregnant women infected by COVID-19 among as many as 55 people and 46 neonates.[3] In Indonesia, there were 18 pregnancies infected with COVID-19, all of them were infected in the third trimester, and the clinical findings were similar to those of non-pregnant adults. This condition needs more attention from health workers.[4]

Based on these limited data and several examples of cases in handling coronavirus, knowledge about COVID-19 infection in pregnancy and fetus is still limited. There are no specific recommendations for handling pregnant women with COVID-19. Therefore, it is necessary to prevent and control COVID-19 for health workers to stay healthy, safe, and productive and for patients to get services according to standards.[2,4,5] Thus, patients get information about the principles of preventing COVID-19 in pregnant women, postpartum mothers, and newborns. The success of pandemic control in hospitals because it has an Infection Prevention and Control Committee, and all health care facilities have it for screening COVID-19.[6]

Postpartum mothers can carry out health

Received: 15 November 2021; Revised: 30 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Luluk Susiloningtyas, S.Si.T., M.Kes. Health Administration S1 Study Program, STIKES Pamenang. Jln. Soekarno Hatta No. 15, Kediri 64225, East Java, Indonesia. E-mail: luluksusiloningtyas@gmail.com

protocols influenced by predisposing factors (sources of information, knowledge, and attitudes), enabling factors (role of health workers and availability of services, and need factors (perception of health and condition of mother's health).[7]

Information influences one's knowledge. Even though someone has low education but gets good information through online and offline media, it will increase one's knowledge.[8] Health workers (midwives) have a role as perpetrators who are obliged to carry out their duties according to their positions.[9] Other research found that there was an effect of the role of health workers, sources of information, and husband's support on postpartum mothers' adherence to breast care with $p<0.05$.[10]

Based on a preliminary study conducted in Teratai Room, RSUD Kabupaten Kediri, some postpartum mothers do not wear masks before being reminded by the midwife on duty. Therefore, this study aimed to analyze the role of midwives and information media on postpartum mothers' knowledge, attitudes, and behaviour about COVID-19 health protocols.

Methods

This research is a correlational analytic study with a cross-sectional approach. The study conducted in Teratai Room, RSUD Kabupaten Kediri, in August–October 2021.

The sampling technique used was simple random sampling. The sample is 100 respondents, with the inclusion criteria: postpartum mothers willing to be respondents in Teratai Room, RSUD Kabupaten Kediri. The exclusion criteria: mothers who experienced post-abortion suffered from gynecological and oncological diseases. Independent variables are the role of midwives and information media with an ordinal scale. Dependent variables are knowledge, attitudes, and behavior of postpartum mothers with an ordinal scale, and the instrument used is a questionnaire. The Research Ethics Committee of Universitas Kadiri approved the study with approval number 005/19/VII/KEP/UNIK/2021. Analysis of the data using Kendall's tau correlation test.

Results

The frequency distribution of respondents based on characteristics (midwife's role, information media, knowledge, attitudes, and behavior of postpartum mothers) can be seen in Table 1. The midwife's role is mainly in the good category, reaching 66%. Media information has a good category, that is 58%. Most of the respondents had sufficient knowledge, namely 37%, the attitude of respondents in implementing the COVID-19 health protocol had a positive category reaching 52%, and the behavior of the respondents mostly had a sufficient category which is 54%.

Based on Table 2, it can be seen that there is a significant correlation between the role of the midwife with knowledge ($p=0.009$), attitude ($p=0.003$), and behavior ($p=0.000$). There is a significant correlation between the information media with knowledge ($p=0.042$) and behavior ($p=0.012$), while the information media on attitudes has no significant correlation ($p=0.756$).

Table 1 Frequency Distribution of Respondents based on Characteristics

Characteristics	n=100 (%)
Midwife's role	
Not very good	0 (0)
Not good	0 (0)
Enough	18 (18)
Good	66 (66)
Very good	16 (16)
Information media	
Not very good	0 (0)
Not good	0 (0)
Enough	23 (23)
Good	58 (58)
Very good	19 (19)
Knowledge of postpartum mothers about the COVID-19 health protocol	
Not very good	1 (1)
Not good	30 (30)
Enough	37 (37)
Good	20 (20)
Very good	12 (12)
Postpartum mother's attitude about the COVID-19 health protocol	
Negative	48 (48)
Positive	52 (52)
Postpartum mother's behavior regarding the COVID-19 health protocol	
Not very good	0 (0)
Not good	5 (5)
Enough	54 (54)
Good	33 (33)
Very good	8 (8)

Table 2 Kendall Tau's Analysis Results

Categories	Postpartum Mother about COVID-19 Health Protocol					
	Knowledge		Attitude		Behavior	
	r	p	r	p	r	p
Midwife's role	0.202	0.009	0.221	0.003	0.412	0.000
Information media	−0.162	0.042	0.024	0.756	0.188	0.012

Discussion

Based on the research results, 100 postpartum mothers have a reasonably good knowledge (41–60%) of (68%). It showed that postpartum mothers know quite well about the COVID-19 health protocol. It allows the reception of information well, and the memory function works well. By receiving good information, it is hoped that postpartum mothers can maintain this information to be applied, especially information about COVID-19 health protocol.

The analysis test used Kendall's tau analysis, namely the role of the midwives in the knowledge, attitudes, and behavior of postpartum mothers. There is a significant correlation between the role of midwives and the knowledge of postpartum mothers about the COVID-19 health protocol with a positive (good) correlation. It occurred because the respondent correctly received information or socialization about the COVID-19 health protocol, especially on the role of health workers in the success of exclusive breastfeeding. Success can be achieved because respondents have good knowledge obtained from counseling activities carried out by health workers, especially midwives.[11]

The results showed that the midwife's role was mainly in the good category, which was 66%. The correlation between the midwife's role and knowledge about COVID-19 health protocols, which were mostly good, could be influenced by the midwife's role regarding COVID-19 health protocols. The results showed the good midwife role regarding the COVID-19 health protocol was affected by the knowledge of postpartum mothers, mainly in the good category with 66%. In comparison, the role of midwives who had sufficient knowledge of the COVID-19 health protocol for postpartum mothers understanding in the adequate category was 18%.

Most of the knowledge that is quite good is obtained through communication, information, and education given by the midwives, which is obtained after giving birth. According to the professional standards of midwives, they are required to be able to provide care for postpartum and breastfeeding mothers. One of the roles of midwives in the puerperium is to provide health education and counseling to clients.[12]

The role of the midwives and the attitude of the postpartum mother have a positive correlation. The better the midwife's role, the more positive the respondent's attitude regarding COVID-19 health protocol (52 respondents). Health workers can have a positive influence by demonstrating this attitude to mothers and their families so that respondents are successful in providing exclusive breastfeeding.[11]

The results showed that the attitude of postpartum mothers about the COVID-19 health protocol was mainly positive, with 52%. The correlation between the role of midwives and attitudes about the COVID-19 health protocol can be influenced by the role of the midwife. The results showed that the role of a good midwife regarding the COVID-19 health protocol affects the attitude of postpartum mothers, mostly positive 53.03%. In comparison, the role of midwives who have sufficient knowledge about the COVID-19 health protocol caused postpartum mothers to have a negative attitude of 66.66%.

Attitudes are influenced by personal experiences, culture, and other people who are considered important. Midwives play a significant role in providing midwifery care, including during the puerperium and breastfeeding. Information, education, and communication (IEC) and counseling provided by midwives about the COVID-19 health protocol will be able to increase the knowledge of postpartum mothers. A good understanding of preventing COVID-19 will cause a person to have a positive attitude towards it. A person's attitude begins with the stimulus he gets. The stimulus can be in the form of counseling about the COVID-19 health protocol. Midwife's

role as an educator so that from that knowledge, she will respond positively or negatively.[13]

Based on the results of Kendall's tau statistical test on the role of midwives on the behavior of postpartum mothers regarding the COVID-19 health protocol, a p value of 0.000 was obtained. There is a correlation between the part of health workers and the conduct of mothers in exclusive breastfeeding. Health workers and health providers are obliged to initiate early breastfeeding for newborns to their mothers for 1 (one) hour.[15] That the role of health workers, particularly midwives, is a major part of efforts to prevent and control the(COVID-19. The study results showed that the behavior of postpartum mothers regarding the COVID-19 health protocol was mainly quite good (54%). It showed that a good level of the midwife's role would be followed by the behavior of postpartum mothers, who are pretty good.[16]

The midwife's role has also been stated in the principle of preventing health protocols during the COVID-19 pandemic for pregnant women, postpartum mothers, and newborns in the community. The active role of midwives as one the health workers at the forefront is expected to remain selfless in providing maternal and child health care and must be more careful and alert to the "high risk" of exposure to COVID-19 transmission. Several measures to prevent COVID-19 infection during pregnancy, childbirth, and breastfeeding, among others, include universal precaution, by constantly washing hands with soap for 20 seconds or using hand sanitizer, using personal protective equipment, maintaining body condition by diligently exercising and getting enough rest, eating with balanced nutrition and practicing ethics cough and sneeze so that mothers can maintain and improve their health.[17]

The role of midwives through IEC and health education about the COVID-19 health protocol is needed as a psychological boost in growing self-confidence and encouraging behavior. In addition, the midwife's role regarding the COVID-19 health protocol will increase the knowledge of postpartum mothers so that a positive attitude and good behavior will be formed.

There was a correlation between information media on knowledge, attitudes, and behavior and prevention of COVID-19 transmission in the community. The results showed a significant correlation between information media and ability ($p=0.006$, $p<0.05$) $r=0.308$, which indicated a correlation between information media on knowledge, attitudes, and behavior and prevention of COVID-19 transmission in the community.[18] That there is an influence of the role of health workers, sources of information, and husband's support on postpartum mothers' adherence to breast care with a $p<0.05$.[10] A study stated there is a correlation between sources of information and knowledge of adolescents about sexually transmitted diseases at GBKP Christian Private High School Berastagi.[19]

In the COVID-19 pandemic, the information media has become the most sought-after place for the public to collect information to increase knowledge and behavior.[20–22] The results showed that the information media about the COVID-19 health protocol was mainly good, 58%. Based on the anamnesis results for postpartum mothers in Teratai Room, RSUD Kabupaten Kediri, most good information media were obtained from cellphone information media, television, newspapers and websites, and magazines.

The results showed that not all media information about the COVID-19 health protocol was not good at 34.48%. Knowledge can be influenced by characteristics which include education, age, gender, intelligence, and socio-economics. With good education and intelligence, supported by good information media.[23]

The correlation between information media and postpartum mothers' attitudes showed that the statistical test through Kendall's tau obtained $p=0.756$ ($p>0.05$) means there is no significant correlation between information media on postpartum mothers' attitudes toward the COVID-19 health protocol. A study showed no significant correlation between information and attitudes in students at the Public High School 9 Manado.[24] A person's attitude towards objects has different intensities or levels because attitudes are influenced by internal factors, namely personal experience, cultural influences, family, mass media, educational institutions and religion, and emotional factors.[13] However, other factors that could influence the attitude of postpartum mothers in implementing the COVID-19 health protocol were not investigated in this study, for example, education and socio-culture, which could have been known more clearly. Differences in the results of this study from previous studies may occur because there are several aspects not examined in this study, namely factors that can

influence attitudes, such as personal experience factors, cultural influences, and emotional factors.[23] The attitude is a readiness or willingness to act and not a particular motive. It will be easier to receive information to have a better attitude than someone with lower education.[25]

The analysis results showed a significant correlation between information media and postpartum mothers' behavior in implementing the COVID-19 health protocol, p=0.012 (p<0.05). There is a correlation between information media and knowledge, attitudes, and preventive measures for the transmission of COVID-19 in the community in Pelangi Gadang village, Ranah Pesisir subdistrict, Pesisir Selatan regency.[18] The results showed that there was a significant correlation between information media and COVID-19 prevention and transmission measures (p=0.028, p<0.05), r=0.241, which indicated that there was a correlation between information media and knowledge, attitudes, and preventive measures for COVID-19 transmission in a society with sufficient closeness.[18] The information media is a factor that influences the behavior of preventing COVID-19.[26]

The results showed that the information media was primarily good about the COVID-19 health protocol affecting the behavior of postpartum mothers on good criteria by 50%. Information media has an effect related to changes in attitudes, feelings, and communication behavior.[27] Individuals who obtain information can determine how to react and make decisions when facing problems.[28] The information they get will influence the community to act and prevent the transmission of COVID-19. The use of media can motivate positive behavior from its users.[29] The media are broadly human, material, or events that build conditions to make a person acquire knowledge, skills, or attitudes to COVID-19 prevention.[30]

There is a correlation between digital media and COVID-19 prevention behavior. This study explains empirical evidence that information related to COVID-19 in various digital media can trigger behavior to prevent the transmission of COVID-19 directly or indirectly.[20] The results showed a significant correlation between information media (p=0.002, p<0.05) and adolescent sexual behavior.[31] Information media cannot be left behind to participate in conveying important information to the general public, especially postpartum mothers. Media Information is one of the factors that influence knowledge and behavior. So what is seen can affect the behavior of postpartum mothers and tend to be imitated in implementing the COVID-19 health protocol.[27] Electronic information media influences because the information media in the form of electronics is audio and visual. Submission of information with audiovisual makes users understand more quickly and often immediately interested in doing the same thing.

The results showed that not all good information media affected the behavior of postpartum mothers at 3.4%. Not all communities comply with these provisions. Only 10% of the community has good COVID-19 health protocol habits: washing hands, wearing masks, maintaining distance, and complying with the COVID-19 protocol correctly.[26] This indicates that there may be other factors that influence the behavior of postpartum mothers regarding the COVID-19 protocol. Predisposing factors that influence behavior include belief, belief, education, motivation, perception, and knowledge.[23]

Conclusions

This study concludes that there is a significant correlation between the role of midwives to the knowledge, attitudes, and behavior of postpartum mothers. In addition, there is a significant correlation between information media and the knowledge and behavior of postpartum mothers. However, there is no significant correlation between information media and the attitude of postpartum mothers regarding the COVID-19 health protocol.

Conflict of Interest

There was not a conflict of interest in this article.

Acknowledgment

Research is entirely funded by the Directorate of Research and Community Service, Directorate General of Research Strengthening and Development of the Ministry of Research, Technology, and Higher Education with Contract Number: 060/AMD_SP2H/LT-MONO-PDPK/LL7/2021. We would also like to thank RSUD Kabupaten Kediri for permitting us to conduct and facilitate this research.

References

1. Direktorat Jenderal Pelayanan Kesehatan, Kementerian Kesehatan Republik Indonesia. Petunjuk teknis alat perlindungan diri (APD) dalam menghadapi wabah COVID-19 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 April 8 [cited 2021 November 12]. Available from: https://infeksiemerging.kemkes.go.id/document/download/axVrWemd9y.
2. Direktorat Jenderal Pelayanan Kesehatan, Kementerian Kesehatan Republik Indonesia. Pedoman pencegahan dan pengendalian coronavirus diseases (COVID-19). 5th revision [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 July 13 [cited 2021 November 30]. Available from: https://infeksiemerging.kemkes.go.id/download/REV-05_Pedoman_P2_COVID-19_13_Juli_2020_1.pdf.
3. Dashraath P, Wong JLJ, Lim MXK, Lim LM, Li S, Biswas A, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. Am J Obstet Gynecol. 2020;222(6):521–31.
4. Pokja Infeksi Saluran Reproduksi, Perkumpulan Obstetri dan Ginekologi Indonesia. Rekomendasi penanganan infeksi virus corona (COVID-19) pada maternal (hamil, bersalin dan nifas). 2nd revision [Internet]. Surabaya: Pokja Infeksi Saluran Reproduksi, Perkumpulan Obstetri dan Ginekologi Indonesia; 2020 August 8 [cited 2021 December 12]. Available from: https://pogi.or.id/publish/wp-content/uploads/2020/10/Rekomendasi-Covid-Maternal-POGI.pdf.
5. Rasmussen SA, Smulian JC, Lednicky JA, Wen TS, Jamieson DJ. Coronavirus diseases 2019 (COVID-19) and pregnancy: what obstetricians need to know. Am J Obstet Gynecol. 2020;222(5):415–26.
6. Kementerian Kesehatan Republik Indonesia. Pelayanan kesehatan essensial tetap menjadi prioritas di masa pandemi COVID-19 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 October 7 [cited 2021 December 19]. Available from: https://www.kemkes.go.id/article/view/20100800007/pelayanan-kesehatan-essensial-tetap-menjadi-prioritas-di-masa-pandemi-covid-19.html.
7. Salamun, Minarti. Hubungan peran petugas kesehatan, sumber informasi terhadap perawatan payudara pada ibu nifas. J 'Aisyiyah Medika. 2019;4(2):157–64.
8. Notoadmodjo S. Metodologi penelitian kesehatan. Jakarta: Rineka Cipta; 2012.
9. Muzaham F. Memperkenalkan sosiologi Kesehatan. Jakarta: UI Press; 2007.
10. Sari EP. Peran petugas kesehatan, sumber informasi, dan dukungan suami terhadap kepatuhan ibu nifas untuk melakukan perawatan payudara. J 'Aisyiyah Medika. 2019;4(3):274–83.
11. Sabati MR, Nuryanto. Peran petugas kesehatan terhadap keberhasilan pemberian ASI eksklusif (studi kualitatif di wilayah Puskesmas Sekaran Kecamatan Gunungpati Kota Semarang). J Nutr Coll. 2015;4(2):526–33.
12. Peraturan Menteri Kesehatan Republik Indonesia Nomor 1464/Menkes/Per/X/2010 tentang Izin dan Penyelenggaraan Praktik Bidan.
13. Rusmini H, Suryawan B. Faktor-faktor yang mempengaruhi sikap dan perilaku masyarakat terhadap kepatuhan minum obat anti filariasis di Kabupaten Bogor. J Ilmu Kedokt Kesehat. 2014;1(3):676.
14. Notoatmodjo S. Ilmu perilaku kesehatan. Jakarta: Rineka Cipta; 2010.
15. Cahyono A, Ulfah M, Handayani RN. Pengaruh peran petugas kesehatan dan bapak peduli ASI eksklusif (Baper Asiek) terhadap perilaku ibu dalam pemberian ASI eksklusif di wilayah kerja Puskesmas Rembang Kabupaten Purbalingga. JKK 'Aisyiyah. 2020;16(1):67–86.
16. Direktorat Jenderal Pencegahan dan Pengendalian Penyakit, Kementerian Kesehatan Republik Indonesia. Pedoman kesiapsiagaan menghadapi coronavirus disease (COVID-19) [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 February 17 [cited 2022 January 10]. Available from: https://infeksiemerging.kemkes.go.id/download/REV-02_Pedoman_Kesiapsiagaan_COVID-19__Versi_17_Feb_2020_fix.pdf.
17. Direktorat Jenderal Pencegahan dan Pengendalian Penyakit, Kementerian Kesehatan Republik Indonesia. Jumlah pasien corona sembuh melebihi angka meninggal [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 April 16

[cited 2021 September 20]. Available from: http://p2p.kemkes.go.id/jumlah-pasien-corona-sembuh-melebihi-angka-meninggal.
18. Simanjuntak EY, Marlina. Hubungan media informasi terhadap pengetahuan, sikap, dan tindakan pencegahan penularan COVID-19 pada masyarakat. Jintan. 2021;1(2):68–75.
19. Tarigan ER. Hubungan sumber informasi dengan pengetahuan remaja tentang penyakit menular seksual di SMA Swasta Masehi GBKP Berastagi. Indones Trust Health J. 2019;1(2):107–12.
20. Liu PL. COVID-19 information seeking on digital media and preventive behaviors: the mediation role of worry. Cyberpsychol Behav Soc Netw. 2020;23(10):677–82.
21. Sampurno MBT, Kusumandyoko TC, Islam MA. Budaya media sosial, edukasi, masyarakat dan pandemi COVID-19. Salam. 2020;7(6):529–42.
22. Nurislaminingsih R. Layanan pengetahuan tentang COVID-19 di lembaga informasi. Tik Ilmeu. 2020;4(1):19–37.
23. Notoatmodjo S. Promosi kesehatan dan ilmu perilaku. Jakarta: Rineka Cipta; 2007.
24. Etwiory J, Pelealu FJO, Tucunan AT. Hubungan antara sumber informasi dan pengetahuan dengan sikap pemeriksaan payudara sendiri (SADARI) siswa putri SMA Negeri 9 Manado [Internet]. Manado: Universitas Sam Ratulangi; 2013 [cited 2021 October 10]. Available from: https://fkm.unsrat.ac.id/wp-content/uploads/2014/08/ABSTRAK_DAN_JURNAL_JEANE.pdf.
25. Notoatmodjo S. Pendidikan dan perilaku kesehatan. Jakarta: Rineka Cipta; 2007.
26. Triyanto E, Kusumawardani LH. An analysis of pepole's behavioral changes to prevent Covid-19 transmission based on integrated behaviour model. JKS. 2020;15(2):66–73.
27. Novasari DH, Nugroho D, Winarni S. Hubungan pengetahuan, sikap dan paparan media informasi dengan praktik pemeriksaan payudara sendiri (SADARI) pada santriwati Pondok Pesantren Al Ishlah Tembalang Semarang tahun 2016. JKM. 2016;4(4)186–94.
28. Yanti B, Mulyadi E, Wahiduddin, Novika RGH, Arina YMD, Martani NS, et al. Community knowledge, attitudes, and behavior towards social distancing policy as a means of preventing transmission of COVID-19 in Indonesia. J Administrasi Kesehat Indones. 2020;8(1):4–14.
29. Sidik TA. Hubungan media informasi dengan tingkat pengetahuan kesehatan reproduksi pada santri di Pondok Pesantren Darut Taqwa Bulusan Semarang. JKM. 2015;3(3):936–44.
30. Syaipudin L. Efektifitas media komunikasi di tengah pandemi: respon Gugus Tugas Percepatan Penanganan Covid-19 Kabupaten Tulungagung. Kalijaga J Commun. 2019;1(2):165–78.
31. Suzanna, Rusmaniar D. Hubungan karakteristik, sikap dan media informasi dengan perilaku seksual mahasiswa di Kota Palembang tahun 2016. J 'Aisyiyah Medika. 2018;1(1):74–89.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8951

GMHC. 2022;10(1):63–68
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

The Effect of Moringa Leaf *Cilok* Supply on Hemoglobin Levels of Female Adolescents with Anemia

Dian Soekmawaty Riezqy Ariendha, Sri Handayani, Yopi Suryatim Pratiwi
Undergraduate of Midwifery Study Program, STIKes Yarsi Mataram, Mataram, Indonesia

Abstract

Blood that contains less iron can cause anemia. This nutritional case is the most common in almost all countries, including Indonesia. Female adolescents are more at risk of anemia due to stress, eating late, and losing large amounts of iron during menstruation. One part of the moringa plant (*Moringa oleifera*), namely the leaves, is believed to increase hemoglobin levels. The method of attracting adolescents to moringa leaf is by processing the moringa leaf becomes a snack called moringa leaf *cilok*. This research aims to determine the hemoglobin level of adolescent girls who experience anemia before and after being given moringa leaves *cilok*. This is experimental research with one group pre-post test design from October to November 2021 in Mataram. The subjects in this research are female adolescents with anemia who met the sample criteria. The sample used is n1=n2=32 respondents. The treatment group received moringa leaf *cilok* and was controlled tablets by giving iron tablets. The data collected was processed by a nonparametric test. The results show an effect of giving moringa leaf *cilok* on the hemoglobin levels of adolescent girls ($p>0.05$). The content of iron and vitamin C in moringa leaves *cilok* has increased hemoglobin levels. This research concludes that moringa leaf *cilok* can increase hemoglobin levels in female adolescents. Therefore, consuming moringa leaves *cilok* regularly can be used to treat anemia.

Keywords: *Cilok*, hemoglobin level, moringa leaf

Introduction

Blood that contains less iron can cause anemia. This nutritional case is the most common in almost all countries globally, including Indonesia.[1] Every age group has the potential to experience anemia, including adolescents, where the World Health Organization (WHO) defines adolescents as children aged 10–20 years.[1] According to WHO, around 29.9% of women of reproductive age have anemia in 2019.[2] According to the Basic Health Research (*Riskesdas*), anemia in female adolescents has increased from 37.1% in 2013 to 48.9% in 2018.[3]

The leading cause of anemia is the lack of iron intake.[4] Female adolescents are more at risk for anemia due to losing significant amounts of iron during menstruation.[5] Female adolescents who experience anemia are more at risk for morbidity and mortality during their reproduction period.[6]

Iron intake can be obtained by consuming food from animal proteins such as liver, fish, and meat. However, not all people can eat this food, so they have to take blood-boosting tablets.[7]

Governments' effort to decrease the anemia rate in female adolescents is by giving a blood-boosting tablet per week through the School Health Promotion or *Usaha Kesehatan Sekolah/ Madrasah* (UKS/M) in educational institutions throughout the year. The coverage of blood-boosting tablet consumption in the province of West Nusa Tenggara has reached 38.22%. According to the 2017 Indonesia Demographic and Health Survey: Adolescents, 57.0% of female adolescents overcome anemia by taking pills to increase their blood, and 14.0% take iron tablets.[8] Whereas only 19.8% consume meat, fish, and liver, 31.8% consume vegetables that contain iron, 2.8% others, and 8.8% are clueless.[8]

Moringa leaves have very high amounts of vitamin A, vitamin C, vitamin B, calcium, potassium, iron, and protein which are easily digested and assimilated by the human body.[9–11] Moringa leaves are vegetables that have been used to treat malnutrition in children, adolescents, and pregnant women.[11] In addition, the micronutrients such as iron can be used as an alternative supplement for female adolescents to prevent anemia. Moringa leaves effectively increase hemoglobin (Hb) levels in children and women with anemia. The iron in moringa leaves processed into powder (flour) is higher than in

Received: 22 November 2021; 30 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Dian Soekmawaty Riezqy Ariendha. Undergraduate of Midwifery Study Program, STIKes Yarsi Mataram. Jln. TGH M. Rais Lingkar Selatan, Mataram 83361, West Nusa Tenggara, Indonesia. E-mail: diansoekmawaty.ra@gmail.com

fresh moringa leaves.[12] Arini's[13] research results show Hb levels in female adolescents experienced a change between before being given moringa leaf flour Hb levels of 10.88 mg/dL and after being given moringa leaf flour Hb levels to 12.27 mg/dL.

The results of non-clinical tests showed that administration of moringa leaf extract at a dose of 400 mg/kgBW affected increasing Hb levels in Wistar strain rats. The rats were previously induced by aluminum chloride for 21 days, resulting in mild anemia with a Hb level of 10.80 g/dL.[14]

The clinical trials showed that giving moringa leaf extract at a dose of 2×1 with a content of 1,000 mg in female adolescents increased Hb levels after two months of intervention.[15] Another study also showed that giving 2×2 doses of moringa leaf flour capsules containing 500 mg of flour per capsule in the morning and evening for 12 weeks was able to increase the Hb levels of female adolescents.[13] Changes in Hb levels in the control group of 14 people (58.3%) with an increase in Hb levels of 0.3–3.5 g/dL who were not given moringa leaf flour, while in the intervention group, the changes in Hb levels were 22 people (91.7%) with an increase in Hb levels of 1.5–2.2 g/dL after being given moringa leaf flour.[13] The rise in Hb levels is due to the iron in moringa leaves, it is rich in vitamin C that helps the absorption of iron.[16]

Cilok—an Indonesian ball-shaped dumpling made from *aci* (tapioca starch), a Sundanese snack originating from West Java, Indonesia—is one of the favorite snacks among adolescents. The results of Bonita and Fitranti's[17] research show that adolescents are into fast food. One of them is *cilok*, with 17.4% of adolescents consuming *cilok* more or twice a week. Utilization of local resources such as moringa leaves and increasing the nutritional value of *cilok*, the substitution of moringa leaf flour in the manufacture of *cilok* is carried out so that the produced *cilok* can be claimed as a *cilok* source of iron.[17] This research aims to identify the effect of moringa leaf *cilok* (*Moringa oleifera*) supply on hemoglobin levels of female adolescents with anemia.

Methods

The research consists of two stages, those are making moringa leaf *cilok* and product testing.

Moringa leaf *cilok* is made using 4 grams of moringa leaf flour, 50 grams of flour, 50 grams of tapioca flour, 2 grams of salt, 70 mL of water, 2 grams of mushroom broth, and one stalk of leek, and cooked until done. The produced *cilok* of moringa leaf is then checked for iron and vitamin C compounds. The study is carried out at the Pharmacy Laboratory of the Universitas Muhammadiyah Mataram.

The method is experimental research with one group pre-post test design. The hemoglobin level was checked before the research subjects were given moringa leaf *cilok* in the treatment group and blood-boosting tablets in the control group. After that, the control group was assigned treatment with iron tablets and blood-enhancing substances for 15 days, and the Hb was rechecked on the 16th day. The sample in this research was female adolescents who experienced mild anemia with the Hb number range 9–11 g/dL from October to November 2021 at STIKes Yarsi Mataram.

There were two groups of respondents in this research. The treatment group received moringa leaf *cilok* twice a day with a mixture of 4 grams of moringa leaf flour in the dough for making *cilok* in each supply, and the control group was given one caplet iron twice a day for 15 days. The evaluation was carried out on the 16th day by checking Hb levels using the Easy Touch brand Hb set. Three enumerators from the Midwifery Study Program students at STIKes Yarsi Mataram assisted this research and distributed moringa leaf *cilok* and iron tablets to respondents.

Data processing is conducted before testing the data obtained by the Kolmogorov-Smirnov normality test with p=0.05. In analyzing the effect of moringa leaf *cilok* supply on female adolescents' Hb levels, the Wilcoxon test is used if the data is not normally distributed.

This research has received research ethics from the Research Ethics Committee of the Faculty of Medicine, Universitas Islam Al-Azhar Mataram, with the number: 40/EC-04/FK-06/UNIZAR/X/2021.

Results

Research results on the identification of Fe content in moringa leaf *cilok* as efforts to increase the Hb of female adolescents can be seen in Table 1 and Table 2.

Based on Table 3, it shows that there is an effect of giving moringa leaf *cilok* on the Hb levels

Table 1 Result of Laboratory Testing Fe Content in Moringa Leaf *Cilok*

Ingredients	Metal	Reactor	Observation	Result
Cilok	Fe	KSCN	Formation of a blood red solution	+
Moringa powder	Fe	KSCN	Formation of a blood red solution	+

Table 2 Result of Laboratory Testing Vitamin C Content in Moringa Leaf *Cilok*

Ingredients	Pre-color	Post-color	Number of Drops	Result
Cilok	Redish brown	Bluish black	160	+
Moringa powder	Redish brown	Yellow	210	+
Vitamin C	Redish brown	Orange	15	+

Table 3 Effect of Moringa Leaves *Cilok* on Hemoglobin Levels for Adolescent Girls

Groups	Median (Min–Max)	p
Experimental		0.000
Hemoglobin		
Before treatment	11.5 (10.1–11.8)	
After treatment	12.5 (12.1–13.0)	
Control		0.001
Hemoglobin		
Before treatment	11.0 (10–11.9)	
After treatment	13.6 (11–17.0)	

of female adolescents.

Discussion

Compared to spinach, the iron content in dried moringa leaves or flour is 25 times higher, so moringa leaves can be used as an option to overcome anemia.[18] Moringa leaves have great potential to fulfill nutritional needs. Anemia is a condition in which the Hb level is lower than the standard limit. Normal Hb levels in female adolescents are >12 g/dL.[19,20] Thus, teenage girls are considered anemic if the Hb level is <12 g/dL. The causes of anemia include lack of nutritional deficiency due to low intake of both animal and vegetable nutrients, which are sources of iron that play an important role in forming hemoglobin. The cause was also bleeding due to prolonged and large amounts of menstruation and bleeding due to infectious diseases such as malaria and dengue fever. Another factor that causes anemia is an unhealthy, irregular, and unbalanced diet supported by adequate nutritional sources needed by the body, such as energy, protein, carbohydrates, fat, and vitamin C intake. It is primarily the intake of adequate food sources containing iron and folic acid.[21] Iron deficiency anemia can be caused by several factors, one of which is consuming less animal food sources as a source of easily absorbed iron (heme iron). Meanwhile, plant food sources (non-heme iron) are sources of high iron that are difficult to absorb. Anemia can also be affected due to a lack of nutrients that play a role in facilitating the absorption of iron, such as protein and vitamin C.[22]

Anemia in adolescent girls can be treated by using leaves from local plants that grow around them, which contain iron and various vitamins, such as moringa leaves to boost the function of Hb.[23] The vital role of hemoglobin in blood cells is to bind and carry oxygen in red blood cells. Suppose the supply of oxygen in various places throughout the body is achieved. In that case, the benefits obtained are that it can reduce the occurrence of dysmenorrhea due to ischemia in adolescent girls.[24]

This study gave moringa leaf *cilok* to adolescent girls with anemia for 15 days. The results show that consuming moringa leaf *cilok* regularly can increase hemoglobin levels in teenage girls tested on day 16. Another study also showed that giving 2×2 doses of moringa leaf flour capsules containing 500 mg of flour per capsule in the morning and evening for 12 weeks was able to increase the Hb levels of female adolescents.[13] Changes in Hb levels in the control group of 14

people (58.3%) with an increase in Hb levels of 0.3–3.5 g/dL who were not given moringa leaf flour, while in the intervention group, the changes in Hb levels were 22 people (91.7%) with an increase in Hb levels of 1.5–2.2 g/dL after being given moringa leaf flour. The rise in Hb levels is due to the iron in moringa leaves, which is rich in vitamin C that helps the absorption of iron.[16]

Moringa (*Moringa oleifera*) is one of the local plants which has long been known as a plant that has many benefits plant which is rich in nutrients and has medicinal properties. It contains natural compounds that are higher and more varied than other types of plants. The research finds that moringa leaves contain very high amounts of vitamin A, vitamin B, vitamin C, calcium, potassium, iron, and protein, easily digested by the human body.[25]

Moringa leaf extract consumed regularly can help increase hemoglobin levels in the blood.[24] Teenage girls who are affected by anemia should consume moringa leaf extract.[18] A study conducted in the Pharmacy Laboratory at the University of Mataram reveals that moringa leaves contain vitamin C and iron.

Several studies also state that the human body quickly digests moringa leaves with several nutritional contents such as iron, protein, vitamin A, vitamin C, potassium, calcium, and antioxidants. Compared to other vegetables, moringa leaves have a high iron content, 26 mg/100 g. Iron (Fe) in dry moringa leaves or moringa leaf flour is equivalent to 25 times higher than spinach.[16,26]

The complete nutritional content of moringa leaves consists of various types of micro and macronutrients and antioxidant compounds. In addition, it also contains essential nutrients such as Fe, protein, and calcium. A relatively complete variety of vitamins such as vitamin A, vitamin C, vitamin D, vitamin E, and vitamin B complexes (B1, B2, B5, B3, B6, B9, and B12). The content of vitamin C in moringa leaf extract helps the absorption of iron in the body.[26] Moringa leaves are widely used for prevention and treatment, so they are widely used as the primary medicine component.[27]

Moringa leaves can be used as a medicine for anemia in low or high doses. The number of red blood cells (erythrocytes) and white blood cells (leukocytes) that significantly increases proves that moringa leaves are good for use as food supplements and drugs for anemia sufferers.[28]

Conclusions

There is an effect of giving moringa leaf *cilok* and blood-added tablets on hemoglobin levels.

Conflict of Interest

There is no conflict of interest in this research.

Acknowledgment

Special thanks to the Ministry of Education, Culture, Research, and Technology, Directorate General of Higher Education, Research and Technology, all respondents, and STIKes Yarsi Mataram, who have assisted this research.

References

1. World Health Organization. WHO guideline on use of ferritin concentrations to assess iron status in individuals and populations. Geneva: World Health Organization; 2020.
2. World Health Organization. WHO global anaemia estimates, 2021 edition [Internet]. Geneva: World Health Organization; 2021 [cited 2022 January 20]. Available from: https://www.who.int/data/gho/data/themes/topics/anaemia_in_women_and_children.
3. Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia. Laporan Nasional Riskesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019.
4. Froessler B, Gajic T, Dekker G, Hodyl NA. Treatment of iron deficiency and iron deficiency anemia with intravenous ferric carboxymaltose in pregnancy. Arch Gynecol Obstet. 2018;298(1):75–82.
5. Stevens GA, Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F, et al. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. Lancet Glob Health. 2013;1(1):e16–25.
6. Teji K, Dessie Y, Assebe T, Abdo M. Anaemia and nutritional status of adolescent girls in Babile District, Eastern Ethiopia. Pan Afr Med J. 2016:24:62.

7. Kementerian Kesehatan Republik Indonesia. Profil kesehatan Indonesia tahun 2017. Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
8. Badan Kependudukan dan Keluarga Berencana Nasional, Badan Pusat Statistik, Kementerian Kesehatan Republik Indonesia. Survei demografi dan kesehatan Indonesia 2017: kesehatan reproduksi remaja. Jakarta: Badan Pusat Statistik; 2018.
9. Islam Z, Islam SMR, Hossen F, Mahtab-Ul-Islam K, Hasan MR, Karim R. *Moringa oleifera* is a prominent source of nutrients with potential health benefits. Int J Food Sci. 2021;2021:6627265.
10. Sultana S. Nutritional and functional properties of *Moringa oleifera*. Metabol Open. 2020;8:100061.
11. Madukwe EU, Ugwuoke AL, Ezeugwu JO. Effectiveness of dry *Moringa oleifera* leaf powder treatment of anaemia. Int J Med Med Sci. 2013;5(5):226–8.
12. Sindhu S, Mangala S, Sherry B. Efficacy of *Moringa oleifera* in treating iron deficiency anemia in women of reproductive age group. Int J Phytother Res. 2013;3(4):15–20.
13. Arini. Pengaruh pemberian tepung daun kelor (*Moringa oleifera* leaves) terhadap peningkatan kadar hemoglobin pada remaja putri di Kecamatan Tamalatea Kabupaten Jeneponto [thesis]. Makassar: Universitas Hasanuddin; 2018. Available from: http://digilib.unhas.ac.id/uploaded_files/temporary/DigitalCollection/Y2UyOTg3NWRkYjJjMDFkZTU1ZWQzYTEzODk2NzIzMmI0ODJkNGE2OQ==.pdf.
14. Dadi AK, Lidya K, Setianingrum ELS, Sasputra IN. Uji efek ekstrak etanol daun kelor (*Moringa oleifera*) terhadap kadar hemoglobin pada tikus putih galur Wistar yang diinduksi aluminium klorida. CMJ. 2020;20(2):191–8.
15. Anwar Y, Hadju V, Samrichar R, Unde AA, Usman AN, Mastuti NLPH. Pemberian ekstrak daun kelor terhadap peningkatan kadar hemoglobin pada remaja putri putus sekolah usia 12–18 tahun. J Kesehat Manarang. 2020;6(2):131–7.
16. Gopalakrishnan L, Doriya K, Kumar DS. *Moringa oleifera*: a review on nutritive importance and its medicinal application. Food Sci Hum Wellness. 2016;5(2):49–56.
17. Bonita IA, Fitranti DY. Konsumsi fast food dan aktivitas fisik sebagai faktor risiko kejadian overweight pada remaja stunting SMP. J Nutr Coll. 2017;6(1):52–60.
18. Aminah S, Ramdhan T, Yanis M. Kandungan nutrisi dan sifat fungsional tanaman kelor (*Moringa oleifera*). Bul Pertanian Perkotaan. 2015;5(2):35–44.
19. Yuliani M, Asri, Oktafiani H, Hayati N. Hemoglobin levels of female students based on Fe consumption and breakfast habits. JGRPH. 2020;5(2):195–203.
20. Proverawati A. Anemia dan anemia kehamilan. Yogyakarta: Nuha Medika; 2011.
21. Kementerian Kesehatan Republik Indonesia. Pedoman pencegahan dan penanggulangan anemia pada remaja putri dan wanita usia subur (WUS). Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
22. Abbaspour N, Hurrell R, Kelishadi R. Review on iron and its importance for human health. J Res Med Sci. 2014;19(2):164–74.
23. Mustapa Y, Hadju V, Indriasari R, Hidayanti H, Sirajuddin S, Russeng SS. The effect of *Moringa oleifera* to hemoglobin levels of preconception women in the health center Tibawa district Tibawa, Gorontalo. OAMJMS. 2020;8(T2):104–8.
24. Kusumawardani PA, Cholifah. The relations between anemia and female adolescent's dysmenorrhea. In: Hidayat MS, Jiar YK, De Guzman TG, Haque SMR, Chandra N, Handayani L, et al., editors. Proceeding 4th Universitas Ahmad Dahlan International Conference on Public Health; 2018 February 21–22; Yogyakarta, Indonesia. Yogyakarta: UAD Press; 2018. p. 190–5.
25. Ponomban SS, Walalangi R, Harikedua VT. Efektivitas suplementasi bubuk daun kelor (*Moringa oleifera*) terhadap peningkatan kadar haemoglobin pada ibu hamil yang menderita anemia. J Gizido. 2013;(51):36–44.
26. Rockwood JL, Anderson BG, Casamatta D. Potential uses of *Moringa oleifera* and an examination of antibiotic efficacy conferred by *M. oleifera* seed and leaf extracts using crude extraction techniques available to underserved indigenous populations. Int J Phytother Res. 2013;3(2):61–71.
27. Matic I, Guidi A, Kenzo M, Mattei M, Galgani A. Investigation of medicinal plants traditionally used as dietary supplements: a review on *Moringa oleifera*. J Public Health

Afr. 2018;9(3):841.
28. Seriki SA, Adebayo FO, Uche-Orji O, Oshagbemi A. Effects of *Moringa oleifera* leaf extract on red and white blood cells counts. Int J Curr Med Pharm Res. 2015;1(9):150–61.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8883

GMHC. 2022;10(1):69–73
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

Correlation of Midwives' Knowledge about COVID-19 to Anxiety in Providing Care during COVID-19 Pandemic

Vide Bahtera Dinastiti, Susanti Tria Jaya, Ratna Feti Wulandari
Diploma III of Midwifery Study Program, STIKES Pamenang, Kediri, Indonesia

Abstract

The increasing incidence of COVID-19 cases caused anxiety for medical workers. Knowledge about COVID-19 is an element that works on medical workers' anxiety levels, including midwives. This study aimed to analyze midwives' knowledge about COVID-19 to the midwives' anxiety in providing midwifery care during the COVID-19 pandemic. This correlational analytic study was conducted between August and October 2021 in RSUD Kabupaten Kediri. A self-administered questionnaire containing knowledge and Zung Self-Anxiety Rating Scale questions was distributed to 45 respondents to complete. The correlation between midwives' knowledge about COVID-19 in midwives' anxiety was examined using Kendall's tau correlation test. The outcomes pointed out that most respondents had good knowledge of approximately COVID-19 (89%), and most of the respondents had moderate anxiety (84%). The analysis showed that there had been a correlation between knowledge about COVID-19 to the anxiety of midwives in providing care. The correlation coefficient value of −0.235 with a significance level of 0.036 indicated that the better the knowledge, the lighter the anxiety of the midwives. Therefore, it's essential to increase the understanding of midwives about COVID-19 and to review other factors that can affect the anxiety of midwives in providing care.

Keywords: Anxiety, COVID-19, knowledge, midwives

Introduction

A disease due to a brand new coronavirus with general signs such as cough, weak point, fever, and convulsions is known as COVID-19.[1] Another symptom is shortness of breath. This symptom is a disorder syndrome acute breathing.[2] In December 2019, some patients with mysterious pneumonia were reported for the first time in Wuhan, China.[3] This virus is also called severe acute respiratory syndrome coronavirus and can move rapidly from human to human through direct contact.[4]

In the middle of 2020, incidents in Indonesia were reported as 68,079 cases of COVID-19, 31,585 people recovered, and 3.359 people died, with a mortality rate of 4.9%.5 But in 2021 of July, the entire showed cases of COVID-19 within the international is 189,828,099 cases, with 4,085,071 deaths (2.2% of CFR) in 204 inflamed nations and 151 community transmission nations.[6]

Medical practitioners treating COVID-19's patients are at greater risk of being infected than other people, increasing psychological stress.[7,8] The psychological response to the coronavirus pandemic that health professionals may experience is anxiety, which will increase due to anxiety about one's health and transmission to their family.[7,9,10]

Disease transmission is also associated with a lack of understanding and consciousness.[11] With proper knowledge about this disease can positively impact attitudes and practices, there is less chance of infection, and it will reduce anxiety levels.[12] According to these studies that 46.7% of nurses have good knowledge, and 65% have an anxiety level in the mild category.[12]

Health workers are at risk of experiencing psychological disorders, namely having anxiety symptoms due to feeling depressed.[10] More than half of medical examiners have a good understanding of how to avoid and deal with COVID-19, but there is mild anxiety.[10]

The majority of the medical practitioners correctly understood preventing COVID-19 transmission.[11,13–16] In this case, it is necessary to support health workers to strengthen their knowledge of health workers so that anxiety levels can be reduced.[13–16]

Midwives are the health workers at the forefront of maternal and toddler health services in health facilities such as hospitals or clinics. They must continue to provide safe health services

Received: 15 November 2021; 30 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Susanti Tria Jaya, S.ST, M.Keb. Diploma III of Midwifery Study Program, STIKES Pamenang. Jln. Soekarno Hatta No. 15, Kediri 64225, East Java, Indonesia. E-mail: santiandi1401@gmail.com

for patients based on existing health protocol guidelines.[8] Anxiety will increase along with the danger of transmitting infectious illnesses that may be obtained from treated patients. This will cause various responses, such as restlessness and nervousness, that affect patient care quality.

This study aimed to analyze the midwives' knowledge about COVID-19 to their anxiety in providing midwifery care during the COVID-19 pandemic.

Methods

The correlational analysis was conducted using a total sampling technique conducted between August 2021 and October 2021 in RSUD Kabupaten Kediri.

The topics of this study were midwives' knowledge about COVID-19 and midwives' anxiety due to providing midwifery care. The population is all midwives in RSUD Kabupaten Kediri, included in the inclusion criteria: midwives who work in RSUD Kabupaten Kediri and are agreed to be respondents. The Research Ethics Committee of Universitas Kadiri approved the study (Number 007/19/VII/KEP/UNIK/2021). The investigation started with prospective respondents who were asked to sign the consent form to become a respondent. After signing the consent form, the respondent is given a self-administered questionnaire. It contains knowledge about COVID-19, and Zung-Self Anxiety Rating Scale questions were distributed. The respondents were 45 midwives. The correlation between knowledge of midwives about COVID-19 to midwives' anxiety was examined using Kendall's tau correlation test. Calculation of test results is if the probability/significance value is less than the mistake degree (0.05).

Results

The characteristics of respondents are presented in Table 1. The majority of the respondents are between 20–29 years (45%). The maximum number of respondents got information about COVID-19 from the internet or social media (69%). The majority of the respondents have good knowledge, equal to 89%, and most of the respondents experienced moderate anxiety (84%).

The outcomes of Kendall's tau correlation analysis test obtained data implied that there is a correlation between midwives' knowledge about COVID-19 to the anxiety of midwives with a correlation coefficient of r=−0.235 with a significance level of 0.036 which indicates that the better the understanding, the lighter the anxiety of the midwives.

Table 1 Characteristics of Respondents

Characteristics	n=45 (%)
Age (years)	
20–29	20 (45)
30–39	18 (40)
40–49	6 (13)
≥50	1 (2)
Information source about COVID-19	
Internet/social media	31 (69)
Television	12 (27)
Others	2 (4)
Knowledge about COVID-19	
Less	0 (0)
Enough	5 (11)
Good	40 (89)
Anxiety level	
Mild	7 (16)
Moderate	38 (84)
Severe	0 (0)

Discussion

Knowledge results from understanding and takes place after humans sense a positive item. Most humans perceive a positive thing, where most are acquired via the eyes and ears. This can be known and interpreted with a good, sufficient, and poor scale.[8,12]

The study outcomes stated that most of the respondents had a good understanding of COVID-19, which was 89%. The existence of a web seminar held by the Indonesian Ministry of Health and the Indonesian Midwives Association and training from the Kediri District Health

Table 2 Kendall Tau's Analysis Results

Categories	Midwives' Knowledge about COVID-19	
	r	p
Knowledge	1.000	0.036
Anxiety	−0.235	

Office regarding the handling of COVID-19, which health workers attended, also helped increase midwives' knowledge in RSUD Kabupaten Kediri. The convenience of accessing the internet is one of the reasons for midwives' good level of knowledge in obtaining information related to COVID-19. They can come from social media such as WhatsApp, Instagram, Facebook, Telegram, and articles on the internet. It is associated with other research that stated most of the healthcare providers in Yemen (69.8%)[15] or nurses in Iran (56.5%)[16] have good knowledge about COVID-19. Good understanding will come from individuals who can know, understand, analyze, synthesize, apply and evaluate stimuli,[17] which in this study is about COVID-19.

Knowledge is encouraged with the aid of internal and external factors. Internal factors include age, experience, education, occupation, and gender. While external factors consist of information, environment, and socio-cultural.[17] The respondents' age in this study was mainly between 20–29 years (45%) and 30–39 years (40%). The highest average knowledge of respondents aged 30–39 years categorized as early adults is 86%, and the lowest is at the age of 20–29 years, 76%. It can occur because, in the early adulthood stage, a person's cognitive abilities are at an optimal stage where a person is easy to learn, do logical reasoning, think creatively, and there has been no memory decline. It is also following the theory that the more mature the person's level of maturity and strength in thinking and working will also increase.[18]

Most respondents obtained information from the internet or social media which is 69%. It can be influenced because one of the preventions of COVID-19 is by implementing health protocols guidance to keep a distance. The government can provide information about COVID-19 that can be accessed by the general public quickly, updated, and trusted through the internet and social media. Health workers at Sungai Durian Health Center, West Kalimantan, received the most information about COVID-19 (62.2%) from the internet.[19]

Anxiety is a feeling of concern, uncertainty, and fear without an apparent stimulus, associated with physiological changes (tachycardia, sweating, tremors, etc.). If anxiety cannot be handled optimally, it can cause trauma.[20]

The effect showed that most respondents had moderate anxiety, 84%. In this study, the health workers who performed midwifery care were midwives, with the highest age range being between 20–39 years. There is a relationship between late adulthood and coping mechanisms with anxiety because most respondents aged 21 to 45 years old have an anxiety disorder.[21]

The factors that influence psychological well-being include demographic characteristics, which are gender, age, and socioeconomic level. Health workers are at the forefront of handling patients who only have symptoms of COVID 19 and patients who are positive for COVID-19 so that various mental conditions will arise. Respondents in this study were all female. Women were more worried about their inability than men. Women are a vulnerable group affected by mental health such as anxiety and stress arising during the coronavirus pandemic or COVID-19.[22] There is 66 percent of female respondents showed that the most common psychological disorders experienced are anxiety.[23,24] During the COVID-19 pandemic, medical examiners feel depressed and worried, so stress improves their mental status while doing their obligations.

The results showed a correlation between knowledge and anxiety of midwives with a correlation coefficient of r=−0.235. It indicates that the better the knowledge, the lighter the anxiety of the midwives.

Nurses had good knowledge about COVID-19, but nurses' anxiety was at a moderate level.[18] Even though knowledge about COVID-19 is one of the elements that affect the anxiety degree of nurses in the Outpatient Installation of Dr. M Djamil General Hospital Padang.[25] However, there is no considerable correlation between anxiety and the extent of understanding of nurses about COVID-19.[26] The results of this research showed a correlation although the level of the correlation was low. It is with a correlation coefficient of r=−0.235 with a significance level of 0.036. It could be because other factors influenced the anxiety of health workers. The anxiety of health workers is not only influenced by knowledge, but several other things can affect it. Most of the respondents experienced anxiety due to the COVID-19 pandemic in the Manggarai district due to several factors, including increased anxiety from female nurses, inadequate PPE availability, fear of transmission to other family members, and nurses' knowledge.[27]

The analysis test results by Kendall's tau test r=−0.235 showed a negative sign correlation coefficient, which means that there is an opposite

correlation between the two variables with a low level of correlation that not only knowledge is a factor that affects the anxiety of midwives.[26] High anxiety can affect a person's physical, spiritual, and knowledge. The consequences of this anxiety need to be overcome to reduce the effects of anxiety itself.[28]

Conclusions

There is a correlation between the knowledge and anxiety of midwives. The results indicate that the better the knowledge, the lighter the anxiety of the midwife. However, the level of correlation between the two is included in a low correlation.

Conflict of Interest

There was not a conflict of interest in this article.

Acknowledgment

The study funded by the Directorate of Research and Community Service, Directorate General of Research and Improvement Strengthening of the Ministry of Research, Technology, and Higher Education (Research Contract Number 060/AMD-SP2H/LT-MONO-PDPK/LL7/2021). We would also like to thank RSUD Kabupaten Kediri for giving permission to conduct and facilitate this research.

References

1. World Health Organization. Tatalaksana klinis infeksi saluran pernapasan akut berat (SARI) suspek penyakit COVID-19 [Internet]. Geneva: World Health Organization; 2020 [cited 2021 October 6]. Available from: https://www.who.int/docs/default-source/searo/indonesia/covid19/tatalaksana-klinis-suspek-penyakit-covid-1935867f18642845f1a1b8fa0a0081efcb.pdf.
2. Prompetchara E, Ketloy C, Palaga T. Immune responses in COVID-19 and potential vaccines: lessons learned from SARS and MERS epidemic. Asian Pac J Allergy Immunol. 2020;38(1):1–9.
3. Phelan AL, Katz R, Gostin LO. The novel coronavirus originating in Wuhan, China: challenges for global health governance. JAMA. 2020;323(8):709–10.
4. Li X, Geng M, Peng Y, Meng L, Lu S. Molecular immune pathogenesis and diagnosis of COVID-19. J Pharm Anal. 2020;10(2):102–8.
5. Kementerian Kesehatan Republik Indonesia. Situasi terkini perkembangan novel coronavirus (COVID-19). Data dilaporkan sampai 8 Juli 2020 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 [cited 2021 October 6]. Available from: https://covid19.kemkes.go.id/document/download/mlwO8kkrJZ.
6. Kementerian Kesehatan Republik Indonesia. Situasi terkini perkembangan coronavirus disease (COVID-19).). Data dilaporkan sampai 18 Juli 2021 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020 [cited 2021 October 10]. Available from: https://infeksiemerging.kemkes.go.id/document/download/KpvOAkg63j.
7. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. Lancet Psychiatry. 2020;7(4):e15–6.
8. Neto MLR, Almeida HG, Esmeraldo JD, Nobre CB, Pinheiro WR, de Oliveira CRT, et all. When health professionals look death in the eye: the mental health of professionals who deal daily with the 2019 coronavirus outbreak. Psychiatry Res. 2020;288:112972.
9. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020;395(10227):912–20.
10. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open. 2020;3(3):e203976.
11. Alwani SS, Majeed MM, Ramzan Z, Rauf S, Syed MS, Shah SH, et all. Evaluation of knowledge, practices, attitude, and anxiety of nurses towards COVID-19 during the current outbreak in Karachi, Pakistan. PJPH. 2021;11(3):82–90.
12. Fadli, Safruddin, Ahmad AS, Sumbara, Baharuddin, R. Faktor yang mempengaruhi kecemasan pada tenaga kesehatan dalam upaya pencegahan Covid-19. J Pendidik Keperawat Indones. 2020;6(1):57–65.
13. Abdel Wahed WY, Hefzy EM, Ahmed MI, Hamed NS. Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-

sectional study from Egypt. J Community Health. 2020;45(6):1242–51.
14. Ahmed N, Shakoor M, Vohra F, Abduljabbar T, Mariam Q, Rehman MA. Knowledge, awareness and practice of health care professionals amid SARS-CoV-2, corona virus disease outbreak. Pak J Med Sci. 2020;36(COVID19-S4):S49–56.
15. Alrubaiee GG, Al-Qalah TAH, Al-Aawar MSA. Knowledge, attitudes, anxiety, and preventive behaviours towards COVID-19 among health care providers in Yemen: an online cross-sectional survey. BMC Public Health. 2020;20(1):1541.
16. Nemati M, Ebrahimi B, Nemati F. Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. Arch Clin Infect Dis. 2020;15(COVID-19):e102848.
17. Notoatmodjo S. Promosi kesehatan dan perilaku kesehatan. Jakarta: Rineka Cipta; 2012.
18. Dharmawati IGAA, Wirata IN. Hubungan tingkat pendidikan, umur, dan masa kerja dengan tingkat pengetahuan kesehatan gigi dan mulut pada guru Penjaskes SD di Kecamatan Tampak Siring Gianyar. J Kesehat Gigi. 2020;4(1):1–5.
19. Grishela VV, Khoris YH, Akbar F. Kajian tingkat pengetahuan Covid-19 terhadap sikap dan perilaku pencegahan penularan infeksi Covid-19 pada tenaga kesehatan di Puskesmas Sungai Durian tahun 2020 [Internet]. Charlottesville; Open Science Framework (OSF); 2020 [cited 2021 October 7]. Available from: https://osf.io/fhqw8.
20. National Health Service United Kingdom. Generalised anxiety disorder in adults [Internet]. Leeds: National Health Service United Kingdom; 2018 December 2018 [cited 2020 September 23]. Available from: https://www.nhs.uk/mental-health/conditions/generalised-anxiety-disorder/overview.
21. Puspanegara A. Pengaruh usia terhadap hubungan mekanisme koping dengan kecemasan ketika menjalani terapi hemodialisa bagi para penderita gagal ginjal kronik di Kabupaten Kuningan Jawa Barat. J Ilmu Kesehat Bhakti Husada. 2019;10(2):142–9.
22. Rayani D, Purqoti DNS. Kecemasan keluarga lansia terhadap berita hoax dimasa pandemi Covid-19. Realita. 2020;5(1):906–12.
23. Sunarti E, Ramadhan DA, Wigar S. Refleksi hasil survey ketahanan keluarga di masa pandemi COVID-19. Webinar The 14th IPB Strategic Talks COVID-19 Series: Mencegah Krisis Keluarga Indonesia di Masa Pandemi COVID-19 [video file]. 2020 June 25 [cited 2021 October 1]. Available from: https://www.youtube.com/watch?v=yxyVB3PIpjo.
24. Vibriyanti, D. Kesehatan mental masyarakat: mengelola kecemasan di tengah pandemi COVID-19. JKI. 2020;Spec No:69–74.
25. Amri SO. Hubungan pengetahuan tentang Covid-19 dengan tingkat kecemasan perawat di Instalasi Rawat Jalan RSUP Dr. M Djamil pada tahun 2020 [minor thesis]. Padang: Universitas Andalas; 2021 [cited 2021 October 6]. Available from: http://scholar.unand.ac.id/75343.
26. Herwawan YP, Siagian E. Faktor yang mempengaruhi tenaga kesehatan dalam upaya pencegahan dan pengendalian pandemi Covid-19. J Penelit Perawat Prof. 2021;3(4):683–92.
27. Danu VK, Ningsih OS, Suryati Y. Faktor-faktor yang mempengaruhi kecemasan perawat selama pandemi COVID-19 di Kabupaten Manggarai. JWK. 2021;6(1):21–31.
28. Kasmi K, Maemonah M, Nurjannah N. Gambaran spiritualitas orang dalam pengawasan (ODP) COVID-19 yang mengalami anxiety: sebuah studi fenomenologis. Al-Isyraq. 2021;4(1):1–14.

Global Medical and Health Communication

Online submission: https://ejournal.unisba.ac.id/index.php/gmhc
DOI: https://doi.org/10.29313/gmhc.v10i1.8811

GMHC. 2022;10(1):74–78
pISSN 2301-9123 | eISSN 2460-5441

RESEARCH ARTICLE

The Effectiveness of Lactation Counseling on Knowledge, Self-Confidence, and Successful Breastfeeding for Postpartum Mothers

Elizabeth Widayati, Ranti Lestari, Novi Widiastuti
Akademi Kebidanan Cianjur, Cianjur, Indonesia

Abstract

The best primary nutrition for babies is breast milk. Exclusive Breastfeeding is given since the baby is born for six months. Breastfeeding proofed to reduce infant mortality and morbidity. The rate of exclusive breastfeeding in Indonesia is still low at around 37.3%. The cause of the low number of breastfeeding is the lack of information obtained by the mother, affecting the mother's knowledge and belief. Breastfeeding mothers need the correct information. This information can be obtained from lactation counseling provided by health workers. This study aims to analyze the effect of counseling on knowledge, mothers' self-confidence, and breastfeeding ability in postpartum mothers. This research was conducted in July–September 2021 in the working area of the Sukaluyu Public Health Center, Cianjur regency. This research method uses a quasi-experimental design with a post-test only with a control group design—the sample in this study was 60 respondents, primigravida mothers aged 37 weeks to 1 month postpartum. The analysis used is the t-test and the Mann-Whitney test. This study uses three instruments: knowledge, self-confidence in the form of a Breastfeeding Self-Efficacy Scale Form (BSESF) questionnaire, and a breastfeeding ability observation sheet. The study results on mothers' knowledge in the intervention group were higher, namely 26, and there was a significant difference between the knowledge of the two groups (p=0.03). There are differences in the beliefs of breastfeeding mothers after being given counseling (p=0.001). There is no difference in the mothers' ability of the two groups after counseling (p=1.000). In conclusion, lactation counseling using video media increases the knowledge and confidence of breastfeeding mothers compared to those given standard care.

Keywords: Breastfeeding ability, counseling, knowledge, self-confidence

Introduction

The best primary nutrition for babies is breast milk, with exclusive breastfeeding can help the growth, development, and survival of babies. Breastfeeding that is not optimal can increase the risk of malnutrition, morbidity, and mortality.[1] Exclusive breastfeeding is given for six months and continued until the baby is two years old. Complementary foods for breast milk are introduced after the baby is six months old.[2,3]

Many studies on exclusive breastfeeding have been carried out, but breastfeeding coverage is still low. The 2018 Indonesian Basic Health Research stated that exclusive breastfeeding in Indonesia is 54.3% and decreased in 2018 to 37.3%.[4] Exclusive breastfeeding data in West Java in 2018 reached 53%, while the range of exclusive breastfeeding coverage in Cianjur regency was 63.18%.[5] This figure exceeds the coverage range of the province.

The data from the Cianjur Regency Health Office in 2017 shows that the lowest coverage of exclusive breastfeeding is in the Sukaluyu Health Center working area, at around 20.5%. Based on data from the Sukaluyu Health Center in 2018, only about 46.51% of babies were given exclusive breastfeeding.[6]

One of the causes of the lack of breastfeeding is the lack of information obtained by the mother. It affects the mother's knowledge about lactation and her belief in breastfeeding. Mothers need lactation information. This information can be obtained from lactation counseling provided by health workers. Counseling will be effective when using various media and affect the absorption of information and increase knowledge about lactation.[7–9]

Many media are used in counseling, one of which is audio-visual media such as video. In addition to the use of media in counseling, community support also affects the duration of breastfeeding. The support can be in technology, for example, using cell phones.[1,7,10–12]

The results of the literature study show that structured counseling programs impact

Received: 2 November 2021; 30 April 2022; Accepted: 30 April 2022; Published: 30 April 2022

Correspondence: Elizabeth Widayati, S.S.T., M.Keb. Akademi Kebidanan Cianjur. Jln. Pangeran Hidayatullah No. 103, Cianjur 43212, West Java, Indonesia. E-mail: lppmakbidcianjur2017@gmail.com

breastfeeding performance. Jerin et al.[1] showed that breastfeeding support is given during pregnancy, and postpartum can increase exclusive breastfeeding. Support is also more successful if it is provided through interpersonal communication. Interpersonal communication support is carried out using cellular telephones.

Based on the study results, it was found that providing support via the telephone can increase exclusive breastfeeding. In addition, the use of cellular phones and text messaging interventions can be measured at several points in time and has a low cost of conducting counseling.[1,11,12]

The purpose of this study was to analyze the effect of counseling on the level of knowledge, self-confidence, and breastfeeding success in postpartum mothers.

Methods

The method in this research is quantitative with a quasi-experimental design. All primigravida pregnant women aged 37 weeks to one month postpartum were the population in this study. The sample selection used a nonprobability/ nonrandom sampling technique with a consecutive sampling method. The sample in this study was 60 respondents, where 30 respondents were in the intervention group, and 30 respondents were in the control group. This research has received ethical approval from the Research Ethics Committee of the University of 'Aisyiyah Bandung with the number 61/KEP.01/ UNISA-BANDUNG/X/2021.

The counseling media used in this research is video media. The variables in this study are knowledge, self-confidence, and breastfeeding success. Measuring self-confidence in mothers using the Breastfeeding Self-Efficacy Scale Form (BSESF) questionnaire developed by McCarter-Spaulding and Dennis[13] in 2010, evaluation of breastfeeding success was assessed at one month postpartum by observing breastfeeding using observation sheets in each group.[14,15] Analysis of the data used in this study used the Mann-Whitney test method to determine differences in knowledge, self-confidence, and breastfeeding success.

Results

Based on Table 1, it was found that most of the research respondents were aged 20–35 years, namely 22 people (73%) and 20 people (66%). Based on the characteristics of the last education, most of the mothers had higher education (high school and university), as many as 20 people (66%) and 17 people (56%). Based on the work characteristics, it was found that most of the homemakers were 17 people (56%) and 20 people (66%).

Based on Table 2, the median knowledge of mothers in the intervention group was 26. The results of the Mann-Whitney test were $p=0.03$ ($p<0.05$), meaning that there was a significant difference between the knowledge of the two groups. The median value of maternal confidence in the intervention group was 65, and there was a significant difference between maternal beliefs in the two groups ($p=0.001$, $p<0.05$). The median value of the mother's ability to breastfeed in the intervention group was the same as the control group, which was 24.50. Furthermore, analysis based on the Mann-Whitney test results showed

Table 1 Characteristics of the Research Respondents

Characteristics	Groups	
	Intervention n=30 (%)	Control n=30 (%)
Age (years)		
20–35 (not at risk)	22 (73)	20 (66)
<20 and >35 (at risk)	8 (27)	10 (34)
Education		
Low (elementary, junior high school)	20 (66)	17 (56)
High (senior high school, university)	10 (34)	13 (44)
Work		
Housewife	7 (16)	20 (66)
Work	38 (84)	10 (34)

Table 3 Effect of Counseling in Postpartum Mothers

Variables	Groups		p Value
	Intervention (n=30)	Control (n=30)	
Knowledge			0.030
Average (SD)	4.934	4.934	
Median	26	23	
Range	23.89–27.58	20.89–24.58	
Self-confidence			0.001
Average (SD)	4.673	8.520	
Median	65	54.50	
Range	61.86–65.34	52.85–59.21	
Breastfeeding ability			1.000
Average (SD)	2.501	2.501	
Median	24.50	24.50	
Range	23.50–25.37	23.50–25.37	

no difference between the mother's breastfeeding ability in the two groups (p=1.000, p>0.05).

Discussion

Counseling is a process of changing the behavior of individuals, groups, or communities to obtain specific goals. In providing counseling services, professional skills are needed to achieve the goals of counseling.

Health promotion efforts in increasing mothers' knowledge of breastfeeding success need to be done with lactation counseling. It is evident from the results obtained in this study that the median value of mothers' knowledge in the intervention group was 23 and higher than the control group, which was 23. Based on the results of the Mann-Whitney test, there was a difference in knowledge between the two groups (p=0.03, p<0.05). Lactation counseling needs to be given in a planned manner, and the use of various counseling media such as audio-visual or video media will increase the mother's knowledge. This study is in line with research by Liliana et al.[16] that after being given lactation counseling using video media, there was a change in knowledge in the intervention group (p=0.000, p<.05). The results of other studies showed an increase in knowledge in the intervention group after being given counseling (p=0.04, p<0.05).[17]

Increased knowledge is due to planned lactation counseling. Thus mothers understand more about lactation so that it can affect the implementation of mothers in giving breast milk to babies. In addition, the intensity of counseling also affects the increase in knowledge. Therefore, the mothers are often given lactation counseling, and the more information about lactation the mother gets. In addition, increasing knowledge will also increase the mother's confidence in breastfeeding her baby. A mother's self-confidence is one of the factors in the success of breastfeeding. Therefore, breastfeeding mothers will try to keep breastfeeding, emotionally controlling mothers in overcoming difficulties in breastfeeding.[18]

Breastfeeding Self-Efficacy Scale Form (BSESF) can be formed from breastfeeding experiences, both personal and other people's experiences. Health workers can help increase motivation and understand the psychological condition of breastfeeding mothers.[19,20] BSESF is a mother's confidence and ability to breastfeed her baby and influences the duration of breastfeeding so that it can predict the continuation of breastfeeding.

Based on Table 2, it was found that the median confidence of mothers who received planned counseling was higher than the control group, namely 65 and 54.50. The Mann-Whitney test results obtained p=0.001 (p<0.05), which means that there are differences in the confidence of breastfeeding mothers in each group.

In this case, the provision of counseling by midwives to mothers using video media can strengthen the mother's confidence to give exclusive breastfeeding. The strategy in this counseling uses interactive communication methods. In this method, communication is focused on constructing thoughts, emotions,

perceptions, and commitments of breastfeeding mothers. Armini et al.[19] showed an increase in the average self-efficacy before and after counseling interventions from 69.33 to 89.67. Providing counseling using video media is an effort to increase awareness of breastfeeding mothers.

Riyanti et al.'s[21] research state a difference between breastfeeding self-efficacy before and after counseling. So it can be concluded that the less counseling, the mother's confidence level will also decrease. Therefore the importance of counseling related to maternal beliefs earlier in the third trimester so pregnant women will have high confidence to breastfeed.[21,22]

Breastfeeding success is the mother's ability to provide exclusive breastfeeding and the correct breastfeeding technique. Proper breastfeeding technique is a factor in breastfeeding success, which needs to be considered in breastfeeding techniques, namely the breastfeeding position and attachment of the baby's mouth to the mother's breast.[7]

Table 2 shows that the median value of the mother's ability to breastfeed in the intervention group is the same as the control group, which is 24.50. In addition, the Mann-Whitney test results showed no difference between the mother's ability to breastfeed in the two groups ($p=1.000$, $p>0.05$).

It is because breastfeeding behavior is a mother's instinct. Still, this attitude will change when the mother faces problems in breastfeeding, such as disturbed milk production, no support from her husband and family, and no support from health workers. The research above is supported by Ambarwati et al.,[23] stating that there is no difference in breastfeeding success before and after lactation counseling ($p=0.577$).

The success of lactation counseling is influenced by several factors, namely: lack of acceptance of mothers with breastfeeding problems, lack of health services in overcoming issues of public health status, beliefs or cultural values in society, and environmental factors that do not support.[24–26]

However, this study was strengthened by research by Ambarwati et al.[23] that the control group showed no difference in breastfeeding success before and after being given counseling. The cause was the lack of knowledge and motivation of breastfeeding mothers. Lactation counseling during pregnancy is ineffective in changing knowledge and success of breastfeeding because mothers learn more from breastfeeding experiences in previous children and experiences from parents.

Conclusions

There is an effect of counseling on the level of knowledge and self-confidence, but not on the breastfeeding success in postpartum mothers. Lactation counseling with video media in the intervention group increased the knowledge and confidence of breastfeeding mothers compared to the control group.

Conflict of Interest

In this study, all authors declare no conflict of interest.

Acknowledgment

Ministry of Research, Technology, and Higher Education has provided funding for the research.

References

1. Jerin I, Akter M, Talukder K, Talukder MQEK, Rahman MA. Mobile phone support to sustain exclusive breastfeeding in the community after hospital delivery and counseling: a quasi-experimental study. Int Breastfeed J. 2020;15(1):14.
2. Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia. Mari dukung! Menyusui dan bekerja [Internet]. Jakarta: Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia; 2015 [cited 2021 October 30]. Available from: https://pusdatin.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin-asi-2015.pdf.
3. Westerfield KL, Koenig K, Oh R. Breastfeeding: common questions and answers. Am Fam Physician. 2018;98(6):368–73.
4. Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia. Hasil utama riskesdas 2018 [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2019 [cited 2021 November 20]. Available from: https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf.
5. Dinas Kesehatan Provinsi Jawa Barat. Profil kesehatan Provinsi Jawa Barat [Internet]. Bandung: Dinas Kesehatan Provinsi Jawa

Barat; 2017 [cited 2021 November 25]. Available from: https://diskes.jabarprov.go.id/assets/unduhan/28.%20PROFIL%20KESEHATAN%20JAWA%20BARAT%20TAHUN%20%202017.pdf.
6. Dinas Kesehatan Kabupaten Cianjur. Profil kesehatan Kabupaten Cianjur. Cianjur: Dinas Kesehatan Kabupaten Cianjur; 2018.
7. Suksesty CE, Hernowo BS, Damayanti M, Husin F, Sekarwana N, Sumintardja EN. Peran konseling laktasi dengan penerapan media terhadap keyakinan diri dan keberhasilan menyusui pada ibu post partum. IJEMC. 2016;3(2)48–56.
8. Nababan S, Yikwa E, Widjanarko B. Health promotion media to behavior change on exclusive breastfeeding mothers. J Promkes. 2019;7(2):233–9.
9. Radzyminski S, Callister LC. Mother's beliefs, attitudes, and decision making related to infant feeding choices. J Perinat Educ. 2016;25(1):18–28.
10. Adam M, Johnston J, Job N, Dronavalli M, Le Roux I, Mbewu N, et al. Evaluation of a community-based mobile video breastfeeding intervention in Khayelitsha, South Africa: the Philani MOVIE cluster-randomized controlled trial. PLoS Med. 2021;18(9):e1003744.
11. Wu Q, Huang Y, Helena van Velthoven M, Wang W, Chang S, Zhang Y. Feasibility of using WeChat to improve infant and young child feeding in rural areas in China: a mixed quantitative and qualitative study. PLoS One. 2021;16(2):e0246942.
12. Gallegos D, Russell-Bennett R, Previte J, Parkinson J. Can a text message a week improve breastfeeding? BMC Pregnancy Childbirth. 2014;14:374.
13. McCarter-Spaulding DE, Dennis CL. Psychometric testing of the Breastfeeding Self-Efficacy Scale-Short Form in a sample of Black women in the United States. Res Nurs Health. 2010;33(2):111–9.
14. Nursan C, Dilek K, Sevin A. Breastfeeding self-efficacy of mothers and the affecting factors. Aquichan. 2014;14(3):327–35.
15. Mardiyah S, Anggorowati, Nurrahima A. Effects of peer education on improving self-efficacy of pregnant women in breastfeeding the baby. PJMHS. 2019;13(4):1282–5.
16. Liliana A, Hapsari ED, Nisman WA. Pengaruh konseling laktasi terhadap pengetahuan kemampuan dan keberhasilan ibu dalam pemberian ASI. J Keperawatan Respati Yogyakarta. 2017;4(2):189–93.
17. Sutrisminah E, Hudaya I. Pengaruh konseling laktasi intensif terhadap keberhasilan pemberian air susu ibu (ASI) eksklusif sampai 6 bulan di Kelurahan Kudu Kecamatan Genuk Kota Semarang. Involusi. 2015;10(1):12–16.
18. Vidayanti V, Wahyuningsih M. Efektifitas konseling laktasi terhadap efikasi diri dan kemampuan menyusui ibu pasca bedah sesar. J Keperawatan Respati Yogyakarta. 2017;4(2):154–162.
19. Armini NW, Marhaeni GA, Suarniti NW, Astiti NKE, Purnamayanti NMD. Meningkatkan self efficacy ibu hamil dalam pemberian air susu ibu (ASI) eksklusif melalui edukasi dengan metode EMO-DEMO di Desa Batubulan Kangin. JPMS. 2020;2(2):113–9.
20. Ngadiarti I, Soekatri MYE, Srimiati M, Fayasari A, Agestika L. Pengaruh konseling pada pengetahuan dan asupan ibu di wilayah kerja Puskesmas Kebayoran Baru Jakarta. Gizi Indones. 2021;44(1):87–96.
21. Riyanti E, Nurlaila, Astutiningrum D. Pengaruh edukasi breastfeeding ibu post partum terhadap breastfeeding self efficacy. JIKK. 2018;14(3):96–104.
22. Kurniawati N, Kurniasari E. Pengaruh konseling cara menyusui terhadap pelaksanaan cara menyusui pada ibu yang mempunyai bayi usia 0–2 minggu di Puskesmas Ngombol. JKK. 2020;11(1):28–38.
23. Ambarwati R, Muis SF, Susantini P. Pengaruh konseling laktasi intensif terhadap pemberian air susu ibu (ASI) eksklusif sampai 3 bulan. JGI. 2013;2(1):15–23.
24. Fatmasari BD, Unde AA, Sundari, Utami R, Chiani SH, Mushawwir A. Pengaruh edukasi berbasis buku saku dan lembar balik terhadap keberhasilan inisiasi menyusu dini di Kota Makassar. J Keperawatan Muhammadiyah. 2020;Spec No:107–13.
25. Aprilina HD, Siswosudarmo R, Setiyarini WI. Pengaruh konseling laktasi pada ibu hamil trimester III terhadap pemberian prelaktal bayi baru lahir. J Kesehat Reproduksi. 2015;2(2):85–92.
26. Pramanik YR, Sumbara, Sholihatul R. Hubungan self-efficacy ibu menyusui dengan pemberian ASI eksklusif. JIKI. 2020;8(1):39–44.

Authors Index

Subjects Index

The Editor would like to thank you for the effort and expertise of all reviewers, without which it would be impossible to maintain the high standards of peer-reviewed journals.

Dr. Arif Susanto, M.H.M., M.Sc.
Assoc. Prof. Dr. Badrul Hisham Yahaya
Prof. Dr. Budi Setiabudiawan, dr., Sp.A.(K.), M.Kes.
Budiman, dr., M.K.M.
Prof. Cordia Ming-Yeuk Chu, B.Sc., M.A., Ph.D.
Ermi Ndoen, B.Sc.P.H., M.Sc.P.H., Ph.D.
Ferry Efendi, S.Kep.Ns., M.Sc., Ph.D.
Prof. Dr. Hendro Sudjono Yuwono, dr., Sp.B.V.(K.)
Prof. Dr. Herri S. Sastramihardja, dr., Sp.F.K.(K.)
Prof. Hidayat Wijayanegara, dr., Sp.O.G.(K.)
Prof. Dr. Ieva Baniasih Akbar, dr., A.I.F.
Dr. Jerico Franciscus Pardosi, B.P.H., M.I.P.H.
Dr. Lelly Yuniarti, S.Si., M.Kes.
Leri Septiani, dr., Sp.O.G., Ph.D.
Lia Faridah, dr., M.Si., Ph.D.
Prof. Dr. M. Ahmad Djojosugito, dr., Sp.B., Sp.O.T.(K.), M.H.A.
Mas Rizky A.A Syamsunarno, dr., M.Kes., Ph.D.
Dr. Maya Tejasari, dr., M.Kes.
Dr. Mia Kusmiati, dr., M.Pd.Ked.
Mirasari Putri, dr., Ph.D.
Prof. Dr. Niniek Lely Pratiwi, drg., M.Kes.
Nunik Kusumawardani, S.K.M., M.P.H., Ph.D.
Prof. Nuzirwan Acang, dr., DTM&H, Sp.P.D.-K.H.O.M.
Riyadi Adrizain, dr., Sp.A.(K.), M.Kes.
Prof. Dr. Roy Rilero Marzo, M.D., M.P.H., M.B.A.
Dr. Titik Respati, drg., M.Sc.P.H.
Prof. Dr. Tony S. Djajakusumah, dr., Sp.KK(K)
Prof. Umar Fahmi Achmadi, dr., M.P.H., Ph.D.
Dr. Ir. Wahyu Widowati, M.Si.
Dr. Wawang S. Sukarya, dr., Sp.O.G.(K.), M.A.R.S., M.H.Kes.
Dr. Wida Purbaningsih, dr., M.Kes.
Dr. Yani Triyani, dr., Sp.P.K., M.Kes.

TABLE OF CONTENTS

RESEARCH ARTICLES

p-ISSN 2301-9123
9 772301 912306

e-ISSN 2460-5441
9 772460 544103