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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 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 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

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Table title is the typed center, font size 10 pt, bold, initial letter of each word written with 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 10 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.

Pictures (graphs, diagrams, and photos) and tables besides written in its place, also created separately on other pages of texts with sufficient sharpness and blackness. A maximum number of tables and or images are six pieces. Photos are sent in black and white glossy, or colored format when required, minimum size 3R (9×13.5 cm). Images and photos can also be sent on CD.

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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 & Abstract (English) and *Judul & Abstrak* (Indonesian), 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. Author's name written with the initial fonts are capital and bold, size 11 pt, one space, and center. Institution name written with the initial fonts are capital, size 10 pt, one space, and center.

Abstract

The abstract is typed using 12 pt font size and one spaces. The abstract is written in one paragraph, one space, maximum 250 words, and should describes the entire contents of the article. The abstract should be suitable for the format of introduction, methods (contain method, place, and time of study), results, and discussion. 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 contains 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 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.

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

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.

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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 enviromental 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.

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RESEARCH ARTICLE

The Increased Knowledge of Children Dental and Oral Health at the Baitus Syukur Orphanage in Bandung

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Abstract

The COVID-19 pandemic has led to restrictions on visits to the dentist except for emergency cases. It causes the examination and treatment of dental and oral diseases to be hampered, which is feared to impact a person's overall health condition negatively. Therefore, each individual is expected to maintain optimal dental and oral health to prevent it. Until now, based on the results of interviews with the head of the Baitus Syukur orphanage, it was stated that the level of awareness of foster children on the importance of maintaining dental and oral health was low, and they did not yet have a special examination program related to dental and oral health. This study aims to analyze whether there is an increase in children's knowledge in the Baitus Syukur orphanage after counseling on oral health. This type of research is a quasi-experiment with pre and post-test methods in March–April 2021. This study uses a total population of 24 children in the Baitus Syukur orphanage. The data were analyzed with the results of the Wilcoxon Test analysis at a 95% confidence level. It showed that statistically, there was a significant difference between the values before and after giving counseling materials to participants with p value=0.003 (p value≤0.05). The conclusion is that there is an increase in children's knowledge about dental and oral health at the Baitus Syukur orphanage after counseling.

Keywords: Counseling, dental health, knowledge, oral health

Peningkatan Pengetahuan Kesehatan Gigi dan Mulut Anak di Panti Asuhan Baitus Syukur Bandung

Abstrak

Kondisi pandemik COVID-19 menyebabkan pembatasan kunjungan ke dokter gigi kecuali untuk kasus penyakit kesehatan gigi dan mulut darurat. Hal ini menyebabkan pemeriksaan dan perawatan penyakit gigi dan mulut terhambat yang dikhawatirkan akan menimbulkan dampak negatif terhadap kondisi kesehatan seseorang secara menyeluruh. Untuk mencegah hal ini, setiap individu diharapkan dapat menjaga kesehatan gigi dan mulutnya secara optimal. Sampai saat ini, berdasar atas hasil wawancara dengan Ketua Panti Asuhan Baitus Syukur menyatakan bahwa tingkat kesadaran anak asuh dalam menjaga kesehatan gigi dan mulut rendah dan belum memiliki program pemeriksaan khusus terkait kesehatan gigi dan mulut. Penelitian ini bertujuan menganalisis apakah terdapat peningkatan pengetahuan anak di Panti Asuhan Baitus Syukur setelah dilakukan penyuluhan mengenai kesehatan gigi dan mulut. Jenis penelitian ini adalah eksperimen quasi dengan metode *pre and post-test* pada Maret–April 2021. Penelitian ini menggunakan total populasi anak di Panti Asuhan Baitus Syukur yang berjumlah 24 orang. Data dianalisis menggunakan Uji Wilcoxon pada derajat kepercayaan 95% menunjukkan bahwa secara statistik, terdapat perbedaan yang signifikan antara nilai sebelum dan setelah pemberian materi penyuluhan pada partisipan dengan p=0,003 (p≤0,05). Simpulan, terdapat peningkatan pengetahuan anak mengenai kesehatan gigi dan mulut di Panti Asuhan Baitus Syukur setelah dilakukan penyuluhan.

Kata kunci: Kesehatan gigi, kesehatan mulut, pengetahuan, penyuluhan

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Introduction

Indonesia and countries worldwide are still struggling to control the coronavirus 2019 (COVID-19) pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The strategies taken by the Indonesian government include implementing large-scale social restrictions (*pembatasan sosial berskala besar*, PSBB). It also imposes regional quarantine or lockdown in several areas, conducting distance learning activities for students, limiting religious activities that gather large numbers of people. It requires all people to wear masks outside their homes, socializing the habit of washing hands using soap under running water or using hand sanitizers as often as possible. Application of physical distancing when someone is in a public place, socializing the importance of avoiding crowds when in public places and reducing mobility to prevent the spread of COVID-19. The task force for handling the spread of COVID-19 provides data that the number of COVID-19 sufferers is increasing every day in Indonesia. especially in the city of Bandung, West Java province.[1,2]

As of January 28, 2021, COVID-19 cases have reached 1,037,993. West Java ranks second as the province with the highest COVID-19 cases, with a case fatality rate of 1.2%.[3] The case fatality rate is the percentage of the number of deaths from the total number of confirmed and reported positive cases of COVID-19.[4]

The COVID-19 pandemic condition causes restrictions on visits to the dentist except for emergency dental and oral health cases. It causes the examination and treatment of dental and oral diseases to be hampered. In the future is feared to harm a person's overall health condition. To prevent this, each individual is expected to maintain optimal dental and oral health.[5]

Efforts to maintain dental and oral health, especially for school-age children, need special attention because, at this age, children are undergoing a process of growth and development. One of the processes of growth and development is influenced by the fulfillment of nutritional needs that require healthy teeth in the process of digesting food. The habit of children in taking care of their dental health from an early age will become a habit that will be carried over into adulthood, which will have an impact on the development of dental health in adulthood.[6]

The orphanage is one of the child protection institutions that protect children's rights (Guidelines for Child Protection 1999). According to the Association of Legislations on Child Protection 2002, it mandated that every child has the right to receive welfare, care, care, and guidance based on affection both within his family and in special care to grow and develop. According to Law no. 35 of 2014 concerning child protection Article 1 paragraph (1), a child is someone who is not yet 18 (eighteen) years old, including children who are still in the womb.[7]

The care and guidance carried out by the Child Welfare Institutions (*Lembaga Kesejahteraan Sosial Anak*, LKSA)/Baitus Syukur orphanage facilitate formal (elementary school, junior high school, vocational/high school, and college) and non-formal (skills training) education. It also guides worship (rituals) and social programs designed so that children welcome their future better. The children are expected to be better, qualified, independent, physically and mentally strong, strong in knowledge, grow into healthy people, knowledgeable, prosperous, and intelligent in science, faith, and charity. It hopes that the children will grow up to become individuals who are beneficial to many people in the pleasure, mercy, and *maghfirah* of *Allah SWT* in the future. Until now, based on the results of interviews with the head of the Baitus Syukur orphanage, it was stated that the level of awareness of foster children on the importance of maintaining dental and oral health was low, and they did not yet have a special examination program related to dental and oral health. To increase this knowledge can be done with health education or counseling. In terms of the age at which children are susceptible to disease, counseling is mainly aimed at groups who are prone to dental and oral health problems, namely elementary school-aged children.[8]

Health education can indirectly change the pattern of knowledge, attitudes, and actions in maintaining health. The knowledge that exists in a person is received through the senses. According to research by sensory experts, the one that transmits the most command into the brain is the sense of sight. Approximately 75% to 87% of human knowledge is transmitted through the sense of sight, 13% through the sense of hearing, and another 12% through the other senses.[9]

This study aims to analyze whether there is an increase in children's knowledge in the Baitus Syukur orphanage after counseling on oral health.

Methods

The design of this research is a quasi-experiment with pre and post method. The data taken is primary data in the form of questions related to counseling materials about dental and oral health knowledge.

Socialization and giving informed consent were done before the research was conducted. This study took the total children (24 children) from the Baitus Syukur orphanage located on Jl. Mars Selatan No. 27 RT 04 RW 07, Manjahlega village, Rancasari district, Bandung city, West Java. The inclusion criteria of this study were children living in the Baitus Syukur orphanage who could read and write, as the exclusion criteria were the sick children of the Baitus Syukur orphanage. Each child was accompanied while filling out the questionnaire.

The independent variable of this research is knowledge about dental and oral health. The dependent variable in this study is counseling about oral health. The primary data obtained were then processed and analyzed. Data analysis used Wilcoxon test analysis at a 95% confidence level.

This study was approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Islam Bandung, with approval number 115/KEPK-Unisba/XII/2021.

Results

The research was conducted at the Baitus Syukur orphanage located in Bandung city, West Java, and held from March to April 2021. The description of the values before and after counseling to respondents is shown in Table 1.

Table 1 shows the average value before giving counseling was 49.58 with a standard deviation of 14.51, and after giving counseling materials, the average value becomes 63.75 with a standard deviation of 15.55. The median value before providing counseling was 47.5, and after counseling was 65.0. The minimum value before giving counseling was 20.0, and after that, it became 30.0, while the maximum value before counseling was 75.0 and after counseling was 85.0.

Table 1 Overview of Values before and after Giving Counseling to Respondents

Values	Before	After
Average	49.58	63.75
Standard deviation	14.51	15.55
Median	47.5	65.0
Minimum	20.0	30.0
Maximum	75.0	85.0

Table 2 Differences in Values before and after Giving Counseling to Respondents

Variable	p Value
Test scores before counseling >< test scores after counseling	0.003

The difference in values before and after giving counseling to participants is shown in Table 2. Based on Table 2, it can be seen that the results of the Wilcoxon Test analysis with a 95% confidence degree indicate that statistically, there is a significant difference between the values before and after giving the counseling to the respondents with a p value=0.003.

Discussion

In this study, researchers conducted counseling on dental and oral health to change the behavior towards the expected direction through the active role of the counseling target. Health counseling is instilling confidence so that people are not only aware, know, and understand, but are also willing and able to carry out a recommendation that is related to health.[10] Dental and oral health counseling is an effort to change the behavior of a person or community so that they have the ability and habits of behaving in a healthy life. One of the benefits of oral health counseling is increasing knowledge and power through techniques learned or instructions to change or influence human behavior in individuals, groups, and communities. It aims to raise awareness of the value of healthy teeth and mouth to change its behavior into healthy behavior consciously. Counseling is expected to provide sustainable benefits to change the concept of health in the aspects of knowledge, attitudes, and behavior of individuals and communities.[11,12] Dental health education in children is essential because at that age is a critical time for both the growth of molars also for the development of his soul as the need approaches to generate knowledge, attitudes,

and behavior of healthy teeth and oral health in particular.[13]

Based on the data presented in Table 1 and Table 2, the level of knowledge of Baitus Syukur orphanage children has increased after attending counseling than before. An increase in the number of correct answers in general and a reduction in the number of incorrect answers shows the effectiveness of the counseling that has been made in improving knowledge. The results of this study are consistent with Sumirat's[14] research which states that of the 30 respondents studied before the counseling, the children's knowledge level was 60% within the sufficient criteria. Still, after the counseling, the results obtained 70% of the children's knowledge were in good standards.

The research of Dwi and Susilarti[15] are also in line with this study, which states that counseling increases the knowledge and attitudes of dental and oral health students at SDN I and II Mergodadi Seyegan Sleman Yogyakarta. Likewise, Husain's[6] research states the same thing as this study there is an increase in children's knowledge about dental and oral health after counseling.

Success in delivering information cannot be separated from the role of the informant and the respondent who is given the data. This opinion is in line with the theory raised by J. Guilbert on factors influencing health education. Among other materials or things learned, the physical and social environments need to be considered, an instrument consisting of hardware (hardware) and software (software) condition individual.[16] Delivery media following the stage of cognitive development will be more readily accepted by children so that dental and oral health knowledge can be improved and the use of the senses can be maximally helpful. It is necessary to provide dental and oral health counseling with assistive devices or media to attract children's interest.[17]

Media as a tool are essential when used for counseling because educators use tools in delivering educational or teaching materials.[18] The respondents well received the selection of audiovisual as a media for health education. This media offers counseling that is more interesting and not monotonous. This counseling uses audiovisual, which displays motion, images, and sound. When the research was conducted, counseling with this media posed a great curiosity about the contents of the material and seriously watched the video on the media zoom meeting until it was finished.[19] Audio visual is a visual and hearing aid to stimulate the eye and hearing senses while delivering teaching materials. Audiovisual media are simultaneously used to stimulate the two senses, namely the eyes and ears, so respondents are more focused on the material provided.[20]

The selection of methods also determines the success of counseling. The commonly used extension methods are the didactic method (one-way method) and the Socratic method (two-way method). In the didactic approach, educators tend to be active while students as the target of educators are not allowed to express opinions. In addition, lectures are one of the best didactic methods used in dental and oral health education for elementary school children. The Socratic method is carried out by two-way communication between students and educators. Students are allowed to express their opinions, and two or more people with different backgrounds work together to provide information and participate in communicating ideas.[21]

This study uses the lecture method, interactive video, and discussion method to increase the children's knowledge. The lecture method is one of how health education explains something verbally.[22] The lecture method was chosen due to several considerations. One of them is because the lecture method has been considered a suitable method and can be well received by the target. This method is ideal for both high and low educated marks. In addition, the lecture method is a method that has often been used, and this method can be done with a large number of participants.[23]

Knowledge is the result of knowing after sensing particular objects. Cognitive knowledge is an essential factor for the formation of one's actions. Knowledge-based on the correct understanding will lead to the expected new behavior. Knowledge and health are two things that are related to each other. One of the factors that affect the health of the body is dental and oral health. One of the causes for dental and oral health problems is behavioral factors due to a lack of knowledge about maintaining dental and oral health, increasing the incidence of dental and oral diseases at an early age.[24]

Conclusions

There was an increase in children's knowledge about dental and oral health at the Baitus Syukur orphanage after counseling.

Conflict of Interest

There is no conflict of interest in this research.

Acknowledgments

The researcher would like to thank the leaders, administrators and children of the Baitus Syukur orphanage.

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RESEARCH ARTICLE

Neonatal Care Education during Pregnancy Using Videos on the iPosyandu Application

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Abstract

Indonesia Demographic and Health Survey (IDHS) 2017 shows that the neonatal mortality rate (NMR) in Indonesia was 15 per 1,000 live births. A decrease in NMR to 12 per 1,000 live births can reduce the infant mortality rate (IMR). Purwakarta regency in 2019 ranked 14 out of 27 regencies and cities that contribute to the NMR in West Java. This research analyzes the knowledge of pregnant women about neonatal care before and after being given a combination of video animation and demonstration on the iPosyandu Parents application. The research method used was quantitative with one group pretest-posttest design, an interventional study without a control group. The sample size was 60 pregnant women in their third trimester. Samples that met the criteria were taken by purposive sampling technique and according to the midwife's instructions at the Pasawahan Public Health Center, Purwakarta regency. This research was conducted in May 2020. The knowledge data were collected using a questionnaire that was translated from previous studies. The questionnaire topic groups were adapted from the government's Maternal and Child Health book. The results showed differences in knowledge before and after being given health education using audiovisual media in 7 topic groups. They comprised general information on neonatal care, early breastfeeding initiation, breastfeeding, keeping babies warm, umbilical cord care, schedule of neonatal visits, and immunization. However, there was no difference in one topic group, namely the newborn danger critical signs.

Keywords: Animation, combination, demonstration, neonatal, nursing

Edukasi selama Kehamilan tentang Perawatan Neonatus Menggunakan Video pada Aplikasi iPosyandu

Abstrak

Angka kematian neonatus (AKN) menurut Survei Demografi dan Kesehatan Indonesia (SDKI) tahun 2017 di Indonesia adalah 15 per 1.000 lahir hidup. Penurunan AKN hingga 12 per 1.000 kelahiran hidup dapat menekan angka kematian bayi (AKB). Kabupaten Purwakarta pada tahun 2019 menempati urutan ke-14 dari 27 kabupaten dan kota penyumbang AKN di Jawa Barat. Tujuan penelitian ini menganalisis pengetahuan ibu hamil mengenai perawatan neonatus sebelum dan sesudah diberikan video kombinasi animasi dan demonstrasi pada aplikasi iPosyandu Orangtua. Metode penelitian yang digunakan adalah kuantitatif dengan desain *one grup pretest-posttest* yang merupakan penelitian intervensional tanpa kelompok kontrol. Besar sampel dalam penelitian ini adalah 60 ibu hamil trimester III. Sampel yang memenuhi kriteria diambil dengan teknik *purposive sampling* sesuai dengan arahan dari bidan Puskesmas Pasawahan Kabupaten Purwakarta. Penelitian ini dilakukan pada bulan Mei 2020. Pengumpulan data pengetahuan dilakukan dengan menggunakan kuesioner yang diterjemahkan dari penelitian sebelumnya. Kelompok topik kuesionernya disesuaikan dengan buku Kesehatan Ibu dan Anak (KIA) dari pemerintah. Hasil penelitian menunjukkan bahwa terdapat perbedaan pengetahuan sebelum dan sesudah diberikan pendidikan kesehatan menggunakan media audiovisual pada 7 kelompok topik. Topik tersebut terdiri atas informasi umum perawatan neonatus, inisiasi menyusui dini (IMD), pemberian ASI, menjaga bayi tetap hangat, perawatan tali pusat, jadwal kunjungan neonatal, dan imunisasi. Akan tetapi, kelompok mengenai tanda bahaya bayi baru lahir tidak terdapat perbedaan.

Kata kunci: Animasi, kombinasi, neonatus, peragaan, perawatan

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Introduction

In the Indonesian Demographic and Health Survey (IDHS) 2017, the neonatal mortality rate (NMR) was 15 per 1,000 live births. The Ministry of Health of Republic of Indonesia targets the IMR to drop to 12 per 1,000 live births, thus reducing the infant mortality rate (IMR). According to the health profile of West Java, the Purwakarta regency was ranked 14th out of 27 regencies and cities that contributed to NMR in West Java, with 77 NMR cases in 2019. The NMR, IMR, and the infant and child mortality rate (ICMR) can be reduced by having an integrated service post (*pos pelayanan terpadu*, *posyandu*). *Posyandu* is a form of community-sourced effort that facilitates the people to obtain health services and information. Among the benefits is that pregnant women can have easier access to information about health, and mothers, babies, and toddlers can easily receive health services. In terms of quantity, the number of *posyandu* is around 3–4 *posyandu* per village. However, several quality problems were found, including mothers not utilizing *posyandu*. One indication of the use of health services by the community is the active participation of the community at the *posyandu*.[1,2]

This utilization will increase public exposure to information from *posyandu*, including details on neonatal mortality prevention. When the community does not use this, they will lack information about neonatal care. One way to fill the gap between the needs regarding a person's knowledge and abilities is by education that activates the five senses, mainly the senses of hearing and sight. Good educational media can stimulate feelings, attention, thoughts, abilities, and learning skills. They can encourage knowledge change and a more effective and efficient learning process. Time and learning intensity are also essential factors in the learning process.[3,4] Information technology under user-friendly needs can be one of the leading alternative solutions.[5,6]

Since 2017, the Universitas Padjadjaran Lecturer Competency Research team has been developing information technology for *posyandu* called the iPosyandu mobile application. The application is made for cadres and parents with the same database. The iPosyandu application dedicated explicitly to parents is called *iPosyandu Orang Tua* (parents). This application makes it easier for parents to monitor the growth and development of their children. Their data have been recorded by cadres on the iPosyandu application, specifically for cadres. [7] In addition, this application contains educational material for parents, including pregnant women, in preparing neonatal babies.[8] This application features educational videos (Figure 1) intended to create a more focused learning atmosphere than learning on chat applications such as WhatsApp, LINE, and Telegram. This research continues Susanti et al.'s study (2019), which assessed the parents' knowledge that they had not used videos in the iPosyandu application.[9] The advantage of video media is that it presents the object as a whole and conveys a real message. It is perfect for stimulating or motivating the learning process. Videos can reduce learning boredom, especially with other learning techniques such as lectures and screened case discussions. This combination will increase memory retention or retention of learning objects in learners.[10]

The videos in this research were made based on input from pregnant women to involve humans in the video and combine them with animation. This educational video, especially for pregnant women, which is the focus of the research, was intended to prepare pregnant women by providing knowledge about neonatal care. Therefore, the

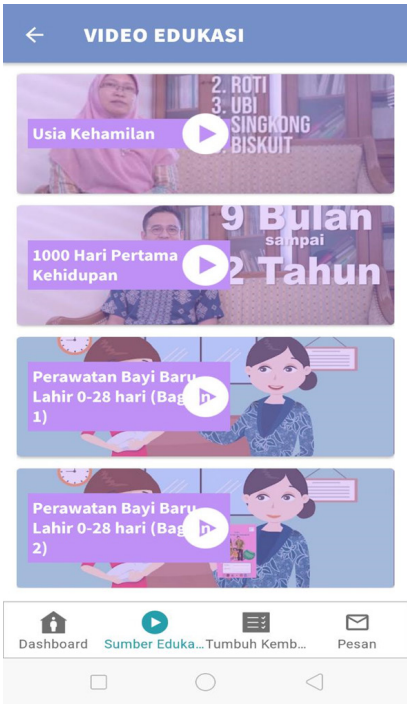

Figure 1 Educational Video Menu

purpose of this research was to identify third-trimester pregnant women's knowledge and the effectiveness of the *iPosyandu Orang Tua* application platform with the combination videos about neonatal care in educating the mothers.

Methods

This research employs a quantitative method with the one-group pretest-posttest design, an interventional study without a control group. This research was conducted in the jurisdiction of Pasawahan Community Health Center, Purwakarta regency. The reason for choosing this area was because the need for an application that could assist cadres and parents in monitoring toddlers has been identified since 2016. As a result, the iPosyandu application was created in 2017. In this application, cadres have registered the data of parents and children so that parents can access them using the *iPosyandu Orang Tua* application, including the educational videos. The number of samples in this research was 60 third trimester pregnant women based on calculations with α=0.05 (two-tailed), β=0.2, and standardized effect size=0.59.[11] This research used a purposive sampling technique with selected samples that met the inclusion criteria. The criteria are pregnant women in the third trimester that owned and were able to operate an Android-based smartphone and WhatsApp, had an internet data plan, and had downloaded the iPosyandu Orangtua Application from the Google Play Store. This research was conducted in May 2020, and research permits were obtained from three agencies, namely the National and Political Unity Agency, the Health Office, and the Pasawahan Community Health Center. The Ethics Committee of Universitas Padjadjaran Bandung is based on the ethical license 1139/UN6.KEP/EC/2020 approved this research.

The knowledge data collection was carried out using a questionnaire translated from previous studies.[12–14] The questionnaire topic group was adapted to the Maternal and Child Health book from the government and was presented in a Google Form. The next step was to collect data on third-trimester pregnant women at the Pasawahan Community Health Center assisted by the coordinating midwife. After that, the WhatsApp group was created so that 60 respondents of third-trimester pregnant women could join. The research agreement was started by explaining to the respondent about this research, namely the benefits, research procedures, and disadvantages of the study. After the respondents agreed with the informed consent sheet, they immediately filled in the pretest sheet and answered neonatal care questions. The respondents then downloaded the *iPosyandu Orang Tua* application from the Google Play Store. At the bottom of the initial display, the respondents can see an educational video icon (Figure 1). Then to watch the video, the respondents were given instructions to click on the educational video icon and choose a neonatal care video. The video was made based on input from pregnant women to make humans provide explanations and animations. When finished, the respondents immediately filled out the posttest questionnaire sheet.

Data were analyzed using univariate analysis to see the characteristics of the respondents. Bivariate analysis using the Wilcoxon difference test using the IBM SPSS version 26 software was carried out because the data was not normally distributed (Kolmogorov-Smirnov obtained a p value<0.05). Cohen's effect size was calculated by dividing the Z score (standardized test statistical score, which is the output of SPSS in calculating the Wilcoxon difference test) with $\sqrt{n}$ (number of respondents). The effect size with a value between 0.1–0.29 is categorized as small, 0.3–0.49 as a medium, and ≥0.5 as large.[15,16]

Results

The research subjects' characteristics were divided into age, education, and occupation. The description of the characteristics of third-trimester pregnant women in Pasawahan district, Purwakarta regency, using the frequency distribution, is presented in Table 1.

Table 1 describes the age category of respondents with most respondents were aged 20–35 years old as many as 50 people (84%) and the least being aged ≥35 years, as many as two people (3%). On the characteristics of education, most of the respondents were in the secondary education category as many as 37 people (62%) and the least in the higher education category, 9 people (15%). For occupation, most respondents did not work, 43 people (72%), and 17 people had work (28%).

Table 2 shows the differences in knowledge about neonatal care before and after video education. Based on Table 2, some highlights emerge based on the effect size of the educational videos on the knowledge groups. The largest

Table 1 Frequency Distribution of the Trimester III Pregnant Women Characteristics

Characteristics	n=60 (%)
Age (years)	
<20	8 (13)
20–35	50 (84)
≥35	2 (3)
Education	
Primary (elementary, junior high school)	14 (23)
Secondary (high school/ vocational high school)	37 (62)
Higher (higher education institution)	9 (15)
Occupation	
Working	17 (28)
Not working	43 (72)

one is breastfeeding, followed by umbilical cord care, neonatal visit schedule, early breastfeeding initiation, keeping baby warm (medium effect), general knowledge of neonatal care, and immunization (small effect). Nonetheless, the educational videos did not affect newborn danger signs knowledge.

Discussion

Based on the literature, health education effectively increases knowledge and skills. The use of audiovisual media is effective in conveying messages to the public.[17–20] It is reinforced by the latest research (2019), which stated that providing knowledge with a complete sensing process will give better results[21] and using educational videos can effectively change mothers' knowledge.[22] This case can occur because the information and learning experiences gained by watching videos will be absorbed by 30%. When added with demonstration, the information absorbed will be 50%. Suppose it is further strengthened by the participation of the mothers in conducting simulations. In that case, it will stimulate the senses of hearing and sight so that the results obtained are maximized (90%).[18,23] Other research made videos only and showed significant results regarding mothers' knowledge and attitudes; however, their effects were not calculated.[24,25] The demonstration in videos with non-animated roleplaying (by humans) shows the complete sensing process accompanied by roleplaying, which gives better results than lectures and videos only.[21]

The combination of animation and non-animation, as in this research, can further activate the five senses to gain effective results. The development of video media in a 2020 research entitled "Neonatal Care" was designed based on the results of qualitative interview analysis. The research stated that the health education videos must follow the community's needs, consisting of animated characters and real demonstrations. In addition, the video must be packaged in a clear and interesting storyline and under the characters depicted. Animated characters are displayed for information on neonatal care that is too graphic to display, such as breastfeeding, early initiation of breastfeeding, and the Kangaroo method. Non-vulgar information, such as general neonatal care, keeping baby warm, umbilical cord care, neonatal visit schedules, newborn danger signs, and immunizations, are presented in the form

Table 2 Differences in Knowledge of Neonatal Care

Knowledge Group	Mean		p	Effect Size
	Pretest n=60	Posttest n=60		
General knowledge of neonatal care	0.87	0.97	0.034	0.27
Early initiation of breastfeeding	2.58	2.80	0.005	0.36
Breastfeeding	3.75	4.32	0.000	0.52
Keeping baby warm	0.67	0.97	0.005	0.36
Umbilical cord care	2.50	2.78	0.001	0.43
Neonatal visit schedule	2.10	2.54	0.001	0.42
Newborn danger signs	2.13	2.18	0.527	0.08
Immunization	1.70	1.83	0.033	0.27

of concrete demonstrations. These contents are also in line with other research on neonatal care parameters such as skin-to-skin contact between the baby and the mother, first bath time, instruments used to cut the umbilical cord, early initiation of breastfeeding, and general information regarding exclusive breastfeeding.[12] This combination of animation and real demonstration (Figure 2) gave significant results with an effectiveness range between 0.27–0.52 (0.1–0.29: small, 0.3–0.49: medium, and 0.5: large) in almost all content groups.[15,16]

The content in the research video consists of one content group with considerable effect, namely breastfeeding; 4 content groups that had medium effects: (1) early initiation of breastfeeding, (2) keeping the baby warm, (3) umbilical cord care, and (4) schedule of neonatal visits; 2 groups of contents with small effect: general knowledge and immunization; and one with minimal and insignificant effect (newborn danger signs). Breastfeeding in this study gave the most substantial-effectiveness value compared to the other eight groups. Previous research showed significant differences in knowledge and attitudes between before and after health education with multimedia methods about breastfeeding and breastfeeding. However, they did not mention the effectiveness of the method.[26] The instruction regarding breastfeeding has an effectiveness value of 0.52, which is in the strong category,[15,16] the strongest among other groups. Information on breastfeeding was given in animation only because it contains sensitive matters. However, previous research suggested that animation can still provide significant changes.[24,25] Early breastfeeding initiation is crucial[27]—education on keeping babies warm shows a medium effect. However, the medium effect is still good, and if the videos were to be watched again, they could still increase knowledge. Keeping the baby warm is not easy to learn because it contains several methods. Types of care regarding keeping the baby warm include bathing the baby properly, changing diapers and clothes when wet, and not putting the baby to sleep in cold and windy places. In addition, it is essential to wear head caps, socks, gloves, and warm clothes by not swaddling the baby tightly. Another step is to dry the baby properly.[28] As for keeping the baby warm for babies with low birth weight (LBW) conditions, the Kangaroo method, with the principle of skin-to-skin contact, for example, heat transfer from mother to the baby so that the baby stays warm, calm, and sleeps well. In addition, this method can also improve the mother's relationship with her baby.

Increasing knowledge about proper and correct umbilical cord care is crucial.[29] In this research, the educational video intervention had a medium effect. Giving examples of good practice through video demonstrations is in line with previous research to increase the knowledge and expertise of mothers in umbilical cord care.[29,30] The schedule of neonatal or newborn visits (0–28 days) provides a corridor for knowledge diffusion. This schedule is one of the main foundations that regulates and supports meeting times for providing knowledge about neonatal care from the midwife to the mother.[31] General knowledge of neonatal care needs to be obtained since the third trimester of pregnancy, including indicators of normal weight from birth. Education to prevent LBW is very important.[32] In addition, immunization arrangements can be integrated with visit schedules and educational

Figure 2 Combination of Animation and Real-life Demonstration of Neonatal Care Videos in the iPosyandu Application

information related to future immunizations.[33,34]

The newborn danger signs are education with the topic group with a minimal and insignificant effect. This case occurred because the mothers did not easily comprehend the material.[35] Humans have two types of memory, namely short-term memory (working memory) and long-term memory.[36] The memory can store initial information ranging from several up to 30 seconds, and it can take several hours to process information consciously. Then, the information can be repeated or further processed to strengthen the memory.[37] Especially for mothers with strong memories who already have basic knowledge, the material given in the video was understandable. Therefore watching the video was mainly a repetition. Repetition does not result in the addition of new knowledge content. In this research, the mothers had already known enough before receiving the video intervention (mean pretest score=2.13 from 3 questionnaire questions in the group). The mothers probably had read the content from a book. The video content on the newborn danger signs was adopted from the government's Mother and Child Health handbook.[28]

The video duration was shortened to approximately 10 minutes to overcome the problem of boredom when viewing video content. Therefore, the educational videos were divided into two video parts. The ideal video duration to prevent boredom is about 5 to 20 minutes.[38] The videos shown in the iPosyandu Orang Tua application are about child development, nutrition for children, gestational age, and the first 1,000 days of life. In conducting online learning using an application, the availability of the internet network is one of the obstacles. However, the iPosyandu Orang Tua application benefited from easier access and focused on repeating learning online. The benefits outweighed the obstacles. In Indonesia, the existing internet network was 78% in 2016, and since 2019 there has been a plan to continue expanding so that it can cover all of Indonesia.[39] The obstacle that arises is the ability of individuals to purchase data plans. It can be overcome by providing a Wi-Fi network in each village.[7]

Conclusions

Neonatal care knowledge provided through health education during pregnancy using video media in the iPosyandu application can contain people giving demonstrations and animations. With this combination, knowledge of neonatal care can provide effects ranging from medium to large. However, the combination can have no impact in pre and post-evaluation assessments on a minority of topics for two reasons: complex material or good prior knowledge.

Conflict of Interest

The authors have no conflict of interest in writing this article.

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RESEARCH ARTICLE

Relationship between Tension-Type Headache and Quality of Sleep, Excessive Daytime Sleepiness, and Fatigue Syndrome among Healthcare Workers during COVID-19

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Abstract

Coronavirus disease 2019 (COVID-19) is an infectious disease that was later declared a pandemic. During a pandemic, excessive workloads cause an increase in physical symptoms, such as tension-type headaches, in medical personnel. Tension-type headache (TTH) is associated with decreased sleep quality which will lead to excessive daytime sleepiness (EDS) and fatigue syndrome. This study aims to determine the relationship between TTH and sleep quality, EDS, and fatigue syndrome in medical personnel during the pandemic. This study is a cross-sectional study conducted on health workers at Sebelas Maret University Hospital, Surakarta, Indonesia in March–August 2020. The relationship between TTH and three other variables was analyzed using the Spearman correlation test. Multiple logistic regression analysis was used to calculate the odds ratio (OR) of headache associated with the covariate. The Kruskal-Wallis test was used to compare sleep quality, EDS, and fatigue syndrome in the TTH, non-TTH headache, and control groups. There were 120 respondents (mean age 30.93±12.48) in this study. The Spearman correlation test found a weak positive correlation between TTH and the three dependent variables. OR sleep quality, EDS, and fatigue syndrome with the incidence of TTH respectively 2.33 (95% CI=1.18–5.11, p<0.001); 2.52 (CI 95%=1.17–4.79, p=0.001), and 4.46 (95% CI=2.71–7.69, p<0.001). The Kruskal-Wallis test showed that the TTH group had poorer sleep quality and more frequent EDS and fatigue syndrome. There is a significant relationship between TTH and sleep quality, EDS, and fatigue syndrome in medical personnel during the pandemic.

Keywords: Coronavirus disease 2019, fatigue syndrome, quality of sleep, sleepiness, tension-type headache

Hubungan Nyeri Kepala Tipe Tegang dengan Kualitas Tidur, Rasa Kantuk Berlebihan di Siang Hari, dan Sindrom Kelelahan pada Tenaga Medis selama COVID-19

Abstrak

Coronavirus disease 2019 (COVID-19) merupakan penyakit menular yang kemudian dinyatakan sebagai pandemi. Selama pandemi, beban kerja yang berlebihan menyebabkan peningkatan gejala fisik, seperti nyeri kepala tipe tegang (*tension-type headache*) pada tenaga medis. *Tension-type headache* (TTH) dikaitkan dengan penurunan kualitas tidur yang akan menyebabkan rasa kantuk berlebihan di siang hari (*excessive daytime sleepiness*, EDS) dan sindrom kelelahan. Penelitian ini bertujuan mengetahui hubungan TTH dengan kualitas tidur, EDS, dan sindrom kelelahan pada tenaga medis selama pandemi. Penelitian ini merupakan studi potong lintang yang dilakukan pada petugas kesehatan di RS Universitas Sebelas Maret, Surakarta, Indonesia pada Maret–Agustus 2020. Hubungan antara TTH dan tiga variabel lainnya dianalisis menggunakan uji korelasi Spearman. Analisis regresi logistik ganda digunakan untuk menghitung *odds ratio* (OR) nyeri kepala yang terkait dengan kovariat. Uji Kruskal-Wallis digunakan untuk membandingkan kualitas tidur, EDS, dan sindrom kelelahan pada kelompok TTH, nyeri kepala non-TTH, dan kontrol. Terdapat 120 responden (rerata usia 30,93±12,48). Uji korelasi Spearman menemukan korelasi positif lemah antara TTH dan tiga variabel terikat. OR kualitas tidur, EDS, dan sindrom kelelahan dengan kejadian TTH secara berurutan 2,33 (IK 95%=1,18–5,11; p<0,001); 2,52 (IK 95%=1,17–4,79; p=0,001); dan 4,46 (IK 95%=2,71–7,69; p<0,001). Uji Kruskal-Wallis menunjukkan bahwa kelompok TTH memiliki kualitas tidur yang lebih buruk dan lebih sering mengalami EDS, serta sindrom kelelahan. Terdapat hubungan yang signifikan TTH dengan kualitas tidur, EDS, dan sindrom kelelahan pada tenaga medis selama pandemi.

Kata kunci: *Coronavirus disease 2019*, kualitas tidur, nyeri kepala tipe tegang, rasa kantuk, sindrom kelelahan

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Introduction

In late December 2019, severe acute respiratory illness reports emerged from Wuhan in Hubei province, China. By January 2020, the condition now known as coronavirus disease 2019 (COVID-19) had rapidly spread from Wuhan to other regions.[1] The rapid global spread of the disease led to the declaration of COVID-19 as a pandemic on March 11th, 2020.[2] On March 2nd, 2020, Indonesia reported its first two cases. Until January 12th, 2021, there were 846,765 confirmed cases and 24,645 total deaths cases in Indonesia.[3]

Infectious disease outbreaks are known to have a psychological impact on healthcare workers and the general population. A notable example would be the psychological sequelae observed during the severe acute respiratory syndrome (SARS) outbreak in 2003.[4] In addition to the specific physical manifestations of various diseases, some symptoms may arise due to the psychological sequelae of these infection outbreaks. Commonly reported symptoms to range from more particular symptoms like headache and back pain to less-specific ones like fatigue, weakness, and lethargy.[5]

During the escalation of the COVID-19 outbreak in Indonesia, frontline healthcare workers in all major hospitals were mandated to wear personal protective equipment (PPE) while taking care of suspected or confirmed COVID-19 patients. It consists of close-fitting N95 face masks, protective eyewear (mainly goggles), gowns, surgical gloves, and the use of powered air-purifying respirators (PAPR). In practice, donning of the PPE is often felt cumbersome and uncomfortable by the frontline healthcare workers, especially if a long period of exposure to such equipment is necessary during the outbreaks of emerging infectious diseases.[6] Previous reports highlighted that pain or discomfort (headache, facial pain, and ear lobe discomfort) arising from tight-fitting face masks and elastic head straps resulted in limited tolerability when the N95 face mask was used for a prolonged period.[7] Besides, the additional workload to the already constrained healthcare systems, increased prevalence of depression, anxiety, and stress, especially in the context of the COVID-19 pandemic, increased the risk factors causing headaches, like sleep disorder, delayed rehydrated condition, and unscheduled meal time.[8]

Around 86% of tension-type headache (TTH) cases among healthcare workers during pandemic were strongly related to PPE use.[9] Previous studies showed that TTH was significantly associated with sleep apnea, insomnia, poor sleep quality, fever, restless sleep leg syndrome, and excessive daytime sleepiness (EDS). It also correlates with poor health quality, poor resting time, irregular meals, and insufficient sleep,[10] which is increased during the COVID-19 pandemic.

The current COVID-19 outbreak in Indonesia provided a unique opportunity to study the association of TTH and quality of sleep, EDS, and fatigue syndrome. We hypothesized that those factors contributed to the development of TTH in healthcare workers or led to the worsening of pre-existing primary headache diagnosis that could influence healthcare workers' work performance during the COVID-19 pandemic. Therefore, this study aimed to determine the relationship between TTH and sleep quality, EDS, and fatigue syndrome among healthcare workers during the pandemic.

Methods

It was an observational analytic study with a cross-sectional design to determine the relationship between TTH and sleep quality, EDS, and fatigue syndrome. This research was conducted at Universitas Sebelas Maret (UNS) Hospital, Indonesia, with a consecutive sampling technique from March to August 2020. The inclusion criteria in this study were older than 21 years old, cooperative, compos mentis, able to read and write, and working as healthcare workers based primarily in high-risk hospital areas in our institution such as the isolation wards, emergency rooms, and the medical intensive care unit. In addition, this study's exclusion criteria included secondary headaches, pregnancy, and severe obstructive sleep apnea (OSA) diagnosed by Berlin score >2. Written informed consent was signed, and the study design was approved by the local institutional review board, UNS Health Research Ethics Committee, through ethical clearance number 120/UN27.06/KEPK/2019.

The participants in this study were grouped into a control group, TTH group, and non-TTH group based on the International Classification of Headache Disorders (ICHD)-3 criteria. All participants completed self-administered questionnaires written in Indonesian, which confirmed validities and reliabilities. They consisted of Pittsburgh Sleep Quality Index

(PSQI) as sleep quality parameter, Epworth Sleepiness Scale (ESS) as EDS parameter, and Fatigue Severity Scale (FSS) as fatigue syndrome parameter. Participants with PSQI score >five were categorized as having poor sleep quality, ESS score >10 were classified as having excessive daytime sleepiness, and FSS score >27 were categorized as experiencing fatigue syndrome.

The data obtained were then analyzed by the Kolmogorov-Smirnov test to determine the normality of data distribution. Data analysis was then continued with the Spearman correlation test to determine the relationship between TTH and PSQI, ESS, and FSS scores representing sleep quality, EDS, and fatigue syndrome. Next, the statistical analysis continued with a logistic regression test using backward elimination procedures to determine the odds ratio (OR) of headaches to sleep quality, EDS, and fatigue syndrome adjusted for covariates. The covariates assessed in this study were OSA, smoking habits, body mass index (BMI), and gender. Finally, the Kruskal-Wallis test was used to compare PSQI, ESS, and FSS scores in the control group, non-TTH group, and TTH group. All statistical analyses were carried out using SPSS 25.0 for Windows.

Results

A total of 131 frontline workers participated in the study, with 120 healthcare workers meeting the inclusion and exclusion criteria, consisting of 30 (25%) male and 90 (75%) female participants. There was no missing data in this study. Participants included 34 nurses (28.3%), 26 general practitioners (21.7%), 18 medical residents (15%), 36 medical clerkships (30%), and 6 paramedical staffs (5%). Participants were 21 to 55 years old with a mean age of 30.93±12.48 years old. The average BMI of participants was 23.44±4.46 kg/cm2. We had 13 (10.8%) smokers and 107 (89.2%) non-smokers. There were 42 participants in the control group, 36 subjects in the TTH group, and 42 subjects in the non-TTH group. The poor sleep quality was found in 84 participants, EDS was found in 41 participants, and fatigue syndrome was found in 98 participants.

Kolmogorov-Smirnov analysis showed that all data were normally distributed ($p>0.05$). The correlation of headaches with PSQI, ESS, and FSS scores was assessed using the Spearman correlation test to determine the correlation coefficient (r). The result showed a weak positive correlation between headache and sleep quality ($r=0.173$, $p=0.039$), between headache and daytime sleepiness ($r=0.157$, $p=0.037$), also between headache and fatigue syndrome ($r=0.293$, $p=0.001$). There were various factors affecting sleep quality, EDS, and fatigue syndrome other than headache.

Then, the data obtained were analyzed using multiple logistic regression tests. The results showed the OR for headache on sleep quality, daytime sleepiness, and fatigue syndrome were 2.33 (95% CI=1.18–5.11, $p<0.001$); 2.52 (95% CI=1.17–4.79, $p=0.01$); and 4.46 (95% CI=2.70–7.69, $p<0.001$) respectively. Meanwhile, the coefficient of determination (R2) were 0.084 ($p<0.001$), 0.284 ($p=0.001$);and 0.354 ($p<0.001$), respectively. It meant that headache had an effect of 8.4% on sleep quality; 28.4% on EDS; and 35.4% on the incidence of fatigue syndrome, with the remaining percentage influenced by other factors such as poor health quality, lack of rest time, irregular meal, lack of physical activity, and gender.[10]

In the backward elimination procedure, ORs for TTH were calculated for the three variables through six steps, i.e., without covariate adjustment, adjusted for OSA risk, adjusted for smoking habits, adjusted for BMI, adjusted for sex, and adjusted ORs for age covariates. A p-value of <0.05 was considered statistically significant during analysis, as shown in Figure 1–Figure 3.

Finally, the comparison of PSQI scores representing sleep quality, ESS representing daytime sleepiness, and FSS describing fatigue syndrome in the control, non-TTH, and TTH groups was made by Kruskal-Wallis test, presented in Table. It is suggested that poor sleep quality, EDS, and fatigue syndrome were most common in the TTH group, followed by the non-TTH group, and were least prevalent in the control group. All of the results were statistically significant.

Discussion

This study evaluated the relationship between TTH and poor sleep quality, EDS, and fatigue syndrome in health workers during the COVID-19 pandemic. In our study, 80.8% of patients experiencing headaches were female, 35.9% had

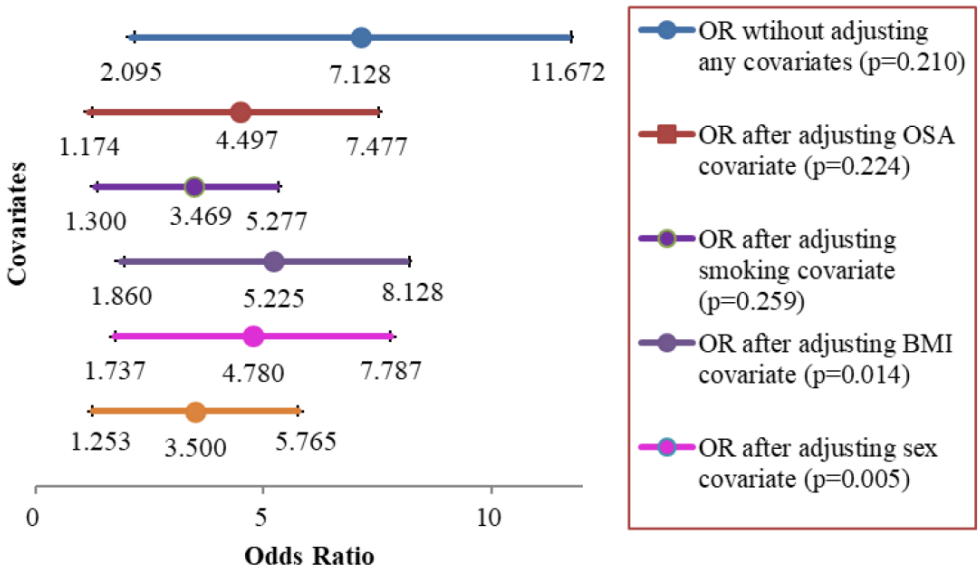

Figure 1 ORs between TTH and Quality of Sleep, adjusted with Covariates

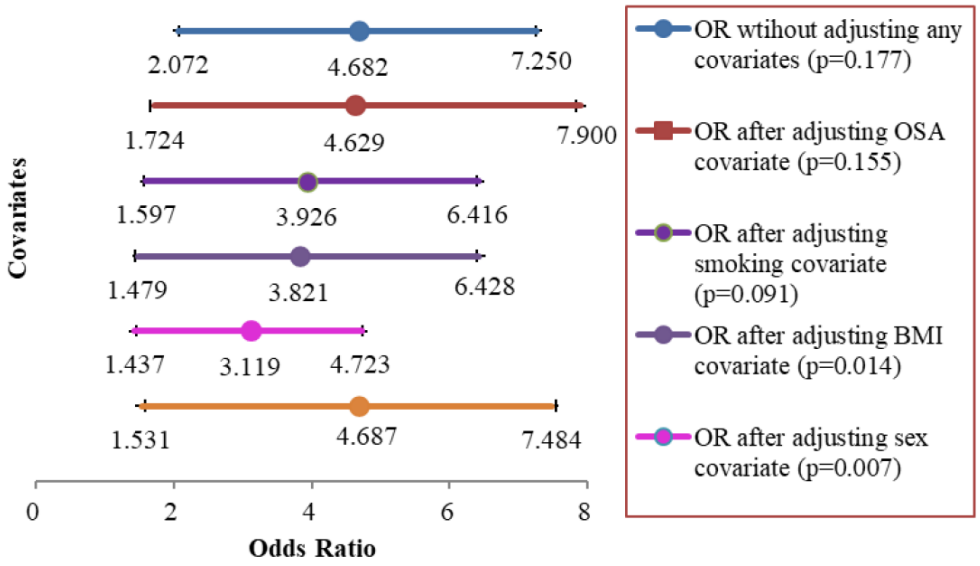

Figure 2 ORs between TTH and Excessive Daytime Sleepiness, adjusted with Covariates

TTH.

Pressure or tractional forces from the PPE (mask and goggles together with the accompanying straps) may lead to local tissue damage and exert an irritative effect on the underlying superficial sensory nerves. It affected particularly trigeminal or occipital nerve branches innervating the face, head, and cervical region. The cervical neck strain from donning the equipment could have led to cervicogenic headache or TTH.[11] The peripheral sensitization may activate the trigeminocervical complex through nociceptive information transmitted via different trigeminal nerve branches. It runs through the trigeminal ganglia and brainstem to the higher cortical areas, triggering headache attacks.[12] The increased duration of PPE exposure among frontline healthcare workers during COVID-19 is mandated by infectious diseases protocols, which is a clear departure from prior

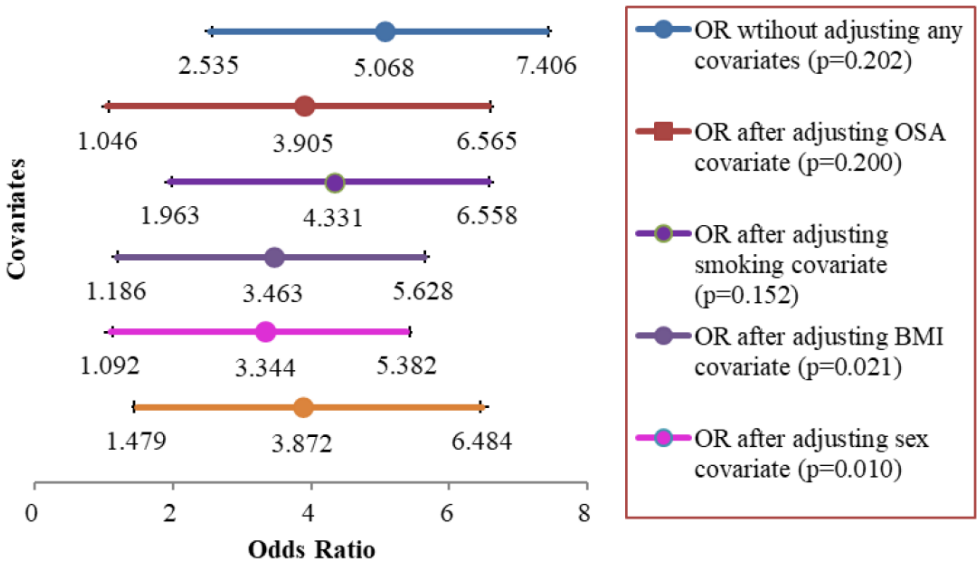

Figure 3 ORs between TTH and Fatigue Syndrome, adjusted with Covariates

usage patterns before the start of the pandemic. These etiological reasons could perhaps explain why a large proportion of those with pre-existing primary headache disorders and concomitant de novo PPE-associated headaches reported an increase in the average number of headache days, with the perception that this change was probably attributable to the PPE.

In terms of gender, our finding was in line with previous studies stating that the highest prevalence occurred in productive age women. Hormonal cycles in productive age women, such as during menstruation, pregnancy, response to stress exposure, and pain, are the causes of high headache pain prevalence in this group.[13] In addition, previous research stated that women health workers, especially those who were married, experienced higher levels of stress as a result of the multiple and complex roles that these women had to play as wives, mothers, employees (health workers), and housekeepers.[14]

Since the COVID-19 pandemic in Indonesia, most respondents have experienced increased headache frequency. Other factors such as sleep deprivation, physical and emotional stress, irregular meal times, and inadequate hydration contributed to this phenomenon. Our findings were in line with multiple studies demonstrating the triggers in migraine or TTH were often related to a change in internal and external homeostasis like circadian rhythm, underscoring the importance of addressing these factors in optimizing headache control.[15]

TTH is caused by persistent activation of peripheral nociceptors and increased pain sensitivity in muscles and fascia. One of the activators of nociceptors is nitric oxide (NO), stimulating the N-methyl-D-aspartate receptor.[16] Sensitization to the presence of these nociceptors also decreases the pain threshold. This phenomenon will reduce sleep quality and increase wake-up time at night, disrupting sleep quality.[10] Decreased sleep quality will lead to fatigue syndrome and daytime sleepiness.[17] Abnormalities in the central nervous system, especially the hypothalamus via orexinergic

Table Mean Rank Results from Kruskal-Wallis Analysis

	PSQI Analysis	ESS Analysis	FSS Analysis
Control group	52.79%	52.86%	51.50%
Non-TTH group	64.21%	63.33%	62.93%
TTH group	65.17%	65.71%	68.17%
Statistical significance	p=0.040	p=0.043	p=0.039

neurons, also affect the pathogenesis of TTH and changes in the sleep-wake cycle. Melatonin, a hormone affecting circadian rhythms, can also affect sleep-wake processes resulting as headaches.[18]

Headache often causes a decreasing quality of life, especially in chronic headaches caused by recurrent headaches, even though no abnormalities were found on physical examination. Both episodic and chronic TTH could affect the quality of work and physical and social functioning. Anxiety, depression, and sleep quality were also worse in headache patients. The decrease of sleep quality in TTH patients could lead to fatigue and EDS.[19] This situation was hazardous to the health system integrity amid the COVID-19 pandemic. Reduced productivity could result in medical errors during working time. It could be a vicious circle caused by the increasing number of working hours and the psychological burden on healthy people medical personnel.[20]

When adjusted for covariates, it was found that the covariates of sex, age, and BMI had a significant effect on sleep quality, EDS, and fatigue syndrome. Meanwhile, other covariates, i.e., OSA and smoking, did not significantly influence these three dependent variables. The significant effect of gender on sleep quality, EDS, and fatigue was supported by Faro et al.,[21] showing that psychological factors like stress levels in women were higher than in men, increasing the incidence of fatigue syndrome. Women were more likely to have more severe depressive symptoms, sleeping difficulty at night, greater EDS, and a higher level of difficulty concentrating due to drowsiness or fatigue.[22]

We also found that age affected sleep quality disturbances, EDS, and fatigue syndrome. This finding was in line with previous studies stating these three-variable were increased in young adults as they get older and shows the accelerated aging process of the brain, which still had a normal cognitive function.[23] Both EDS and fatigue syndrome were caused by insufficient sleeping time, changes in daily work routines, and hormonal sleep homeostasis changes. It involves stress-induced corticotrophin-releasing hormone, which causes sleep disturbances to appear more frequently in older subjects.[24]

The significant effect of BMI on the three independent variables was also in line with previous studies. Vargas et al.[25] stated that one-third of the respondents had BMI≥25, and 51% had poor sleep quality. Poor sleep quality was associated with hormonal changes, particularly with decreased levels of leptin (a hormone suppressing appetite) and increased levels of ghrelin (a hormone increasing appetite), which might mediate the relationship between sleep quality and BMI. In addition, a study by Markwald et al.[26] demonstrated that five days of consistent sleep deprivation increased energy requirements and energy intake and decreased responses to satiety and satiety hormones. From a physiological point of view, higher energy requirements during sleep deprivation might lead to decreased leptin and increased ghrelin levels leading to excessive weight gain. Bariatric surgery in obese patients had also been clinically shown to reduce EDS, fatigue, and snoring during sleep.[27]

We found no significant effect of OSA on sleep quality, EDS, and fatigue syndrome. However, it was inconsistent with other studies showing that OSA affected sleep quality, apnea, and snoring, leading to fatigue and increased EDS.[28] The difference of this study from previous studies might happen because all participants had a low risk of OSA with a Berlin score<2.

When adjusted for smoking covariates, there was no significant effect on all three variables. However, in contrast to previous studies, worse sleep quality in smokers was reflected by reduced sleep continuity, increased sleep onset latency, and decreased total sleeping time, resulting in fatigue and daytime sleepiness.[29] The difference with previous studies might happen because most (75%) of the subjects in this study were women. In Asian countries, including Indonesia, men have a higher dependence on smoking than women.[30] This reason caused the low number of smoking participants in this study.

Poor sleep quality, daytime sleepiness, and fatigue were more common in the TTH group than in the non-TTH group and the control group. It is in line with a study done by Uhlig et al. They observed a 1.8 times higher prevalence of sleep quality disturbances in subjects with TTH than those without headaches.[31] Other studies also showed that poor sleep quality was more common in individuals in the TTH group than in the migraine group. Poor sleep quality was a risk factor for progression from episodic to chronic TTH.[17] Half of TTH patients experiencing insomnia and decreased sleep quality was associated with increased frequency and intensity of headaches resulting in fatigue and EDS.[32]

We also realized some limitations of our

study. First, the sample size may be considered small. However, the restrictions imposed by infection control protocols during the COVID-19 outbreak and barriers in approaching healthcare personnel working in the high-risk areas made it difficult to recruit more participants. The cross-sectional nature of the study also does not allow interpretation for causality. To establish the cause-effect relations, it is necessary to conduct longitudinal studies. Second, since the study was performed among frontline healthcare providers based in high-risk hospital areas, we could have missed more predisposed personnel who had avoided or been excused from working in such areas. Third, other predisposing factors such as ambient room temperature and humidity were not assessed and may have influenced PPE use. For example, healthcare workers based at the outdoor emergency room or fever facility in a tropical country like Indonesia are often subject to hot and humid conditions. These unaccustomed environmental changes may trigger new-onset headaches or exacerbate pre-existing headaches. Fourth, we used a self-administered questionnaire, which could have been affected by the recall bias. Fifth, our study did not assess the efficacy of the analgesics used to treat headaches. Lastly, we did not record socioeconomic status and education level, which could have influenced our results.

Conclusions

This study showed a relationship between TTH and sleep quality, EDS, and fatigue syndrome among frontline health workers, along with the frequency of headaches in the era of the COVID-19 pandemic.

Conflict of Interest

All authors state there was no conflict of interest in this article.

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RESEARCH ARTICLE

The Role of Perceived Social and Spiritual Support and Depression to Health-Related Quality of Life on Patients with SLE

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Abstract

Belief in the availability of social support (perceived social support) was known to influence depression and health-related quality of life in SLE patients. This support becomes a psychological resource when they experience negative emotional states such as depression caused by a chronic illness such as SLE. In people whose lives are influenced by religion, such as in Indonesian culture, belief in God's help (perceived spiritual support) is an important variable that needs to be studied because it is predicted to affect patients' health-related quality of life. This study aims to explain the relationship between perceived social support, spiritual support, and depression to health-related quality of life in a patient with SLE. This cross-sectional study was conducted from March to June 2021 towards 328 SLE patients selected using the convenient sampling technique. Data was collected through forms that are distributed online and offline. The research sample was SLE patients who were members of a lupus community in Indonesia and lived in several cities in Java. The statistical analysis using a structural model (CMIN/df=103, RMSEA=0.103, CFI=0.972, TLI=0.963). Chi-square value=201,835 (p=0.000) suggested that perceived social support directly affected the level of depression and health-related quality of life on a patient with SLE, while perceived spiritual support affected the health-related quality of life through the mediation of depression, which means that spiritual support affected the quality of life by reducing negative emotions experienced by SLE patients.

Keywords: Depression, health-related quality of life, social support, spiritual support, systemic lupus erythematosus

Peran Dukungan Sosial, Spiritual, dan Depresi terhadap Kualitas Hidup Terkait Kesehatan Pasien SLE

Abstrak

Keyakinan akan ketersediaan dukungan sosial (*perceived social support*) diketahui memengaruhi depresi dan kualitas hidup terkait kesehatan pada pasien SLE. Dukungan ini diyakini menjadi sumber daya psikologis saat individu berada dalam kondisi emosi yang negatif seperti depresi yang disebabkan oleh penyakit kronis seperti SLE. Pada masyarakat yang kehidupannya dipengaruhi oleh agama seperti di Indonesia, keyakinan akan pertolongan Tuhan (*perceived spiritual support*) merupakan variabel penting yang perlu dipelajari karena diprediksi memengaruhi kualitas hidup terkait kesehatan. Penelitian ini bertujuan menjelaskan mekanisme hubungan antara *perceived social support*, *spiritual support*, dan depresi terhadap kualitas hidup terkait kesehatan pasien SLE. Penelitian *cross-sectional* ini dilakukan dari Maret hingga Juni 2021 pada 328 pasien SLE yang dipilih dengan *convinient sampling technique*. Data dikumpulkan melalui formulir yang disebarkan secara daring dan luring. Sampel penelitian merupakan pasien SLE yang tergabung dalam suatu komunitas lupus dan berdomisili di beberapa kota di pulau Jawa. Hasil analisis statistik dengan model struktural (CMIN/df=103; RMSEA=0,103; CFI=0,972; TLI=0,963). Nilai *chi-square*=201.835 (p=0,000) memperlihatkan bahwa *perceived social support* berpengaruh secara langsung pada tingkat depresi dan kualitas hidup pasien SLE. Sementara itu, *perceived spiritual support* memengaruhi kualitas hidup terkait kesehatan melalui mediasi depresi yang berarti bahwa *spiritual support* memengaruhi kualitas hidup dengan mengurangi kondisi emosi negatif yang dirasakan oleh pasien SLE.

Kata kunci: Depresi, dukungan sosial, kualitas hidup terkait kesehatan, *spiritual support*, *systemic lupus erythematosus*

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Introduction

Health-related quality of life is an essential aspect of the health and well-being of a patient with systemic lupus erythematosus (SLE).[1] According to WHO, quality of life (QoL) is defined as 'individuals' perception of their position in life in the context of culture and value systems in which they live and their goals, expectations, standards, and concerns.[2] SLE has a very significant impact on patients' quality of life, making them unable to carry out daily activities compared to the healthy population.[3] Research showed that the quality of life of SLE patients decreased compared to the general population.[4] In addition, the quality of life of patients with SLE was lower than other chronic diseases,[5] both in physical and mental dimensions.

SLE patients experience general symptoms that become a burden to their lives, such as fatigue, sleeping difficulty/sleep problems, and pain; hence it is common to experience depression and anxiety.[6] According to Anyfanti et al.,[7] depression and anxiety were found in 21.8% to 30.8% of SLE patients and significantly correlated with health-related quality of life. Therefore, to reduce depression and improve the quality of life of SLE patients, both social and spiritual support is needed.

Religious individuals believe that God or higher power outside of themselves determines the conditions they experience, including health. Therefore, they generally think their illness has a divine purpose.[8,9] Belief in God is often found in patients with chronic diseases.[9,10] The direct effect of believing in God is the feeling of closeness with the divine, which, in turn, becomes a resource for individuals to overcome difficult times.[11] The study about the effect of believing God as a source of mental support for chronic disease patients, especially SLE patients, needs to be conducted towards Indonesian society-which has a religious culture.

Several factors were found to be the resources for SLE patients facing difficult times and closely related to depression and quality of life, including perceived social support. Several findings indicated that low perceived social support was associated with a weakened immune system.[12] Perceived social support was consistently associated with health through healthy behaviors, more adequate coping strategies,[13–15] and a better quality of life.[16] It also moderated the relationship between stressful life events and depression.[17] The perception that family and friends will support during stress was consistently associated with good mental health, including lower rates of major depression.[18] Perceived spiritual support as a form of perceived social support proved to have an important role when facing traumatic life events over which they have little control.[19] Maton[11] argued perceived spiritual support was a predictor of more positive mental health.

The effect of perceived social support on SLE patients' depression and health-related quality of life has been widely investigated. Still, only a few studies investigated the impact of spiritual support on these two variables. The study about the effect of spiritual support on depression and SLE patients' quality of life is still limited. It prompted the authors to investigate the impact of these variables in patients with SLE who deal with high and chronic life stress.

Perceived social support and spiritual support are beliefs about several different sources of support. However, research on the effect of these variables on patients with SLE is still lacking. Therefore, research on the impact of these two types of support towards depression and health-related quality of life in SLE patients will contribute to literature about the effect of support on patients with chronic disease. Specifically, this study examines the impact of perceived social support, spiritual support, and depression on health-related quality of life in patients with SLE.

Methods

This study was conducted on patients with SLE in the Lupus Indonesia Volunteer (*Relawan Lupus Indonesia*, ReLI) community. The convenience sampling technique was used. It was one of the non-probability sampling techniques in which the sample was deliberately selected as it was considered the most suitable for research.[20]

The following are the inclusion criteria and exclusion criteria. Inclusion criteria to be respondents are as follows: (1) patients with SLE, (2) in their early and middle adulthood, and (3) SLE disease activity is minimal, at least in the last three months. Exclusion criteria for research subjects include (1) patients with SLE who are experiencing flares or moderate and high disease activity, (2) patients with autoimmune other than SLE.

Four hundred two respondents filled out

the questionnaire, with 328 were found to meet the criteria for this research. Furthermore, all respondents expressed consent to participate in the study. The Research Ethics Committee, Faculty of Psychology, Universitas Indonesia has approved this research, with the ethics committee approval number: 379/FPsi.Komite Etik/PDP.04.00/2018.

All variables studied used a self-reported questionnaire.[19] The instruments were provided in person (paper-and-pencil) and online (via google form), starting with informed consent, demographic factors, and questionnaires.

We used the Indonesian version of Lupus QoL to assess the health-related quality of life. Most studies examining SLE patients' health-related quality of life use the generic instrument of Medical Outcome Study Short Form (SF-36). The advantage of a generic tool is that it allows comparing the health-related quality of life of patients with SLE with other chronic patients or with a normal population. In addition, generic instruments have been extensively validated and adapted in various languages and cultures. But, the disadvantage of a generic tool is that sensitivity is lacking in detecting a specific symptom of SLE

Lupus QoL measures eight domains of quality of life: physical health, emotional health, body image, pain, planning, fatigue, intimate relationships, and being a burden to others. The questions given were in the form of range using a 5-point Likert scale (0=all the time to 4=never). Lupus QoL shows good internal consistency (Cronbach's α ranging from 0.88, 0.87, 0.96, 0.94, 0.92, 0.90, 0.86, 0.91), respectively.

Multidimensional Perceived Social Support (MPSS) was used to measure belief about the availability of social support. This instrument consists of 12 items which are divided into three subscales in the form of a 7-point Likert scale (1=strongly disagrees with to 7=is strongly agree). MPSS reliability is 0.81,[21] with each subscale measuring perceived support from 3 sources (i.e., family, friends, and significant other). This instrument is a generic instrument widely used in research on social support.

Maton[11] conceptualized spiritual support similar to perceived social support and divided it into three dimensions: (1) emotional aspects, (2) proximity, and (3) belief. Respondents were asked to answer a 7-point scale to mark whether the items in question were following their situation. The original spiritual support scale consisted of 3 items. Since this instrument was constructed initially for Christian religious tradition, we added 1 item in each dimension to align with Indonesia's religious diversity, bringing six items. The internal consistency value of this scale is 0.95, while the reliability value is 0.81.[22] The instrument used was a 7-point Likert scale (1= strongly disagrees to 7=strongly agree). To see the factors in this instrument, the authors conducted a Confirmatory Factor Analysis (CFA) and validity test. The validity test result shows that all items are valid, and this tool has a reliability value of 0.94.

The Beck Depression Inventory-II, which has been adapted into the Indonesian language, was used to measure depression. This inventory consisting of 21 items measures cognitive, somatic, and affective factors. The Cronbach's α BDI II score for Indonesia is 0.9 for the total score, 0.8 for cognitive factors, 0.81 for somatic factors, and 0.74 for affective factors.[23] Each item has a measurement scale of 0–3. A value of 0 indicates minimal depressive symptoms, while 3 indicates major depressive symptoms. For example, a score of 0–13 is considered minimal depression, a score of 14–19 is regarded as mild depression, a score of 20–28 is deemed moderate depression, and a score of 29–63 is considered major depression.

Data analysis was performed using SPSS software version 23.0. The mean, standard deviation, and range of data were used for the continuous and frequency variables, and percentages were used for categorical variables to describe respondents' socio-demographic characteristics.

Data were analyzed to determine the effect of perceived social support, perceived spiritual support, and depression on health-related quality of life. To investigate the relationship between these variables, the Structural Equation Modeling (SEM) test was carried out by using Analysis of Moment Structures (AMOS).

Results

The demographic characteristics of the respondents in this study are shown in Table 1.

Table 2 shows the results of the statistical analysis. The average value of spiritual support was 39.02 (SD=4.62), while the value of depression was 16.77 (SD=9.53). The value of health-related quality of life domains which varied between 55–

Table 1 Demographics

Characteristics	n=328	%
Occupation		
Employed	143	43.6
Housewives	115	35.1
School/college students	45	13.7
Unemployed	25	7.6
Education		
Bachelor's/master's degree	123	37.5
Diploma-3	35	10.7
Senior high school/	153	46.6
vocational school	14	4.3
Junior high school	3	0.9
Others (elementary school, diploma-1)		
Marital status		
Married	199	60.7
Divorced	15	4.6
Widowed	1	0.3
Single	113	34.4
Children		
Have children	157	47.9
Doesn't have children	171	52.1
Duration of illness (years)		
≥5	115	35.1
3–4	89	27.1
1–2	112	34.1
≤1	12	3.7
Comorbidities		
Have comorbidities	140	42.7
Doesn't have comorbidities	188	57.3
Last relapse		
≥3 years	35	10.7
2–3 years	22	6.6
1–2 years	56	17.1
6–12 months	118	36.0
<6 months	97	29.6
Gender		
Male	17	5.2
Female	311	94.8

80. The mean values of the eight domains were as follows: physical domain (65,79), emotion (62.82), body image (66.97), pain (69.74), fatigue (58.12), interpersonal/intimate relationships (81.33), and being a burden to others (55,16).

From the results of the analysis of the final CFA model, we obtained χ^2=180.9397 with a probability p value= .000. When compared with the required critical value $\chi^2 > \chi^2$ table=123,225 (real level of 5% and the degrees of freedom DB=99) or the real probability value (p value)

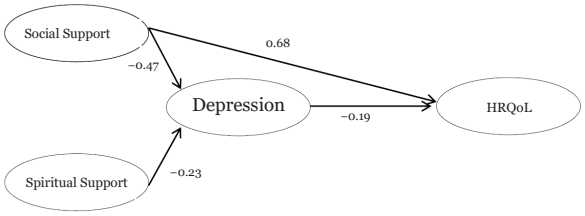

Figure SLE Patients' Structural Model of Health-Related Quality of Life

below 0.05, thus H_o was rejected. RMSEA of 0.0503 was smaller than 0.08. Likewise, the comparative fit index value, all of which were above 0.90, explained that the model was in the good category with CMIN/DF below 2.00. Thus, this CFA model is considered quite appropriate in forming the constructs that would be used in SEM.

The tests was carried out by using the SEM full model through AMOS showed that the model was good fit at CMIN/df=103; RMSEA=0.103; CFI=0.972; TLI=0.963. The value of chi-square=201,835; p=0.000 indicated a fit model.

Discussion

This study examines the model of effects of perceived social support, spiritual support, and depression towards the health-related quality of life in a patient with SLE. The analysis suggested that all research hypotheses were accepted except for the direct effect of perceived spiritual support on health-related quality of life. Perceived spiritual support indirectly affected the quality of life through the mediation of depression. Research on the impact of perceived social support on quality of life has been widely conducted with consistent results that it will reduce depression and improve quality of life. Data analysis results showed that perceived social support had a more significant direct effect on depression and quality of life than spiritual support. This finding revealed that although perceived social support and spiritual support were beliefs about a source of help, their effects on depression and quality of life were different.

We will first discuss perceived social support on depression and health-related quality of life. This study found a negative impact of perceived social support towards depression. This finding confirmed previous studies in the same population that patients with SLE with high

Table 2 Results of Data Analysis

Characteristics	HRQoL Domain							
	Depression	Physical	Emotional	Body Image	Pain	Fatigue	Intimate Relationship	Burden to Others
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Employed	15.58±8.14	69.14±19	66.57±22.32	70.13±25	72.9±22.1	59.44±22.02	81.99±22.72	58.56±29.58
Housewives	15.57±9.87	68.15±23.03	65.36±25.28	70.26±27.87	70±23.92	61.41±24.85	74.67±28.21	59.34±28.27
School/college students	22.15±11.37	54.51±25.17	48.88±26.58	55.11±29.72	60±25.35	50.55±29.37	91.94±14.63	44.44±31.88
Unemployed	19.44±8.23	56±23.47	54.66±27.3	55±30.75	68±30.39	49±23.7	89±22.62	35.66±32.05
Education								
Bachelor's/master's degree	15.63±9.15	65.67±22.64	63.14 ± 24.75	67.76±28.56	66.86±25.55	58.38±23.64	79.97±24.2	56.77±30.03
Diploma-3	13.59±7.36	77.95±15.32	72.29 ± 20.37	79.32±22.88	83.55±14.49	68.75±21.94	87.83±17.55	66.89±21.73
Senior high school/ vocational school	18.45±9.68	62.47±22.57	59.99 ± 25.15	63.3±26.84	67.97±24.01	55.02±24.35	80.47±26.54	51.14±32.19
Junior high school	16.8±12.85	70.41±22.89	65.55 ± 33.01	67.33±33.64	77.22±21.7	61.25±33.17	85±20.15	53.88±27.61
Others (elementary school, diploma-1)	26±6.24	57.29±18.04	51.38 ± 16.83	33.33±36.85	58.33±8.33	50±0	87.5±12.5	61.11±37.57
Marital status								
Married	15.09±9.34	69.59±21.63	68.4±24.37	71.15±26.64	70.89±23.53	61.02±24.4	77.07±26.16	62.01±27.91
Divorced	19.56±6.72	62.5±18.07	64.06±20.4	69.68±24.04	76.56±14.34	62.89±18.74	77.34±29.3	46.87±31.16
Widowed	19±0	84.37±0	58.33±0	80±0	91.66±0	68.75±0	100±0	75±0
Single	19.34±9.53	59.54±22.78	52.8±23.96	59.2±28.64	66.74±26.05	52.32±24.6	89.38±18.39	44.24±31.4
Children								
Have children	14.54±8.51	70.82±22.34	69.55±22.4	74.64±23.5	72.82± 21.3	62.3±24.09	77.78±26.68	63.58±26.22
Doesn't have children	18.81±9.97	61.16±22.34	56.62±25.87	59.91±29.46	66.91±24.15	54.27±24.38	84.57±22.04	47.41±32.03
Duration of illness (years)								
≥5	15.73±8.54	65.67±22.93	64.16±25.78	69.73±26.28	69.13±25.67	59.67±23.18	75.86±26.63	58.62±31.58
3–4	16.59±9.72	65.94±21.76	63.48±25.79	68.25±29.74	70.97±25.25	58.07±25.05	82.02±26.71	54.96±31.57
1–2	18.19±10.25	64.42±22.73	60.45±24.3	63.16±26.84	69.27±21.97	55.97±25.39	84.82±20.23	50.74±28.37
≤1	14.83±9.63	78.38±13.87	67.01±20.9	66.25±33.44	70.83±22.89	63.54±26.35	95.83±9.73	64.58±26.38
Comorbidities								
Have comorbidities	17.79±9.08	63.7±21.83	60.17±24.67	65.85±25.94	69.28±24.44	55.08±24.25	76.69±26.1	50.71±31.07
Doesn't have comorbidities	16.01±9.8	67.33±22.65	64.78±25.27	67.79±29.04	70.07±24	60.37±24.57	84.77±22.83	58.46±29.62
Last relapse								
≥3 years	11.45±7.46	75.08±21.37	74.16±24.35	75.85±26.52	74.52±23.56	70±24.1	74.28±27.77	71.66±26.82
2–3 years	16±10.34	70.59±23.27	65.53±26.88	73.18±25.09	70.45±27.18	67.61±22.79	73.29±33.25	64.77±28.85
1–2 years	16.82±10	68.02±21.88	62.64±25.63	71.42±27.04	73.66±24.91	60.04±24.09	82.58±23.91	55.65±29.39
6–12 months	16.61±9.64	67.92±21.37	64.97±22.81	68.55±25.52	69.63±23.1	58.79±24.35	81.46±24.82	57.76±28.73
<6 months	19.03±8.95	57.44±21.75	55.58±25.64	57.83±29.72	65.72±24.29	49.74±23.03	84.79±20.43	43.55±30.88
Gender								
Male	23.23±6.88	57.53±22.59	55.39±22.47	65±25.12	60.78±25.98	52.2±20.36	81.61±24.25	47.54±27.28
Female	16.42±9.53	66.23±22.27	63.22±25.19	67.07±27.9	70.23±24	58.44±24.73	81.31±24.63	55.57±30.59

social support showed lower levels of depression than those without. High perceived social support was strongly associated with a positive quality of life. The existing studies showed that the health-related quality of life of the patient with SLE was decreased and similar to patients with severe medical illness.[14] In general, it was also found that the physical and mental health dimensions of quality of life appeared to be positively affected by the level of social support. Social support was inversely correlated with fatigue felt by the patient with SLE. These results confirmed the predictive role of social support that was benefited not only psychological health but also physical condition.

The value of the health-related quality of life domain in this study varied. Of all the domains, being a burden to others was the worst perceived by SLE patients. This domain measured the

SLE patient's concern about being a burden to their environment. The low score in this domain indicated that they tended to judge themselves as a burden to those around them. In other words, there was a high level of concern about the effects of SLE impacting people in their environment.

To gain a deeper understanding of how bad or how good the quality of life of SLE patients is, we tried to compare it with the quality of life of the general population in Indonesia. No research directly studied SLE patients' quality of life with the general population in Indonesia. Still, we found a study about the Indonesian general population's quality of life.[24] The previous study suggested that the Indonesian general population's quality of life (measured by WHOQOL-BREF) was 0.70–0.79.[24] We found that SLE patients' quality of life scores were lower when compared to the general population. The comparison of quality of life (QoL) between SLE patients and the general population in Indonesia indicated that QoL of SLE patients was lower than the population without SLE, although to obtain more accurate results, the comparison of QoL between these two groups needs further research.

We also highlight the depression value in this research. It indicated that the depression experienced by the respondents was in the mild category. It also showed a large distribution or variation of data. These results confirmed previous studies which stated that SLE patients experienced mild to severe depression. From the distribution of values, it can be seen that there were respondents who had minimal depression scores, but there were also those who had severe depression scores.[25] Groups of respondents with school/college students and unemployed status showed more severe depression scores than the employed and homemakers groups (data attached). Meanwhile, the group of SLE patients divorced, widowed, and single underwent more severe depression than the married group.

The value of depression also varied depending on the time of the last relapse. SLE patients who had their previous relapse three years ago showed minimal depression scores. In contrast, patients who had their previous relapse less than six months before data collection showed more severe depression scores in the moderate category. In the category of education, comorbidities, and duration of illness, there was no difference in the variation of depression levels in SLE patients.

The relationship between social support and mental and physical health was described in the literature by three main mechanisms: direct effects, buffering effects, and coping strategies. The primary effect hypothesis stated that social support was beneficial regardless of the level of stress experienced, indicating that more support is associated with better health. This idea is in line with the approach that includes social support as a component of the quality of life of SLE patients.[26]

The stress-buffering hypothesis predicted that social support acted as a protective factor against harmful effects of stress when individuals faced intense or persistent stressors. Stress has often been identified as an essential contributor to SLE disease activity.[27]

The coping strategies of SLE patients were believed to predict health outcomes. Regarding social support, several authors emphasized that living with SLE means dealing with several challenges, and many of these adaptive challenges require the help of others. For example, Kozora et al.[28] stated that active coping strategies could be more adaptive in preventing depression.

We hypothesized that social support could positively influence psychological health by developing more active coping strategies than emotional coping. According to Lakey and Orehek,[29] the mechanism of perceived social support and mental health can be explained by cognitive means. His research suggested that perceived social support worked like a cognitive schema by paying attention, assessing, and remembering support transactions. The experience of positive support transactions will form a positive schema about help and people who help. Perceived social support is a cognitive variable in personality that is relatively permanent; it is in the form of a collection of beliefs about the quality of a person's interpersonal/intimate relationships that will determine his interpretation and memory of social interactions.[30]

Perceived spiritual support is a form of perceived social support and is something that individuals believe in their relationship with God.[11] To explain the effect of this support on depression and quality of life, we calculated the magnitude between perceived social support and spiritual support. The result showed a strong correlation between the two variables. It shows that once a cognitive scheme about individuals' relation with the environment (family, friend, and

significant other) is interpreted as supportive, individuals tend to view other ties, including connection to God, as having a supportive nature.

According to Maton,[11] spiritual support is a form of perceived social support. Maton[11] concluded that individuals perceive the same elements of support in the context of their relationship with God as their relationships with people. Maton[11] stated that spiritual support was perceived in the context of a relationship with God, emphasizing the perception and experience of love, presence, direction, and availability for themselves. Although Maton[11] argued that spiritual support was a form of perceived social support, this study did find that spiritual support had a different effect on depression and quality of life as perceived social support has for these two variables.

As explained in the previous section, perceived social support works similar to the cognitive schema by paying attention, assessing, and remembering support transactions. To have confidence in a source of support when needed, one needs to have experience obtaining support from a particular source of support. The experience of positive support transactions will form a positive schema about help and people who help. Spiritual support has the exact nature of perceived social support: believing that God will provide support. Individuals need to have direct support transactions regarding the type of support and who supports them. Patients with SLE directly feel the help from their parents, friends, and significant others in their daily life. We hypothesized that direct support transactions seemed to be rarely experienced by individuals with their God. They generally felt support from God came through parents, friends, or significant others. The individual's cognitive schema will remember the helper as a figure who has helped them. Belief in God as a source of support has a weaker effect than a belief in figures who have directly supported them.

The limited research about perceived spiritual support becomes a theoretical gap and has implications for the inability of this study to explain the mechanism of the relationship between variables. This limitation opens the opportunities for further research on the relationship between belief in God's support and mental health, especially for people with a high religious culture such as Indonesia. The use of the BDI II as a measurement tool for chronic disease patients is still being debated, especially regarding fatigue items and sleep difficulties. Furthermore, online data collection (due to pandemic) made the target population less accessible—and the small number of respondents from Catholicism, Protestantism, and Hinduism was considered unrepresentative. The theoretical implication of this research is the empirical finding of the effect of spiritual support on individuals facing chronic stress. This variable was previously studied more in the condition of acute stress. The practical implication is that these findings will serve as the basis for stakeholders to consider perceived social and spiritual support variables in the depression treatment program for patients with SLE, which in the long run will improve their quality of life.

Conclusions

This study found that the health-related quality of life of SLE patients in Indonesia was affected by social and spiritual support and levels of depression. Social support (perceived social support) and spiritual support had a strong correlation and had different effects on depression and health-related quality of life. Social support directly affected depression and quality of life, while spiritual support affected the quality of life when patients with SLE were experiencing depression.

Conflict of Interest

There was no conflict of interest in this study.

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RESEARCH ARTICLE

Relationship between Pain and Serum Ferritin Levels in Adult Transfusion-Dependent Thalassemia

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Abstract

Patients with transfusion-dependent thalassemia (TDT) may experience an increase in ferritin due to shorter erythrocyte lifespan and lysis, as well as side effects of transfusion. Increasing ferritin can cause various complications, including pain, which can develop into chronic pain and interfere with life quality. This study aims to determine the relationship between pain and serum ferritin levels in adults with TDT. This study was an analytical observational study using a cross-sectional design on adult TDT patients with pain who came to the Hemato-Oncology Clinic of Dr. Hasan Sadikin General Hospital Bandung. This research was conducted from March to June 2021. All subjects were assisted to fill out the Indonesian version of the Brief Pain Inventory Short Form (BPI-SF) questionnaire before transfusion. Ferritin levels in the last three months were obtained from medical records. If more than three months, serum ferritin levels were examined. Ferritin levels and BPI-SF scores were then correlated using the Pearson test. The study was conducted on 51 adult TDT patients with pain, and the average value of ferritin levels in research subjects is 5081±2929 g/L. There was a relationship between pain (the dimensions of pain interfere with life on the BPI-SF score) and an increase in ferritin levels (p=0.042, r=0.29). The results showed there is a relationship between pain and serum ferritin levels. Regular consumption of iron chelation tablets can reduce ferritin levels and improve the quality of life for adults with TDT.

Keywords: Ferritin, pain, thalassemia

Hubungan Nyeri dengan Kadar Feritin Serum pada Penyandang *Transfusion-dependent Thalassemia* Dewasa

Abstrak

Penyandang *transfusion-dependent thalassemia* (TDT) dapat mengalami peningkatan feritin akibat umur eritrosit yang lebih pendek dan mudah lisis, serta efek samping terhadap pemberian transfusi. Peningkatan feritin tersebut dapat menyebabkan berbagai komplikasi di antaranya nyeri yang dapat berkembang menjadi nyeri kronik dan mengganggu kualitas hidup. Penelitian ini bertujuan mengetahui hubungan nyeri dengan kadar feritin serum pada penyandang TDT dewasa. Penelitian dengan observasional analitik menggunakan rancangan potong lintang pada penyandang TDT dewasa dengan nyeri yang datang ke Klinik Hemato-Onkologi RSUP Dr. Hasan Sadikin Bandung. Penelitian dilakukan dari Maret hingga Juni 2021. Seluruh subjek dilakukan pendampingan untuk mengisi kuesioner *Brief Pain Inventory Short Form* (BPI-SF) versi Indonesia sebelum transfusi. Kadar feritin dalam tiga bulan terakhir didapatkan dari rekam medis dan bila lebih dari tiga bulan dilakukan pemeriksaan kadar feritin serum. Kadar feritin dan skor BPI-SF kemudian dikorelasikan menggunakan Uji Pearson. Penelitian dilakukan kepada 51 penyandang TDT dewasa dengan gejala nyeri dan didapatkan nilai rerata kadar feritin pada subjek penelitian adalah 5081±2929 µg/L. Hasil penelitian memperlihatkan terdapat hubungan antara nyeri (dimensi efek nyeri terhadap kehidupan) dan peningkatan kadar feritin (p=0,042; r=0,29). Hasil penelitian menunjukkan terdapat hubungan antara nyeri dan kadar feritin serum. Konsumsi tablet kelasi besi secara rutin dapat menurunkan kadar feritin dan memperbaiki kualitas hidup penyandang TDT dewasa.

Kata kunci: Feritin, nyeri, *thalassemia*

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Introduction

Thalassemia is a blood disorder disease that occurs due to decreased or lost synthesis of one or more globin chains. This disease is hereditary autosomal recessive due to mutations in the globin-forming gene.[1,2] Thalassemia can cause various transfusion-dependent thalassemia (TDT) complications, including pain. TDT patients need regular transfusions (2–6 weeks) to survive.[1,3] Recent studies have shown an increase in pain in thalassemia patients, while the assessment and management of pain in thalassemia patients are still neglected.[4]

People with TDT can experience iron accumulation in the body through several mechanisms. They include shorter erythrocyte lifespan, lysed erythrocytes, and transfusion side effects, thus requiring an iron binder (chelate); iron can be excreted through urine and feces. This accumulation causes an increase in NTBI, which is reflected in ferritin levels in the blood. NTBI is a labile iron that can cause an increase in ROS and then activates transient receptor potential ankyrin 1 (TRPA1) and transient receptor potential vanilloid 1 (TRPV1), which can increase pain sensitization. An increase in NTBI causes an increase in bone resorption and thinning of the bone cortex so that osteopenia and osteoporosis can occur, which can cause fractures and compression of the surrounding nerves. Iron accumulation can also occur in muscles and cause muscle damage due to increased reactive oxygen species (ROS) and then trigger peripheral and central pain sensitization. In addition, iron deposits can occur in the synovial tissue and release free radical products that cause synovial destruction in the joints.[5,6] The accumulation of iron in the blood can be monitored by measuring the ferritin level in the blood. The advantages of the serum ferritin test are that it is easy to assess quickly, measures the adequacy of iron chelation therapy, and can show long-term outcomes.[7]

Pain is a multidimensional sensation influenced by intensity, quality, location, frequency, and psychosocial. Acute pain can directly impact the patient's quality of life, while chronic pain can be adapted to pain to experience pain tolerance. However, their quality of life can be disrupted due to long-lasting pain.[8] The purpose of this study is to determine the relationship between pain and serum ferritin levels in adults with TDT using the BPI-SF questionnaire. This tool can assess pain in the thalassemia patient that is easy to apply and determine how the impact of pain on the quality of life of people with thalassemia.

Methods

The subjects in this study were people with transfusion-dependent thalassemia with pain who regularly came to the Hemato-Oncology Clinic, Dr. Hasan Sadikin General Hospital Bandung, who met the inclusion criteria. The inclusion criteria for the subjects were patients diagnosed with thalassemia with pain who underwent routine transfusions at the Hemato-Oncology Clinic, Dr. Hasan Sadikin General Hospital Bandung with high ferritin levels, and is 18 years old and willing to participate in the study. Exclusion criteria were patients with confirmed pain due to fractures/other diseases. Approval of research ethics was obtained from the ethics committee Universitas Padjadjaran Bandung under the ethical clearance number 198/UN6. KEP/EC/2021.

This study was an analytical observation using a cross-sectional design conducted from March to June 2021. Ferritin levels in the last three months were obtained from medical records. Serum ferritin levels were examined and not taken from the medical history if the patients did not have it for more than three months. Subjects filled demographic data was filled in, and pain screening was carried out on the subject, with assistance using the BPI-SF questionnaire, which had been validated in Indonesian before transfusion. The BPI-SF was a multidimensional pain assessment tool suitable for assessing chronic pain. The pain components considered were pain intensity, and pain interferes with life. The pain scale to describe pain intensity was using the Numeric Rating Scale (NRS), with score intervals were 1–3 (mild pain), 4–7 (moderate pain), and 8–10 (severe pain). BPI-SF scores before transfusion were correlated with serum ferritin levels using the Pearson test.

Results

This study is conducted on 51 people diagnosed with transfusion-dependent thalassemia with pain symptoms who regularly come to the Hemato-Oncology Clinic, Dr. Hasan Sadikin General Hospital Bandung. Demographic data are obtained through interviews after signing

the informed consent form. The demographic distribution of the subjects is described in Table 1.

The mean age of the subjects were young adults, i.e., 25.5±7.2 years, and most of them were women (75%). Most (86%) do not work with daily activities at home and go to school. The duration of being diagnosed with thalassemia ranged from 3–40 years with a mean of 19.5±6.4 years. Most subjects took iron chelation tablets regularly, with the most consumed chelation drug being deferasirox (55%). Three subjects did not take iron chelation tablets because one subject was breastfeeding. In the previous examination, two subjects showed ferritin results of less than 1,000 g/L, so they did not need iron chelation tablets.

The results of the BPI-SF score for adults with TDT, in Table 2, show that the highest pain intensity before transfusion was moderate pain in 43 (84%), mild pain in 6 (12%), and severe pain in 2 (4%) subjects. The average value of ferritin levels in the subjects of this study was 5,081±2,929 g/L.

Table 1 Description of the Characteristics of Research Subjects

Characteristics	n=51 (%)
Age (years)	
Mean±Std	25.5±7.2
Range (min–max)	18–43
Gender	
Male	13 (25)
Female	38 (75)
Education	
Elementary school	7 (14)
Junior high school	12 (23)
Senior high/vocational school	28 (55)
College	4 (8)
Profession	
Unemployed	44 (86)
Employed	7 (14)
Length of diagnosed thalassemia (years)	
Mean±Std	19.5±6.4
Range (min–max)	3–40
Iron chelation tablet	
Not taking iron chelation tablets	3 (6)
Deferasirox	28 (55)
Deferiprone	20 (39)

Table 2 Description of BPI and Ferritin of Research Subjects

Variables	n=51
Pain intensity	
Median	5.00
Range (min–max)	1.8–7.5
Effects of pain on life	
Median	2.75
Range (min–max)	0–8.1
Ferritin level (µg/L)	
Average±SD	5,081±2,929
Range (min–max)	334.3–12,937.7
Decrease in pain intensity	
Average±SD	−4.4±2.2
Range (min–max)	−7.5–1.8

Note: the normal value of ferritin in male: 10–220 µg/L, female: 10–85 µg/L[4]

The location of the pain was experienced mainly in the lower back 22 (43%), the second most common location was the knee 17 (33%), 12 (24%) complained of more than one location in the body, such as in the joints of the fingers and toes, calves, ankles, ankles, heels, and shoulders

The results of the Pearson test between the variables of pain interferes with life and ferritin levels obtained p=0.042 (p<0.05), which shows a significant correlation (Table 3). The r value is 0.29 with a positive correlation direction and weak strength (not close). On the other hand, the results of the Pearson test between the variables of pain intensity and ferritin levels obtained p=0.332 (p>0.05), which shows an insignificant correlation. The correlation coefficient (r) value is −0.14 with a positive correlation direction and

Table 3 Relationship between Pain Intensity and Pain Interferes with Life with Ferritin Levels

Variables	r	p Value*
Correlation of pain interferes with life with ferritin levels	0.9	0.042
Correlation of pain intensity with ferritin levels	−0.14	0.332

Note: *Pearson test, p<0.05 significant

weak strength.

Discussion

The ferritin results obtained in this study indicate that adult TDT patients at Dr. Hasan Sadikin General Hospital Bandung are in a state of hyperferritinemia. Ferritin levels of more than 1,000 g/L are at risk for complications, including arthropathy.[9] Iron accumulation can occur in thalassemia due to easy lysis of erythrocytes. This lysed erythrocyte will cause iron accumulation, resulting in an increase in free iron in the form of NTBI in the cytosol.[4,7] This NTBI is labile and releases ROS, which causes TRPA1 and TRPV1 to increase pain sensitization.[10] TRPA1 and TRPV1 are nonselective cations. The channel is expressed mainly in unmyelinated C nerve fibers, which act as detectors and integrators of pain stimuli. The role of TRPV1 and TRPA1 in thalassemia-related pain is thought to be associated with arthritis. The two molecules can be activated in sensory neurons, chondrocytes, and synoviocytes.[11]

Iron accumulation can also occur in muscles and cause muscle damage due to increased ROS.[12] An increase in NTBI causes an increase in bone resorption and thinning of the bone cortex so that osteopenia and osteoporosis can occur, which, if left unchecked, will cause fracture and compression of the surrounding nerves. In addition, iron deposits can occur in the synovial tissue and release free radical products that cause synovial destruction in the joints. Joints are innervated by sensory and sympathetic nerve fibers, which are sensitive to nociceptive stimuli, and function as vasoregulator and proprioceptive. Fibers are activated by joint movement, whereas Aß and C fibers are activated by noxious mechanical, thermal, and chemical stimuli and inflammatory mediators. Joint nociceptors are generally inactive but become activated when joint damage occurs, as in arthritis. These nociceptors then cause peripheral and central sensitization. The discrepancy between the intensity of pain and the level of joint damage is one of the causes of this pain sensitization.[6]

Pain in thalassemia is associated with musculoskeletal involvement with a wide variety of symptoms.[13] The most common musculoskeletal pain complaints are arthritis and low back pain.[4] Iron accumulation causes delays in osteoid maturation and bone mineralization. Decreased bone mass in thalassemia often occurs in the vertebral column. It manifests as spinal deformity, bone marrow compression, vertebral collapse, and intervertebral disc degeneration.[14–16] Formation of matrix metalloproteinases that can underlie the development of arthritis.[17] The knee joint is also a site frequently involved in musculoskeletal pain, as it is the part of the body that supports more weight. The features found on ultrasonography of the knee joint are synovitis, effusion, and metaphyseal dysplasia. The ankle joint is prone to inflammation that damages the joint cartilage, also known as thalassemic osteoarthropathy.[18,19]

Pain assessment in the subjects of this study used the BPI-SF questionnaire. The BPI questionnaire was first developed for cancer patients but is now widely used for non-malignant diseases, including thalassemia. This questionnaire can be completed by the patient or by the examiner. The pain components assessed are pain intensity, and pain interferes with life, so this questionnaire is a multidimensional assessment tool suitable for assessing chronic pain. Uni-dimensional pain assessment tools such as Numeric Rating Scale (NRS), Verbal Rating Scale (VRS), Visual Analogue Scale (VAS), and Faces Pain Scale are good in assessing acute pain. They describe pain intensity and are easy to use for pain evaluation. However, evaluating chronic pain has many limitations because it is influenced by many factors, including pain tolerance, pain experience, and emotions.[20] It consists of 15 questions with a sensitivity of 79.4%. The advantage of BPI-SF is that it is easier to do, it only takes five minutes, and it can evaluate therapy.[21–23]

Pain is a multidimensional sensation influenced by intensity, quality, location, frequency, and psychosocial. The degree of pain must also be considered to the frequency of pain because patients with mild or moderate pain, but chronic, can interfere with the patient's quality of life on a par with patients with acute pain lasting 1–2 days. Pain is influenced by biological and psychosocial factors, including pain tolerance.[1] Acute pain can directly affect the patient's quality of life. In contrast, chronic pain can occur adaptation to pain so that patients experience pain tolerance, but their quality of life can be disrupted due to long-lasting pain.[24]

The subjects in this research may have experienced tolerance to pain because thalassemia has been suffered for a long time. Subjects felt

the impact of pain improvement on life after transfusion compared to the intensity of pain, primarily moderate. Assessment of pain that interferes with life in people with thalassemia is currently being carried out for better evaluation and management.[24]

Research using the NRS may not show improvement in treatment because the NRS does not fully describe the pain experienced by the patient.[25] Important to assess, as found in the BPI-SF questionnaire. This questionnaire can be more effective in determining the improvement of pain experienced by patients with chronic pain than setting pain intensity with NRS alone. This questionnaire assesses how much pain interferes with daily activities, mood, ability to walk, work relationships with others sleep. And the comfort of life.[26,27]

This study indicates a relationship between pain (the dimensions of pain interfere with life on BPI-SF) and serum ferritin levels. Pain intensity analysis test with ferritin levels was insignificant ($p>0.05$). This result is similar to a previous study by the Thalassemia Clinical Research Network.[1] It could be due to 94.1% of subjects taking iron chelation tablets regularly. The mechanism of pain in thalassemia is associated with musculoskeletal disease. Arthropathy caused by iron accumulation can continue even though iron stores are normal. The number of ferritin levels can be disproportionate to the intensity of pain.[28] There is a relationship between ferritin levels and pain that interferes with life because the pain in people with thalassemia is often chronic, so the intensity of pain, which is not too high, can interfere with the patient's quality of life.[28] In addition, the pain intensity component has limitations in assessing chronic pain. It can be due to several factors. The objective assessment of pain is complex because pain is subjective. Acute pain can be considered adequate using a uni-dimensional pain screening tool, but a multidimensional pain screening tool is needed for chronic pain. Chronic pain is influenced by complex individual variations, despite getting the same exposure that can cause pain. The BPI-SF questionnaire is multidimensional, so from the results of a significant correlation on the dimensions of pain that interferes with life, it can be concluded that ferritin levels are correlated with pain.[25,29]

Conclusions

There is a relationship between pain and serum ferritin levels in adults with TDT. Regular consumption of iron chelation tablets can reduce ferritin and improve the quality of life for adults with TDT. Therefore, it is necessary to regularly assess pain in adults with TDT and monitor serum ferritin levels.

Conflict of Interest

The authors declare no conflicts of interest in this study.

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RESEARCH ARTICLE

Clinical Characteristics, Comorbidities, Length of Stay, and Mortality of COVID-19 Patients in RSUD Cideres, Majalengka, West Java

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Abstract

Until now, the world is still facing the COVID-19 pandemic caused by SARS-CoV-2. The number of deaths of COVID-19 patients in Indonesia is quite large when compared to other countries. Clinical manifestations, comorbidities, length of stay, and the mortality of COVID-19 vary widely in each study. This study analyzes clinical characteristics, comorbidities, length of stay, and mortality of COVID-19 patients in RSUD Cideres, Majalengka, West Java. This study is an observational study with total sampling and purposive sampling. Subjects were patients with nasal swabs confirmed SARS-CoV-2 and hospitalized at RSUD Cideres from January to July 2021. Clinical manifestations, comorbidities, length of stay, and mortality of COVID-19 patients aged ≥17 years old, were extracted from medical records. Results showed that the majority of 213 COVID-19 patients were age 41–60 years 114 (53.5%), female 114 (53.5%), with an upper respiratory tract in 207 (97.1%), and shortness of breath in 203 (95.3%) patients. 153 (71.8%) patients had a fever, while headache, diarrhea, and anosmia respectively 49 (23.0%), 19 (8.9%), and 10 (4.6%), respectively. Vital signs were the Glasgow Coma Scale (GCS) normal in 190 (89.2%) patients. Most of patients had respiration rate >20/min in 201 (94.3%), oxygen saturation <90% in 98 (46.0%), and chest x-rays: bronchopneumonia 134 (62.9%) and pneumonia 23 (10.7%). Comorbidities were hypertension, diabetes mellitus, and chronic heart failure in 74 (34.7%), 56 (26.2%), and 46 (11.7%) patients, respectively. The length of stay who died for 1–7 days (22 patients) and 8–14 days (9 patients); means almost all patients (29 of 32) died during the length of stay for 1–14 days. In conclusion, the majority of COVID-19 patients at RSUD Cideres are female, aged 41–60 years, had upper respiratory tract/shortness of breath, GCS normal, saturation oxygen <90%, chest x-rays: bronchopneumonia and pneumonia, comorbidities: hypertension, and length of stay for patients who died 1–7 days.

Keywords: Comorbidities, COVID-19, length of stay, mortality

Karakteristik Klinis, Komorbitas, Lama Rawat, dan Mortalitas Pasien COVID-19 di RSUD Cideres, Majalengka, Jawa Barat

Abstrak

Hingga saat ini, dunia masih menghadapi pandemi COVID-19 yang disebabkan oleh SARS-CoV-2. Jumlah kematian pasien COVID-19 di Indonesia cukup besar jika dibanding dengan negara lain. Manifestasi klinis, komorbid, lama rawat, dan mortalitas pasien COVID-19 sangat bervariasi pada setiap penelitian. Tujuan penelitian ini menganalisis karakteristik klinis, komorbiditas, lama rawat, dan mortalitas pasien COVID-19 di RSUD Cideres, Majalengka, Jawa Barat. Penelitian ini adalah penelitian observasional dengan *total sampling* dan *purposive sampling*. Subjek adalah pasien dengan *nasal swab* terkonfirmasi SARS-CoV-2 dan dirawat di RSUD Cideres periode Januari hingga Juli 2021. Data manifestasi klinis, komorbid, lama rawat, dan mortalitas pasien COVID-19 usia ≥17 diambil dari rekam medik. Hasil menunjukkan bahwa mayoritas 213 pasien COVID-19 berusia 41–60 tahun 114 (53,5%) dan wanita 114 (53,5%) dengan keluhan saluran napas atas 207 (97,1%) dan napas pendek 203 (95,3%) pasien. 153 (71,8%) pasien mengalami demam, sedangkan sakit kepala, diare, dan anosmia masing-masing 49 (23,0%), 19 (8,9%), dan 10 (4,6%) pasien. Tanda vital *Glasgow Coma Scale* (GCS) normal pada 190 (89,2%) pasien. Kebanyakan pasien mempunyai frekuensi napas >20/menit pada 201 (94,3%) pasien, saturasi oksigen <90% pada 98 (46,0%) pasien, serta rontgen toraks: bronkopneumonia pada 134 (62,9%) pasien dan pneumonia pada 23 (10,7%) pasien. Komorbid adalah hipertensi, diabetes melitus, dan *chronic heart failure* pada 74 (34,7%), 56 (26,2%), dan 46 (11,7%) pasien berturut-turut. Lama rawat pasien yang meninggal 1–7 hari (22 pasien) dan 8–14 hari (9 pasien), berarti hampir semua pasien (29 dari 32) meninggal selama rawat 1–14 hari. Simpulan, mayoritas pasien COVID-19 di RSUD Cideres adalah wanita, berusia 41–60 tahun, keluhan saluran napas atas/napas pendek, GCS normal, rontgen toraks: bronkopneumonia dan pneumonia, komorbid: hipertensi, serta lama rawat pasien yang meninggal paling banyak 1–7 hari.

Kata kunci: COVID-19, komorbid, lama rawat, mortalitas

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Introduction

In late December 2019, a novel beta coronavirus (severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2) first appeared in Wuhan, Hubei province, China. World Health Organization named the disease caused by this virus was coronavirus disease 2019 (COVID-19). This virus can be transmitted through droplets from infected people to spread quickly. On March 11, 2020, the World Health Organization declared a pandemic.[1–4] According to the WHO data for February 2021, 110 million cases were found worldwide. Indonesia is ranked 18th with a distribution of 175 thousand positive confirmed cases of COVID-19 in West Java province based on data from the Indonesian COVID-19 Task Force in June 2021.

Several risk factors can influence COVID-19 infection, such as older age, male, diabetes, hypertension, cardiovascular disease, and malignancy.[5] Other studies also mention several risk factors, including older age, male, high body mass index, and smoking history.[6] From the two studies, there were overlapping risk factors, namely old age, and male gender.

RSUD Cideres Majalengka is hospital in West Java area that hospitalized COVID-19 patients. Whether COVID-19 patients hospitalized at RSUP Cideres, Majalengka have different characteristics from COVID-19 patients in general? The purpose of this study was to describe clinical characteristics, comorbidities, length of stay, and mortality of COVID-19 patients in RSUD Cideres, Majalengka, West Java.

Methods

This research was an observational study with total sampling. Subjects were patients with nasal swabs confirmed SARS-CoV-2 and were hospitalized at RSUD Cideres, Majalengka from January to July 2021. The data was analyzed from secondary data (medical records) of clinical manifestations, comorbidities, length of stay, and mortality of COVID-19 patients aged ≥17 years old. The data were tabulated and then processed using Graphpad Prism version 9.2.0.

The clinical characteristics analyzed were gender, age, vital signs, clinical signs and symptoms, accompanied by results of chest x-ray examination, comorbidities, length of stay, and mortality. The research was obtained from the Health Research Ethics Committee of the Universitas Islam Bandung ethical approval number: 111/KEPK-Unisba/VIII/2021.

Results

The results of analysis of gender, age, vital signs, clinical signs and symptoms, results of chest x-ray examination, and comorbidities of COVID-19 patients can be seen in Table 1, while the length of stay and mortality of COVID-19 patients are in Table 2.

The majority of COVID-19 patients in RSUD Cideres, Majalengka were aged 41–60 years (53.5%), female 114 (53.5%), with complaints of upper respiratory tract 207 (97.1%) and shortness of breath 203 (95.3%). Fever only in 153 (71.8%) patients, while headache, diarrhea, and anosmia were 49 (23.0%), 19 (8.9%), and 10 (4.6%), respectively. Vital signs were the Glasgow Coma Scale normal in 190 (89.2%) patients. Most of patients had respiration rate >20/minute in 201 (94.3%) patients and oxygen saturation <90% in 98 (46.0%) patients.

The majority of COVID-19 patients on chest x-ray examination had bronchopneumonia and pneumonia in 134 (62.9%) and 23 (10.7%) patients. Comorbidities of patients found in the form of hypertension, diabetes mellitus, and chronic heart failure in 74 (34.7%), 56 (26.2%), and 46 (11.7%) patients, respectively.

The length of hospital stay for COVID-19 patients who died was 1–7 days (22 patients) and 8–14 days (9 patients), respectively. It means almost all patients (29 of 32) died during the length of stay in the hospital for 1–14 days. The contingency test with fisher extract test shows that there is a relationship between the length of stay and mortality (p=<0.0001).

Discussion

Most of the COVID-19 patients hospitalized at the hospital RSUD Cideres, Majalengka were women aged 41–60 years (53.5%). It is different from the research in Jakarta by Surendra et al.[7] from March–July 2020 of 4,265 COVID-19 patients, although the same occurred over 40 years, but was more in men (52% vs. 48%). This difference in results occurs because positive cases of COVID-19 in West Java are more common in women than men. Karyono and Wicaksana's[8] study also in Indonesia based on data of the

Table 1 Clinical Characteristics and Comorbidities of COVID-19 Patients in RSUD Cideres Majalengka

Characteristics	n=213	%
Age (years)		
17–40	41	19.3
41–60	114	53.5
>61	58	27.2
Gender		
Female	114	53.5
Male	99	46.5
Signs/symptoms		
Fever on admission	153	71.8
Complaint of upper respiratory tract	207	97.1
Shortness of breath	203	95.3
Headache	49	23.0
Diarrhea	19	8.9
Anosmia	10	4.6
Bowel obstruction	9	4.2
Chest pain	6	2.8
Urination disorders	1	0.4
Vital signs		
Glasgow Coma Scale		
7–9	4	1.8
10–14	19	8.9
15	190	89.2
Hypertension	105	49.2
Pulse		
≤60	3	1.4
61–100	119	55.8
>100	91	42.7
Respiration rate/min		
≤12	0	0
13–20	12	5.6
>20	301	94.3
Oxygen saturation		
<90	98	46.0
91–95	69	32.3
≥96	46	21.5
Chest x-rays		
Bronchopneumonia	134	62.9
Pneumonia	23	10.7
Normal	29	13.6
TB pulmonary	13	6.1
Others	14	6.5
Comorbidities		
Negative	66	30.9
Hypertension	74	34.7
Diabetes mellitus	56	26.2
Chronic renal failure	46	11.7

official website Indonesian COVID-19 Task Force, Ministry of Health Indonesia up to 3rd June 2020 reported 28,233 the confirmed COVID-19 most at the age 31–45 years (29.3%) and 46–59 (27.3%) years. Retrospective cohort study in Wuhan, China, based on the data from two hospitals in December 2019 and January 2020, the majority occurred in men (62%) compared to women (38%).[9] Guan et al.'s[10] research from 552 hospitals and 30 provinces in China also reported that most COVID-19 occurred in men (58.1% vs. 41.9%). The meta-analysis was based on 42 studies, including many descriptions from China and the United States. Studies conducted in Italy, India, the United Kingdom, Singapore, and South Korea have a higher prevalence of males with COVID-19 than females.[11]

Clinical manifestations of COVID-19 vary widely in each study. The results of the COVID-19 study in Cideres, Majalengka, the most common clinical manifestation was upper respiratory tract complaints (97.1%) and shortest of breath (95.3%). Surendra et al.[7] got the most common complaints in the form of cough (66%), fever (53%), malaise (35%), and shortness of breath (32%). Other clinical manifestations were headache, sore throat, runny nose, nausea/vomiting, myalgia, chills, diarrhea, and abdominal pain. Karyono and Wicaksana[8] got the most frequent manifestations were cough (76.2%), history of fever (50.4%), current fever (47.1%), and shortness of breaths (41.6%). Guan et al.'s[10] research in China stated the majority was cough (67.8%), fatigue (38.1%), and sputum production (33.7%). Systemic review and meta-analysis by Yang et al.,[12] including 46,248 patients, the most prevalent clinical symptom was fever, followed by cough, fatigue, and dyspnea. Also, Fu et al.[1] stated that the most common clinical signs were fever, cough, and fatigue. Even though fever is the most common symptom in some studies, only 38–50% of COVID-19 patients show fever.[10,13–15]

Our study's main comorbidities were hypertension and diabetes mellitus (34.7% and 26.2%). Karyono and Wicaksana[8] also stated that the most frequent comorbidities in Indonesia were hypertension (52.1%), diabetes mellitus (33.6%) in addition to cardiovascular disease (20.9%), and obstructive pulmonary (15.1%). Other comorbidities were respiratory problems (9.0), kidney disease (4.9%), asthma (3.1%), cancer (2.3%), tuberculosis (1.8%), liver disease (1.2%), and diseases related to the immune system (1.2%). Research in Jakarta by Surendra et al.,[7] most comorbid on COVID-19 were hypertension

Table 2 Length of Stay and Mortality of COVID-19 Patients in RSUD Cideres Majalengka

Length of Stay (Days)	Death (n=32)	Recovery (n=181)	Percentage (%)	p Value*
1–7	22	10	5.5	0.0001
8–14	9	116	64.1	
≥15	1	55	31.4	

Note: *Fisher's exact test, p<0.05 significant

(19%) and diabetes mellitus besides heart disease (10%). Other comorbidities were COPD, chronic kidney disease, immunocompromised, liver disease, malignancy, and obesity. Prevalence of comorbidities in the COVID-19 infection patients includes hypertension, respiratory system disease, and cardiovascular disease.[10] Most comorbidities appear to increase with males, and obesity is also associated with an increased risk of death.[14]

According to Keller et al.,[15] survivors of COVID-19 compared to living patients have more frequent sepsis and multi-organ disorders, including acute cardiac injury, ARDS requiring mechanical ventilation, and dialysis due to acute kidney injury. In addition, secondary infection and septic shock often occur in severe cases of COVID-19.

An x-ray examination of the lungs in our study showed bronchopneumonia (62.9%) and pneumonia (10.7%), meaning ¾ COVID-19 patients on a chest x-ray were in the form of bronchopneumonia and pneumonia. Whether this is due to coronavirus or other causes requires further study. In this study, it is also apparent that in the 32 deceased COVID-19 patients, 29 (91%) showed signs of bronchopneumonia and pneumonia, which worsened the disease.[16–17] Hosseiny et al. stated that the radiological picture in COVID-19 is usually nonspecific, often overlapping with the concept of SARS and MERS. On chest x-ray examination, at least 85% showed abnormalities with 75% in both lungs. The pneumonic chest x-ray compromise was predominantly bilateral (72.9%).[18]

The length of hospitalization COVID-19 who safe in RSUD Cideres, Majalengka mostly 8–14 days (64.1%) and ≥15 days (31.4%). Of the 32 COVID-19 patients who died, 22 patients were hospitalized for 1–7 days and nine for 8–14 days of hospitalization.

According to Wang et al.,[19] hospital stays of survival patients 26–29 days while COVID-19 patients died 3–8 days. The rapid progress of the disease was noted in the dead patients with a median survival time of 5 days after admission. Logistic regression analysis showed that fever, pneumonia, acute respiratory distress syndrome, diabetes mellitus, and cancer were the variables that showed independent and statistically significant associations with mortality.[20] According to Zhang et al.,[21] respiratory failure remained the most frequent cause of death (69.5%), followed by sepsis (28.0%) and cardiac failure (14.6%). Older patients with underlying comorbidities suffering COVID-19 were at risk of death. Rao et al.[22] and Li et al.[23] stated that the lower cycle threshold (Ct) values may be associated with bad outcomes and that Ct values may help predict the clinical course and prognosis of COVID-19 patients. Still, Karahasan Yagci et al.[24] stated that viral load was not a critical factor for hospitalization and mortality.

Conclusions

In conclusion, most COVID-19 patients at RSUD Cideres are female, aged 41–60 years, had upper respiratory tract/shortness of breath, normal GCS, oxygen saturation <90%. The chest x-rays showed bronchopneumonia and pneumonia, and the comorbidities were hypertension. The length of stay for patients who died was 1–7 days.

Conflict of Interest

All authors state whether there was a conflict of interest in this article or not.

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RESEARCH ARTICLE

Noviemeter Diagnostic Test as a Head Circumference Measurement Device for Under-Five Children

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Abstract

The current typical practice for measuring the head circumference of under-five children is by using a measuring tape. However, it may create some difficulties as children cry and move during measurement, leading to less accurate results. Accurate head circumference measurement is essential for assessing brain development and early detection of brain development disorders. Therefore, a more accurate device to measure head circumference is needed. Noviemeter is a non-touch digitalized head circumference measuring device that enables easier measurement in under-five children. As a new tool, noviemeter's accuracy, sensitivity, and specificity must be determined. This study aimed to analyze the difference in the head of under-five children circumference measurement results between a typical measuring tape as the gold standard and noviemeter and determine the accuracy, sensitivity, and specificity of the noviemeter. It was a cross-sectional analytical study using cluster random sampling on 72 under-five children in the work area of Guntung Payung Public Health, South Kalimantan, during August 2020. The measurement was performed twice, first using a measuring tape and, second, using a noviemeter. Data were analyzed statistically using the dependent t test and diagnostic test. No significant difference was found between the results of the two measuring devices (p=0.257). The sensitivity, specificity, and accuracy of the noviemeter were 87.0%, 88.4%, and 91.8%, respectively. Thus, noviemeter has good sensitivity, specificity, and accuracy as an easier alternative device to measure head circumference in under-five children.

Keywords: Diagnostic test, head circumference, measuring tape, noviemeter

Uji Diagnostik Noviemeter sebagai Alat Pengukur Lingkar Kepala Balita

Abstrak

Praktik pengukuran lingkar kepala balita yang umum dilakukan saat ini adalah dengan menggunakan pita ukur. Akan tetapi, hal itu dapat menimbulkan beberapa kesulitan karena anak menangis dan bergerak selama pengukuran yang menyebabkan hasil yang kurang akurat. Pengukuran lingkar kepala yang akurat sangat penting untuk menilai perkembangan otak dan deteksi dini gangguan perkembangan otak. Oleh karena itu, diperlukan alat yang lebih akurat untuk mengukur lingkar kepala. Noviemeter merupakan alat pengukur lingkar kepala digital non-sentuh yang memungkinkan pengukuran lebih mudah pada anak balita. Sebagai alat baru, akurasi, sensitivitas, dan spesifisitas noviemeter harus ditentukan. Penelitian ini bertujuan menganalisis perbedaan hasil pengukuran lingkar kepala balita antara pita ukur tipikal sebagai baku emas dan noviemeter serta mengetahui akurasi, sensitivitas, dan spesifisitas dari noviemeter tersebut. Jenis penelitian ini adalah *cross-sectional analytical* dengan menggunakan *cluster random sampling* pada 72 balita di wilayah kerja Puskesmas Guntung Payung Kalimantan Selatan selama bulan Agustus 2020. Pengukuran dilakukan dua kali, pertama menggunakan pita pengukur dan kedua menggunakan noviemeter. Data dianalisis secara statistik menggunakan uji t dependen dan uji diagnostik. Tidak ditemukan perbedaan yang signifikan antara hasil kedua alat ukur (p=0,257). Sensitivitas, spesifisitas, dan akurasi noviemeter masing-masing adalah 87,0%; 88,4%; dan 91,8%. Dengan demikian, noviemeter memiliki sensitivitas, spesifisitas, dan akurasi yang baik sebagai alat alternatif yang lebih mudah untuk mengukur lingkar kepala pada anak balita.

Kata kunci: Lingkar kepala, noviemeter, pita ukur, uji diagnostik

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Introduction

Under-five children's growth is among the critical factors for improving the quality of life of a nation's future generation. Although most parents understand the importance of brain development for their child's future, not many of them know that it is essential to measure their child's head circumference to estimate the inner volume of the head, which will reflect the growth of the brain.[1–3]

Under-five children with a head circumference disorder are at a higher risk of developing developmental disorders, nine times higher than those with normal head circumference.[4] Monitoring the head circumference of infants is essential because it can detect abnormalities that will trigger further examinations of the head to identify the cause, leading to early interventions for the abnormality. With early interventions, the consequences of the brain growth abnormality, such as mental retardation and under-developed brain, can be lessened. When the circulation of the cerebrospinal fluid in the brain is disturbed, the head will be enlarged (macrocephaly), which is known as hydrocephaly or fluid accumulation in the brain, and brain growth and development will be impaired.[5,6]

The average size of a newborn's head, both boys and girls, is 33–35 cm. Several sources stated that the skull's growth in under-five children follows the growth and development of the brain. Thus, when the skull growth is disturbed, brain development is hampered.[7,8] In a study involving 633 children, it is suggested that the head circumference can be used as one of the benchmarks for a child's ability level.[3] In addition, a study by Ribek et al.[9] demonstrated a correlation between head circumference and brain growth and development in infants aged 0–12 months.

Errors in the process of head circumference measurement will affect the results. These errors may come from the use of inappropriate tools for measurement. There are concerns regarding the weaknesses of the conventional measuring instrument typically used for measuring head circumference. These weaknesses include difficulty in seeing or reading the measuring lines, leading to rounding of 0.5–1.0 cm up or down; the need for good lighting during measurement; and impractical method of measuring.[3,10–12]

A digital tool for measuring health circumference will benefit health workers as it addresses some of the weaknesses mentioned above. Noviemeter is a solution designed by the authors to measure the under-five children's head circumference from the glabellar or supraorbital bone to the occipital bone in a digitized manner so that the result can be easily interpreted. It is expected that this tool will enable early detection of any abnormality in the child's head circumference. Noviemeter, as a head circumference measuring device, uses infrared proximity sensors that are safe for humans. This device is user-friendly and practical as the user only needs to put the holder above the head. The program will calculate the head circumference, and the results will appear on the monitor display. This tool is specifically designed as a non-touch device, meaning that it will not directly contact the child's head. The measurement results using this device can then be compared to the normal circumference according to the child's age and gender for further assessment. The limitation of this device is that it does not have a memory storage facility and graphical display.

The purpose of this study was to analyze the differences in the results of head circumference measurement between the conventional measuring tape and noviemeter. In addition, the accuracy (sensitivity and specificity) of noviemeter in measuring the head circumference of under-five children was also assessed.

Methods

It was a cross-sectional observational study using cluster random sampling.[13,14] The cluster for this study was defined by residency area. Each subject had their head circumference measured twice. The first measurement was performed using a measuring tape, while the second used a noviemeter, and two different operators conducted both measurements. During the recruitment of the subject, 72 children aged 36–60 months who met the inclusion criterion were recruited. The inclusion criteria used were aged 36–60 months old, healthy, and parents or guardians were willing to consent their child to participate in this study. The instruments used to collect data were a questionnaire, a measuring tape, and a noviemeter. A bivariate statistical analysis using the dependent t test and diagnostic test was performed on the data.[15]

Noviemeter uses four infrared proximity

Figure Noviemeter

sensors that will convert the measurement results from distance to an electrical signal that will be read by a microcontroller, which in turn will process the signal into letters and numbers using an analog to digital converter (ADC). The result of this process is diameter measures (D1, D2, D3, and D4). A computerized program then calculates the head circumference by referring to the child's age and gender using a 2-dimensional ellipse formula. The result of the head circumference measurement is then sent to the LCD monitor. In the study, the operator typed in the gender and age of the child and then placed the holder above the child's head. The measurement results then appeared on the LCD after about 1–2 seconds, and the operator pressed the print button to get the printed output of the measurement. The research was obtained from the Health Research Ethics Committee of the STIKes Dharma Husada Bandung ethical approval number: 08/SDHB/B/VIII/2020.

Results

Table 1 shows the majority of the subjects of this study were boys (56%) aged 36–48 months old (61%).

The result of the data normality testing on head circumference measurement using the Kolmogorov-Smirnov test in this study presented a p value of 0.093, showing normally distributed data (Table 2). In addition, it made dependent t test analysis possible. The head circumference results using the two measurement results

Table 1 Subject Characteristics

Characteristics	n=72 (%)
Gender	
Boy	40 (56)
Girl	32 (44)
Age (month)	
36–48	44 (61)
49–60	28 (39)

Note: univariate analysis

Table 2 Normality and Data Homogeneity Tests

Type of Test	p Value*
Normality test	
Measurement tape	0.093
Noviemeter	
Homogeneity test	
Measurement tape	0.460
Noviemeter	

Note: *Kolmogorov-Smirnov test (sample >50) and Levene test, p<0.05 significant

Table 3 Differences of Measurement Results between Measurement Tape and Noviemeter

Head Circumference Device	Mean	Mean Difference	p Value*
Measurement tape	49.250	0.05	0.257
Noviemeter	49.300		

Note: *dependent t test, p<0.05 significant

Table 4 Diagnostic Test of Noviemeter in Under-Five Child Head Circumference Measurement

Examination	AUC* (%)	Sensitivity* (%)	Specificity* (%)
Head circumference	91.8	87.0	88.4

Note: *receiver operating curve test

were also proven to have a similar variance (homogenous) with a p value of 0.460, showing that the data from the two measurement devices were comparable.

The results of the dependent t test on the head circumference measures using the Noviemeter and the measuring tape demonstrated a difference of 0.05 (p=0.257), showing an insignificant difference (Table 3).

Based on the receiver operating curve result, the AUC value for the head circumference measurement using the Noviemeter was 91.8%, which was a very strong AUC value (Table 4).

Discussion

The majority of the under-five children in this study were boys (56%) and 36–48 months old (61%). The small sample size of this study is because this study was performed during the COVID-19 pandemic. In addition, the lack of parental knowledge and awareness on the importance of the early detection of brain development and growth in under-five children through head circumference measurement is also a factor that hinders participation in this study, even though the research team visited them in their own house.

Several studies have demonstrated that environmental and genetic factors influence the development of children. The environmental factors include the knowledge of the mother regarding under-five child development. Parental involvement in monitoring child development is crucial for good child growth and development.[16–18]

Under-five mothers, cadres, health care workers, and the community must understand the importance of growth and development monitoring. It is necessary to ensure that the parents have the appropriate knowledge and awareness regarding brain development monitoring through routine and guided monitoring to ensure the child's optimum growth.[19,20]

In this study, most subjects had mothers with a good educational background of a minimum of senior high school. According to Baker-Henningham and Lopez Boo,[21] parents with higher education and experience will better apply what they know. For example, they will understand the importance of a child's growth and development monitoring and use it for their child.

Based on the results of the statistical tests, a difference of 0.05 (p=0.257) in the measurement results between the two measuring instruments was observed, indicating that there is no difference in head circumference measurement results between using a measuring tape and a noviemeter. No significant difference was observed in the two measurements performed consecutively, although two operators did the measurement. This result supports Thezar et al.,[22] stating that measuring head circumference using measurement tape will give good measurement results if the child is cooperative. However, not all children are cooperative, and head circumference measurement using measurement tape in these

children may result in inaccurate results as the child may move their head a lot during the measurement. In this situation, noviemeter is assumed to be an alternative digitalized solution to measure the head circumference to accurately estimate the brain growth inside the child's head.[12]

In Indonesia, the Ministry of Health has issued the Decree of Minister of Health Number 25 of 2014 on Child Health and the Decree of Minister of Health Number 66 of 2014 on Child Growth and Development Monitoring that stated the requirement for routine head circumference measurement in under-five children.[23] Currently, the measurement tape is the gold standard for measuring head circumference.[24,25] The tape is considered to have several advantages, such as being easy to carry, no need for batteries, and no need for calibration. However, there is also a limitation in using the tape as it needs collaboration from the child. Noviemeter is a digitalized device designed to measure the head circumference in under-five children without touching the child's head, thus reducing the tension that the child feels during measurement. Therefore, it is a tremendous advantage for measuring head circumference in children who refuse to cooperate with the operator. The principle of noviemeter is similar to the measurement tape, that is measuring head circumference from the glabellar or supraorbital bone to the occipital bone. The noviemeter uses four distance sensors using infrared that works on detecting an object to get the figure of the object and its distance by making use of the heat radiated from the object.[26,27] Noviemeter can be used in health clinics, private practices, public health centers, and integrated health posts as it is easy to use and easy to read, making interpretation easier as it provides easily interpreted data based on the comparison with the appropriate head circumference classification based on age and gender, so the operator does not have to make the comparison manually. Another advantage is that the result can also be printed, making the job of the operator easier.

Conclusions

Noviemeter has high accuracy in both sensitivity and specificity for measuring head circumference. The result of head circumference measurement using Noviemeter is not significantly different from that of the measurement tape. Still, it is a better tool to measure head circumference in uncooperative children.

Conflict of Interest

All authors stated that there was no conflict of interest in this study.

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RESEARCH ARTICLE

Effect of Nursing Dysphagia Screening Tool Education on Increasing Knowledge of Documentation for Screening Results in Hospital Nurses

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Abstract

Efforts to prevent complications of dysphagia can be detected using a quick and correct screening method. Dysphagia screening tool (DST) can identify dysphagia stroke patients with eight indicators. Therefore, it makes it easier for nurses to improve their ability to document it. This study aims to analyze the effect of nursing dysphagia screening tool (NDST) education on increasing knowledge of screening documentation for hospital nurses. The research method was a quasi-experimental design with a non-equivalent control group. The research was taking place at Tk. II dr. Soepraoen Hospital Malang starting 14 July–23 July 2021. A sample of 120 nurses was selected with a total sampling of 60 controls and interventions. Bivariate data analysis applied dependent t test followed by Mann-Whitney. The results showed that the mean difference of knowledge value was −19.999 with t arithmetic of −8.373 and p=0.000 (p<0.05). The significance value of the control group is p=0.000 (p<0.05), which means that there is a difference before and after the action on the knowledge variable of the NDST education control group through the website link. Value of p=0.000 (p<0.05) means a difference between the increase in knowledge of the intervention group through face-to-face lectures and the website link control group. In conclusion, there are knowledge differences in documenting the results of dysphagia screening on patients with stroke before and after DST learning for hospital nurses. It is necessary to disseminate NDST learning socialization to screen for dysphagia in patients with stroke to optimize the prevention of stroke complications in the first 24 hours.

Keywords: Dysphagia, education, NDST, stroke

Pengaruh Edukasi *Nursing Dysphagia Screening Tool* terhadap Peningkatan Pengetahuan Dokumentasi Hasil Skrining pada Perawat Rumah Sakit

Abstrak

Upaya pencegahan komplikasi disfagia dapat dideteksi menggunakan metode skrining yang cepat dan benar. *Dysphagia screening tool* (DST) dapat mengidentifikasi disfagia pasien strok dengan delapan indikator. Hal ini mempermudah perawat untuk meningkatkan kemampuannya dalam mendokumentasikannya. Tujuan penelitian ini menganalisis pengaruh edukasi *nursing dysphagia screening tool* (NDST) terhadap peningkatan pengetahuan dokumentasi hasil skrining pada perawat rumah sakit. Metode penelitian yang digunakan adalah *quasi-experimental design* dengan *non-equivalent control group*. Penelitian bertempat di RS Tk. II dr. Soepraoen Malang pada 14 Juli–23 Juli 2021. Sampel sebanyak 120 perawat dipilih secara *total sampling*, 60 kontrol dan perlakuan. Analisis data bivariat menggunakan uji t dependen dilanjutkan dengan Mann-Whitney. Hasil menunjukkan nilai *mean difference* pengetahuan sebesar −19,999 dengan t hitung sebesar −8,373 dan p=0,000 (p<0,05). Nilai signifikansi kelompok kontrol p=0,000 (p<0,05) yang berarti terdapat perbedaan sebelum dan sesudah tindakan pada variabel pengetahuan kelompok kontrol edukasi NDST melalui tautan *website*. Nilai p=0,000 (p<0,05) berarti terdapat perbedaan peningkatan pengetahuan kelompok perlakuan edukasi melalui ceramah tatap muka dengan kelompok kontrol tautan *website*. Simpulan, terdapat perbedaan pengetahuan dalam pendokumentasian hasil skrining disfagia pasien strok di RS sebelum dan sesudah dilakukan edukasi NDST pada perawat rumah sakit. Diperlukan sosialisasi edukasi NDST untuk menskrining disfagia pasien strok untuk mengoptimalkan pencegahan perburukan klinis komplikasi strok pada 24 jam pertama.

Kata kunci: Disfagia, edukasi, NDST, strok

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Introduction

Stroke or cerebrovascular accident is a clinical condition that causes a reduction of focal neurological function in the central nervous system.[1] Dysphagia has also increased with the rising stroke prevalence globally and in Indonesia.[2] A study in Canada registered 55,000 cases every year, with 55% experiencing dysphagia in acute stroke patients.[3] At the same time, the Indonesia Basic Health Research Report 2018 data explained that in Indonesia, the cases of dysphagia hit 2,632,000 every year.[4] However, the exact number of dysphagia in East Java has not been found because most hospitals do not have standard procedures regarding dysphagia screening. The only data obtained was during the last three months in 2015. A total of 30% of them experienced dysphagia.[2]

Complications of dysphagia that can threaten the life of stroke patients are the occurrence of aspiration or limitations in the ability to swallow food and fluids. Therefore, it can lead to a rising risk for lack of nutrition and hydration or pneumonia.[5–6] In addition, dysphagia can increase the length of hospital stay, resulting in increased mortality, comorbidities, and increased health care costs.[5–7] However, in general, dysphagia is not considered the leading cause of death, but its complications are aspiration pneumonia and malnutrition, which can cause death commonly in the elderly.[5,7] Aspiration pneumonia cases that hit 40–71% will cause death in the elderly with dysphagia; this can also cause a length of stay of about 40% in all age groups.[8]

In performing dysphagia screening, nurses can use various tools, one of which is the nursing dysphagia screening tool (NDST). The dysphagia screening tool (DST) is a dysphagia screening tool that contains eight indicators to observe stroke patients who have difficulty swallowing. The main advantage of using this tool is that it has been designed with an easy-to-use procedure to be applied quickly and precisely by nurses as a daily routine. Furthermore, it is also effective in shortening the length of stay in the hospital and reducing the cost of treatment.[9] According to previous research, NDST is more effective than other tools so that nurses can use it in accelerating their work in finding cases of dysphagia. Thus, complications from dysphagia can be prevented as early as possible.[10]

This identification is vital to be carried out by hospitals to empower health workers, especially nurses, in reducing mortality due to dysphagia. The form of treatment that nurses can carry out must be accompanied by sound knowledge and attitudes to be diagnosed quickly. In general, nurses' attitudes are influenced by personal experience because they have no experience at all in screening. As a result, they tend to have a negative attitude and do not perform correctly.[11] Therefore, it is essential that regular teaching is given to increase knowledge of documenting the dysphagia screening results.

The ability of nurses to document the dysphagia screening results is influenced by knowledge.[12,13] In addition, from the results of interviews with nurses who have served in the stroke unit of Tk.II dr. Soepraoen Hospital Malang, from December 18th, 2020 to January 3rd, 2021, seven people stated that they did not know how to document the action regarding dysphagia screening in patients with stroke because they had never received an education.

Nurses have a significant role in handling the first 24 hours of stroke patients, primarily to diagnose dysphagia.[13] Therefore, it is essential to document it properly and correctly. The research problem is whether education influences the discrepancy of nursing dysphagia screening tools over documentation knowledge of nurses in reporting dysphagia on patients with stroke. The purpose of this study was to analyze the effect of nursing dysphagia screening tool (NDST) education on increasing knowledge of screening documentation for hospital nurses.

Methods

The research design was quantitative with a quasi-experimental design method, and the approach was a non-equivalent control group design. The population of this study was nurses who had treated stroke patients in the internal medicine ward, neuro clinical polyclinic, emergency room, stroke unit, a total of 120 people. The samples in this study were nurses who had treated stroke patients in the internal medicine ward, neuro-clinical polyclinic, emergency department, and stroke unit, a total of 120 people with total sampling. The sample was divided into the intervention group (face-to-face lecturers) of 60 respondents and the control group (website) of 60 people. The independent variable was the NDST learning. The dependent variable was the

nurses' knowledge in documenting dysphagia screening results on patients with stroke. This research was conducted in Tk. II dr. Soepraoen Hospital Malang from July 14th to July 23rd, 2021. Data analysis used paired sample t test SPSS version 20.0. The ethical approval letter from the Health Research Ethics Committee of the Faculty of Medicine Universitas Brawijaya Malang is number 190/EC/KEPK-S2/07/2021.

Results

Table 1 explained that the NDST education using the face-to-face lecturer and the control group who educated NDST using a website group's age characteristics for nurses were 25–30 years. People (46.7%), the highest education group was the NDST face-to-face lecturer group, and the control group was 47 people (78.3%) and 51 people (85%), respectively. The female respondents in the NDST education face-to-face lecturer group were 46 people (76.7%), and the control group website was 45 people (75%). In comparison, the length of work in the face-to-face and control groups was 6–10 years.

Based on Table 2, the interpretation of the statistical t test dependent sample results was that variable of knowledge on group intervention face to face lecturer generated mean difference values amounted to −19.999 with statistic t arithmetic of −8.373 and p=0.000. The interpretation of the statistical t test dependent sample results was that variable of knowledge on website control group generated mean difference values amounted to −8.70433 with statistic t arithmetic of −4.216 and p=0.000.

Discussion

The age group of 19–34 is a early adult category.[14] This period is a period of adjustment to new life patterns and new social expectations.[15] Early adults are also able to adjust independently. The range of mature emotions can be categorized as having reached the maturity level to provide the proper response according to the situation they face.[16,17] In this case, nurses must carry out the task of checking dysphagia on patients with stroke. Thus, specific skills are needed in conducting assessments, especially interpersonal

Table 1 Characteristics of NDST Educational Treatment and Control Group

Characteristics	Groups	Category	n=120 (%)
Age (years)	NDST educational face to face lecturer	25–30	38 (63.3)
		31–35	5 (8.3)
		36–40	11 (18.3)
		41–45	2 (3.3)
		46–50	4 (6.7)
	NDST educational with website	25–30	28 (46.7)
		31–35	22 (36.7)
		36–40	10 (16.7)
Education	NDST educational face to face lecturer	DIII Nursing	47 (78.3)
		S1 Nursing	13 (21.7)
	NDST educational with website	DIII Nursing	51 (85.0)
		S1 Nursing	9 (15.0)
Gender	NDST educational face to face lecturer	Man	14 (23.3)
		Woman	46 (76.7)
	NDST educational with website	Man	15 (25)
		Woman	45 (75)
Length of working (years)	NDST educational face to face lecturer	0–5	20 (33.3)
		6–10	24 (40.0)
		11–15	11 (18.3)
		16–20	1 (1.7)
		21–25	4 (4)
	NDST educational with website	0–5	22 (36.7)
		6–10	26 (43.3)
		11–15	12 (20.0)

Table 2 Research Differences in Increase Nurse Knowledge about NDST in Intervention and Control Group

Groups	Mean	SD	SE	t	df	p Value	95% CI	n
Intervention group								
Pre-test	70.3723	21.81035	2.81570	−8.373	59	0.000	−24.77865 to −15.21935	60
Post-test	90.3713	9.47732	1.22352					
Control group								
Pre-test	72.9638	22.25756	2.87344	−4.216	59	0.000	−12.83523 to −4.57344	60
Post-test	81.6682	10.98245	1.41783					

communication skills. The essential skills of interpersonal communication are expressing feelings, choosing what to do, expressing opinions, increasing self-esteem, and adapting to others.[18] These are needed to detect special events as dysphagia characteristics, including dysarthria, are challenging to study, and patients tend to be discreet. Therefore, these communication skills can help nurses find signs of dysphagia symptoms as described in the DST. Another source also explained that early adulthood could have matured emotionally and controlled emotions, making it easier for one to receive new knowledge and information from the surrounding environment.[19]

These research references were also relevant to the results of this study, wherein researchers also found that subjective and objective data on patients with stroke could be ultimately obtained if nurses have interpersonal communication skills. These interpersonal skills are in the form of the ability to observe signs of dysphagia symptoms that have been generated from providing NDST education by researchers.

The research data showed that the NDST education treatment group's highest education and control group was DIII Nursing. The DIII Nursing education group with a higher education category aligned with research from.[20] It explained that someone who has a higher education background is easier in the process of accepting new things so that in the end, it will be easier to solve problems related to these new things. Similarly, the research result from Nurhafizah et al.[21] stated that the education achieved by a person is a determinant of productivity, including knowledge, skills, abilities, attitudes, and behavior which are sufficient in carrying out their work. The results of this study were in line with the researcher's assumption that the productivity of nurses' performance could be supported by formal education of nurses. Education provides knowledge for the implementation of tasks and the basis for self-development and the ability to utilize all means, one of which is to understand the application of observing dysphagia patients with NDST.

The length of work in the treatment group in the 6–10 year range was 40%, while the control group 6–10 years was 43.3%. The researcher concluded that nurses who worked at Tk.II dr. Soepraoen Hospital Malang still had few experiences. Expressed as work experience, time at work becomes a reasonable basis for predicting employee productivity. It was in line with several studies that state the longer you work, the more experiences you will get and the more cases you will handle, making someone more skilled and thorough in completing work.[21–24]

Table 2 explained that the statistical test sample pair results showed that the value of the mean difference of knowledge amounted to −19.999 by statistic t arithmetic of −8.373 and p=0.000 ($p<0.05$). It meant a difference in the average on the variable understanding of group intervention education NDST between the values before and after the performed treatment. The difference is because the level of knowledge must go through several processes; the stages of knowing, understanding, and applying what one knows.[25] In this case, the knowledge about documenting dysphagia screening results and a nurse's daily routine.

The cognitive level of knowledge includes knowing, understanding, applying, analyzing, synthesizing, and evaluating.[26] It may be drawn a common thread that before someone can apply the knowledge he has, one must know and understand something first. As one of the actors of nursing documentation, nurses have a

significant role in caring for and conveying the patient's condition to other disciplines in the hospital. They need to have good knowledge and understanding of the documentation. Therefore, nurses must continuously improve their abilities through training or attending formal and non-formal education organized by hospital institutions to enhance their work productivity. In addition, it must also be noted that the workload for nurses has to be considered. Nurses often need extra time to complete their tasks, so that time for work must be in harmony with work productivity in direct health services.

The researcher concluded that was a difference between the study results before and after the NDST education, meaning that the educational intervention carried out by the researcher had good influences on nurses. The positive impact of education could be influenced by the high work motivation of nurses so that the tendency to burn out on their duties in carrying out dysphagia screening was low. It was in line with research from Wahyudi and Gunarto,[25] which explained that the low work motivation of nurses could result in burnout, so it affects the work productivity of nurses. Work ethic has a 4.8 times greater opportunity to support work productivity.[26] Another source also stated that high work motivation of nurses would improve the performance of nurses so that each task will be carried out correctly.[27] The tendency of a strong desire for something can make a person try and pursue something and gain more profound knowledge.[28] Thus, hospital stakeholders need to pay attention to motivational factors in increasing the knowledge and skills of nurses in carrying out dysphagia screening of stroke patients to prevent further clinical deterioration.

Conclusion

In conclusion, there are discrepancies in the average on the variable knowledge of group treatment education NDST between the values before and after the performed treatment for hospital nurses.

Conflict of Interest

The authors have no conflict of interest to declare.

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RESEARCH ARTICLE

Level of Depression, Anxiety, and Stress of College Students in Indonesia during the Pandemic COVID-19

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Abstract

The COVID-19 pandemic has caused a shift in learning methods to online. The obstacles felt by college students can have an impact on mental health. However, data on student mental health in Indonesia during the pandemic is still limited. This study describes the depression, anxiety, and stress of college students in Indonesia during the COVID-19 pandemic. This research method is descriptive, conducted on college students in Indonesia from July to August 2021. Sampling is done by voluntary sampling collection, with 258 respondents. The research instrument is a questionnaire of characteristics and depression, anxiety, stress scale (DASS) 42 in the form of Google Form. Data analysis using Microsoft Excel. The results of the research on the characteristics of the most respondents, namely, age in the range of 20–24 years (85.3%), female (64.7%), from Java (60.8), third grade (66.7%), living with parents (74.8%), and from the faculty of medicine (23.3%). More college students are not depressed (55.0%) or not stressed (57.4%) than those who are depressed or stressed. However, more college students experience anxiety than those who are not anxious, 60.1%. Based on the level, most college students experienced moderate depression (12.8%), very severe anxiety (20.9%), and severe stress (13.6%). This study concludes that most college students experience moderate depression, very severe anxiety, and severe stress. The success of online education depends on several factors, such as basic technical skills and the ability to access hardware and software, good self-motivation, and the availability of a conducive learning environment. This problem can have an impact on the mental health of college students.

Keywords: Anxiety, college students, depression, online learning, stress

Tingkat Depresi, Kecemasan, dan Stres pada Mahasiswa di Indonesia selama Masa Pandemi COVID-19

Abstrak

Pandemi COVID-19 menyebabkan peralihan metode pembelajaran menjadi daring. Terdapat manfaat dan kendala pada pembelajaran daring. Kendala yang dirasakan mahasiswa dapat berdampak pada kesehatan mental. Data kesehatan mental mahasiswa di Indonesia selama pandemik masih terbatas. Penelitian ini bertujuan menggambarkan depresi, kecemasan, dan stres pada mahasiswa di Indonesia selama masa pandemi COVID-19. Metode penelitian adalah deskriptif yang dilakukan pada mahasiswa di Indonesia pada Juli hingga Agustus 2021. Pengambilan sampel dengan cara *sampling* sukarela dengan jumlah responden 258 orang. Instrumen penelitian berupa kuesioner karakteristik dan *depression, anxiety, stress scale* (DASS) 42 dalam bentuk *Google Form*. Analisis data menggunakan *Microsoft Excel*. Hasil penelitian karakteristik responden yang terbanyak, yaitu usia pada rentang 20–24 tahun (85,3%), perempuan (64,7%), berasal dari Pulau Jawa (60,8), tingkat tiga (66,7%), tinggal bersama orangtua (74,8%), dan dari fakultas kedokteran (23,3%). Lebih banyak mahasiswa yang tidak depresi (55,0%) atau tidak stres (57,4%) daripada yang depresi atau stres. Namun, lebih banyak mahasiswa yang mengalami kecemasan daripada yang tidak cemas, yaitu 60,1%. Berdasar atas tingkatannya, mahasiswa paling banyak mengalami depresi sedang (12,8%), kecemasan sangat berat (20,9%), dan stres berat (13,6%). Simpulan penelitian ini adalah sebagian besar mahasiswa mengalami depresi sedang, kecemasan sangat berat, dan stres berat. Keberhasilan pendidikan daring bergantung pada beberapa faktor seperti keterampilan teknis dasar dan kemampuan mengakses perangkat keras dan lunak, motivasi diri yang baik, serta ketersediaan lingkungan belajar yang kondusif. Terkendalanya hal ini dapat berdampak pada kesehatan mental mahasiswa.

Kata kunci: Depresi, kecemasan, mahasiswa, pembelajaran daring, stres

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Introduction

The COVID-19 pandemic has hit countries in the world.[1,2] To break the chain of the COVID-19 virus, the authorities instruct the public to self-quarantine at home for healthy and self-isolate for those diagnosed and symptomatic in various countries. There are restrictions on working outside the home and school closures in more than 100 countries worldwide.[3]

Similarly, throughout Indonesia, learning activities at schools and universities were also stopped as stated in the Circular from the Minister of Education and Culture Number: 36962/MPK.A/HK/2020 dated March 17, 2020, regarding Online Learning and Working from Home to Prevent the Spread of Corona Virus Disease (COVID-19).[4]

Cessation of learning activities in schools, including universities, causing the shift to learning from home.[4] Online learning in the form of distance learning is an alternative and a necessity in organizing learning for students.[5]

The benefits of online education include being able to reach college students broadly, allowing for more flexible learning interactions, increasing the intensity of learning interactions between college students and lecturers, and facilitating the refinement and storage of learning materials.[4,6]

In addition to the perceived benefits, some obstacles arise. College students may encounter online learning. The blocks are network instability and technological constraints, lack of belonging and connectedness, lack of student involvement, delivery of material online is not as straightforward as when face to face, changes to the academic schedule,[7] and Finally, the online learning atmosphere is not conducive.[3,6–8]

Online learning has an impact on college students. Results research conducted by the non-profit organization Active Minds on 2,000 college students found that one in five respondents experienced a significant deterioration in their mental health during the pandemic. Stressors related to this are online learning, social distancing, and health and economic impacts that cause anxiety, resulting in long-term stress.[9] The results of a review of various journals show that changes in learning methods can cause mental health problems for college students. Previous research results on 30 college students in Samarinda, namely college students with low parental income causing anxiety due to problems buying internet quota to participate in online learning.[10]

Research results from a review of 10 journals show an increase in stress and anxiety in college students during the COVID-19 pandemic.[7] The results of a literature review by Kartika show that psychological problems that college students often experience are excessive anxiety, stress, and depression. The cause of this problem, among others, is many college assignments, do not understand the course material, authoritarian task groups could not meet with relatives, problematic internet network, saturated with online learning, learning-conducive environment, and changes in the family.[11] Empirical studies conducted in various countries, namely Bangladesh, China, France, the UK, and the US, found that most college students suffer from mental disorders such as depression, anxiety, and even suicidal thoughts.[7,12]

Another research results stated that mental health is the key to student success in completing studies.[13] The mental health status of college students during the pandemic must be monitored for evaluation. It is the primary data for the psychological intervention approach of college students so that academic performance is well maintained. There is not much data regarding the mental health picture of college students in Indonesia. This data is the basis for the government determining policies related to the pandemic.[14] This study describes the overview of depression, anxiety, and stress in college students in Indonesia during the pandemic COVID-19.

Methods

The design of this research is descriptive. This research was conducted on college students in Indonesia from July to August 2021. Sampling was carried out by voluntary sampling, with 258 respondents. The study was conducted by spreading Google Forms through social media. Google Form contains characteristics and questionnaires for depression, anxiety, stress scale (DASS) 42. Respondents' characteristics consist of age, gender, regional origin, academic level, who live with, and faculty. The DASS 42 questionnaire has been adapted into Indonesian by Damanik[15] and has passed the validity and reliability tests.

There are 42 questions where each statement can indicate three conditions, namely depression

Table 1 Categories of Depression, Anxiety, and Stress

Categories	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Very severe	≥28	≥20	≥34

in statements 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, 42; anxiety on numbers 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, 41; and stress numbers 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35, 39.

There are four answer choices provided for each statement. A value of 0 means that it does not match the same respondent once, or never, a score of 1 means that it fits the respondent to a certain degree, or sometimes, a score of 2 means that it provides the respondent to a considerable extent, or quite often, and a score of 3 means that it fits the respondent very well, or very often.

The statements are then summed up according to the grouping of depression, anxiety, and stress reports, then put into the categories in Table 1.[14]

Data were analyzed and processed using Microsoft Excel. This research has received ethical approval from the Health Research Ethics Committee of Universitas Islam Indonesia with the number: 101/KEPK-UNISBA/VII/2021.

Results

An overview of student characteristics in Indonesia during the pandemic can be seen in Table 2. Most respondents are in the range of 20–24 years, which is 85.3%. The number of female respondents is more than males, 64.7%. Most of the respondents came from the island of Java, namely 60.8%. Most respondents are at level three, which is 66.7%. Most of the respondents live with their parents, which is 74.8%. As for those who live with other people, such as boarding schools, dormitories, relatives, while those who live alone, such as boarding houses, own houses, prayer rooms, mosques. Most of the respondents came from the faculty of medicine, 23.3%

Table 2 Characteristics of Respondents

Characteristics	n=258 (%)
Age (years)	
15–19	36 (13.9)
20–24	220 (85.3)
25–29	2 (0.8)
Gender	
Male	91 (35.3)
Female	167 (64.7)
Origin	
Sumatra	49 (19.0)
Java	157 (60.8)
Sulawesi	29 (11.2)
Kalimantan	16 (6.2)
Papua	2 (0.8)
NTB	3 (1.2)
Maluku	2 (0.8)
Academic level	
1	47 (18.2)
2	20 (7.7)
3	172 (66.7)
4	19 (7.4)
Living	
With parents	193 (74.8)
With others	23 (8.9)
Alone	42 (16.3)
Faculty	
Economics	34 (13.2)
Law	1 (0.4)
Cultural Studies	2 (0.8)
Communication Studies	1 (0.4)
Education Science	54 (20.9)
Political Science	13 (5.0)
Medicine	60 (23.3)
Public Health	3 (1.2)
Nursing	8 (3.1)
Mathematics and Natural Sciences	8 (3.1)
Agriculture and Animal Husbandry	11 (4.3)
Psychology	4 (1.5)
Fine Arts and Design	1 (0.4)
Engineering	21 (8.1)
Ushuluddin	28 (10.8)
Others	9 (3.5)

An overview of depression, anxiety, and stress, in general, can be seen in Table 3. More college students are not depressed (55.0%) or not stressed (57.4%) than those who are depressed or stressed. However, more students experience anxiety than those who are not anxious, 60.1%.

Based on Table 4, most students experienced moderate depression, 12.8%, very severe anxiety, 20.9%, and severe stress, 13.6%.

Table 3 Overview of Depression, Anxiety, and Stress of College Students

Categories	Percentage
Depression	
No	55.0
Yes	45.0
Anxiety	
No	39.9
Yes	60.1
Stress	
No	57.4
Yes	42.6

Discussion

In this study, 60.1% of respondents experienced anxiety. It is in line with the quantitative research by Hasanah et al.,[17] which shows most psychological problems college students encounter in online learning, is anxiety. A study by the Indonesian Mental Medicine Specialist Association (*Perhimpunan Dokter Spesialis Kedokteran Jiwa Indonesia*, PDSKJI) on mental health through self-examination showed 64.8% experienced anxiety. The average student anxiety rate in Indonesia during online learning is 40%.[7] The category of anxiety in this study was the most, which was very severe (20.9%). It is different from the online survey research by Rakhmanov and Dane[14] on college students in Africa, which showed that the most anxiety category was mild, at 30%. Another study by Wang et al.[18] using a generalized anxiety disorder 7 (GAD-7) questionnaire on university students in the United States also showed different results. The category of most anxiety is mild at 33.27%. The results of correlation analysis from research using the GAD-7 questionnaire on college students from Changzhi medical college showed a positive relationship between barriers to academic activities and symptoms of anxiety ($p<0.001$).[19]

Table 4 Overview of Depression, Anxiety, and Stress Levels of College Students

Categories	Depression	Anxiety	Stress
Mild	11.6	7.4	10.3
Moderate	12.8	17.8	13.2
Severe	10.9	14.0	13.6
Very severe	9.7	20.9	5.4
Total	45.0	60.1	42.7

Anxiety is described as worry, anxiety, fear, restlessness, accompanied by various physical complaints.[20,21] Experiencing anxiety occasionally is a normal part of life. The most common symptoms and signs of anxiety are an unpleasant, vague sense of worry, often accompanied by autonomic symptoms such as headache, sweating, palpitations, tightness in the chest, mild abdominal complaints, and restlessness, indicated by an inability to sit or remain still for a long time.[22]

Anxiety disorders are related to genetic and experiential factors. The evidence clearly shows that traumatic and stressful life events are also the etiology of anxiety disorders. Anxiety disorders form one of the most common groups of psychiatric disorders. The prevalence of anxiety disorders in 12 months was 17.7%. Women are more likely to experience anxiety disorders than men. The lifetime prevalence of women is 30.5%, while that of men is 19.2%. The majority of anxiety disorders decreases with higher socioeconomic status.[22]

The general description of depression in this study was 45.0%. In contrast to the results of a survey by PDSKJI research on mental health through self-examination, 61.5% of respondents experience depression.[7]

By category, most respondents experienced moderate depression, which is 12.8%. This study is not in line with research Wang et al.[18] of the results of analysis patient health questionnaire 9 (PHQ-9) to college students in the United States, stating that most college students were in the category of mild depression, which is 32.45%.

Depression is a common psychiatric disorder, with an estimated lifetime prevalence of 10% in the general population. Depression is more common in rural areas than in urban areas.[22] According to the American Psychiatric Association,[23] a diagnosis of a major depression episode (MDE) requires five or more symptoms to be present in 2 weeks. One of the symptoms must, at the very least, be depressed mood (DM) or anhedonia (loss of interest or pleasure- LI). Secondary symptoms of MDE are appetite or weight change (AW), difficulty sleeping (insomnia or hypersomnia), psychomotor agitation, or retardation (PAR). Other symptoms include fatigue or loss of energy

(FE), reduced ability to think or concentrate (C), feelings of worthlessness or excessive guilt (FW), and suicide (SU).[23–25]

The general description of stress in this study is 42.7%. In Indonesia, the average stress rate for college students during online learning is 55.1%.[7] Studies in China states that a small portion of college students experience stress because of many tasks and complex of understanding the material.[2]

Based on the stress category, most respondents experienced severe stress, i.e., 13.6%. In contrast to the descriptive study by Harahap et al.,[26] the average student experiences stress in the moderate category. The study results in a systematic review by Argaheni[4] stated that most college students experienced mild stress, namely 38.57%. The primary stressor is difficulty understanding material online. In contrast to the results of a previous descriptive study, which showed that most college students experienced mild stress, namely 40.3%.[27]

A previous study states that several universities are still not ready to face online learning. The policy of temporarily closing educational institutions impacts college students, especially those who live in areas with limited infrastructure. It is one of the causes of increased stress and anxiety during the COVID-19 pandemic. Other factors that become stressors for college students are academic, economic, and family health concerns. Educational factors include adapting to online learning methods, the transition period of learning styles from high school to higher education, college assignments, and target achievement scores. Economic factors include concerns about not buying internet quota for online learning and limited job vacancies. These factors are by the results of previous studies that internal and external factors are stressors for college students during the COVID-19 pandemic.[7]

Stress comes from the Latin meaning tense or strained. Another definition literally, stress is a stimulus or situation that triggers negative emotions that create physical and psychological demands on individuals in the face of threats.[27]

Factors that can cause stress are called stressors. It can be physiological stressors (temperature, infection, pain), psychological stressors (worried, afraid, anxious, lonely, disappointed, falling in love), and socio-cultural stressors (divorce, unemployment, disputes). Stressors can cause positive (eustress) and negative (distress) changes. Prolonged stress can impact various aspects of a person's life, such as cognitive, emotional, behavioral, and physiological. Stress can cause psychological and psychological ailments, affecting performance at work, family, social life, drug addiction, and possibly criminal behavior.[27]

In this study, most of the respondents were in the age range of 20–24 years. This study is similar to research conducted by PDSKJI through an online survey; the result is that psychological problems are most commonly found in the 17–29 year age group.[7] The research results in China stated that people younger are at a higher risk of experiencing psychological problems than older people. It needs to be a concern because college students are included in the younger age group.[2]

There are problems at an even younger age. Globally, depression is one of the leading causes of disability in adolescents. Suicide is the fourth leading cause of death in the 15–19 year age range.[28]

College students belong to the young age group, under pressure from all aspects of life, such as academic demands, emotions, work, and others. Immature psychological development causes unstable emotions, psychological conflicts, and social problems. This pandemic situation exacerbates psychological conditions such as increased anxiety, fear, worry, and other negative emotions.[29]

In this study, the number of respondents was women more than men, i.e., 64.7%. This research is in line with research by PDSKJI through an online survey which shows that there are more female respondents than males, namely 71%.[7] College students' anxiety scores about COVID-19 in Africa using a questionnaire survey were higher for women than men ($p=0.027$).[14] Research using the PHQ-9 questionnaire states that women are more at risk of depression, with an average female score of 1.76 points higher than men.[18] The prevalence of the major depressive disorder is two times greater in women than in men.[22]

In dealing with stressors, women have lower coping abilities than men, which causes women to be more at risk of experiencing psychological disorders. In addition, most women have sensitive characteristics. Women have fear and tension higher than men and are also more concerned about the situation of the pandemic COVID-19.[29]

In this study, respondents mostly came from the island of Java, which is 60.8%. Online learning is sometimes an obstacle for college students who live in remote areas. It is due

to the limited internet coverage in the area. If this obstacle is not resolved, it can cause stress to college students because of the delay in the implementation of online learning.[8] The challenges facing online learning are categorized into five: internet connection, hardware, economic conditions, difficulties in discussing with friends, and difficulties in interacting with lecturers. As many as 47% of college students feel that internet connection is an obstacle in online learning, while 18% think that internet connection is not an obstacle. Indonesia is an archipelagic country with unequal internet coverage.[30]

In this study, most of the respondents were at level 3, 66.7%. There was no significant difference in student anxiety based on an academic level (p=0.813). Each group has its difficulties which can have an impact on psychological problems. Depression, stress, and anxiety usually occur in level 1 and 2 college students because they are still adapting to the transition period from high school to higher education, while levels 3 and 4 are due to thesis and internship guidance as graduation requirements in several faculties. During the pandemic, only a few companies can accept college students for internships and data collection.[30]

In this study, most respondents lived with their parents, 74.8%. As for those who live with other people, namely in boarding schools, dormitories, relatives, while those who live alone, namely in boarding houses, own homes, prayer rooms, mosques. Most college students prefer to study at home because it is comfortable.[3] One of the stressors for college students is the extended distance from their parents and relatives.[7] College students who study away from their families during the pandemic are afraid of being infected with COVID-19 and worried that they would not see their families again. They also worry about their families' safety and health, which can affect them psychosocially.[8] In contrast to other studies, college students who live with their parents are involved in helping their parents; some have to work, causing anxiety when they cannot participate in online learning optimally.2

In this study, most respondents, 23.3%, came from the faculty of medicine. Under normal conditions, medical college students have a busy class schedule and a heavy study load. With the pandemic, college students must adapt to online learning. If there are obstacles in adaptation such as internet connection disorders, a less conducive learning environment, and others, it causes anxiety in college students. Research by NurCita and Susantiningsih[20] regarding the anxiety level of the college students of the Faculty of Medicine Universitas Pembangunan Nasional Veteran Jakarta in 2020 stated that 88% of college students experienced severe anxiety levels. In another study, there was no difference in the level of anxiety between faculties.[14]

Conclusion

This study concludes that most college students experience moderate depression, very severe anxiety, and severe stress.

Conflict of Interest

The authors declare no conflict of interest.

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RESEARCH ARTICLE

Antagonic Effect of Soursop Leaf Aqueous Extract and Doxorubicin Combination in MCF7 and T47D Breast Cancer Cell

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Abstract

The success of breast cancer therapy is still not optimal and the side effects caused by breast cancer therapy. The use of standard drug combinations with herbs is often used as co-chemotherapy and is believed to increase the drug's effectiveness. However, research on the antagonistic effect of the drug combination is still minimal. This study examines the anticancer effect of soursop leaf aquoxes extract and the combined impact of doxorubicin on MCF7 and T47D breast cancer cells. This research is pure in vitro experimental study of MCF7 and T47D breast cancer culture cells at the Parasitology Laboratory of the Faculty of Medicine, Universitas Gadjah Mada in August 2018. Toxicity tests were carried out using the method of tetrazolium 3-(4,5-dimethylthiazol-2-yl) 2,5-diphenyltetrazolium bromide (MTT) to calculate cell viability. The IC_{50} value was obtained by analyzing probit regression calculation using SPSS software. The synergism of this compound with doxorubicin was determined based on the value of the Combination Index (CI) using a combination test with series 1/2 IC_{50}, 3/8 IC_{50}, 1/4 IC_{50}, and 1/8 IC_{50} and the data was analyzed using Compusyn 1.0 software. In this study, the effect of soursop leaf preparations will be tested on T47D and MCF7 breast cancer cell cultures and assess the impacts of co-chemotherapy of soursop leaf aqueous extract with doxorubicin. This study showed that IC_{50} soursop leaf aqueous extract in T47D breast cancer culture was 84 μg/mL and in MCF7 166.5 μg/mL. In contrast, the combined test showed that soursop leaf aqueous extract was antagonistic with doxorubicin in both T47D and MCF7 cancer cell cultures.

Keywords: Antagonic effect, breast cancer, doxorubicin, MCF7, soursop leaf, T47D

Efek Antagonis Kombinasi Extrak Air Daun Sirsak dan Doksorubisin pada Kultur Sel Kanker MCF7 and T47D

Abstrak

Keberhasilan terapi kanker payudara saat ini masih belum optimal dan terdapat efek samping yang ditimbulkan dari terapi kanker payudara tersebut. Penggunaan kombinasi obat standar dengan herbal sering digunakan sebagai ko-kemoterapi dan diyakini dapat meningkatkan efektivitas obat, tetapi penelitian mengenai efek antagonis kombinasi obat masih sangat terbatas. Penelitian ini mengkaji efek antikanker ekstrak air daun sirsak dan kombinasinya dengan doksorubisin pada sel kanker payudara MCF7 dan T47D. Penelitian ini merupakan eksperimental murni secara *in vitro* pada sel kanker payudara MCF7 dan T47D di Laboratorium Parasitologi Fakultas Kedokteran Universitas Gadjah Mada periode Agustus 2018. Uji toksisitas dilakukan menggunakan metode *tetrazolium 3-(4,5-dimethylthiazol-2-yl) 2,5-diphenyltetrazolium bromide* (MTT) untuk menghitung viabilitas sel. Nilai IC_{50} didapatkan melalui analisis menggunakan perhitungan regresi probit menggunakan perangkat lunak SPSS. Efek sinergis senyawa ini dengan doksorubisin ditentukan berdasar atas nilai Indeks Kombinasi (IK) menggunakan uji kombinasi dengan seri 1/2 IC_{50}, 3/8 IC_{50}, 1/4 IC_{50}, dan 1/8 IC_{50} serta data dianalisis menggunakan perangkat lunak Compusyn 1.0. Efek sediaan daun sirsak pada penelitian ini akan diujikan terhadap kultur sel kanker payudara T47D dan MCF7 serta menilai efek ko-kemoterapi ekstrak air daun sirsak dengan doksorubisin. Hasil penelitian ini menunjukkan bahwa IC_{50} ekstrak air daun sirsak pada kultur sel kanker T47D adalah 84 μg/mL dan pada kultur sel kanker MCF7 166.5 μg/mL, sedangkan uji kombinasi memperlihatkan bahwa ekstrak air daun sirsak berefek antagonis dengan doksorubisin pada kultur sel kanker T47D dan MCF7.

Kata kunci: Daun sirsak, doksorubisin, efek antagonis, kanker payudara, MCF7, T47D

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Introduction

Breast cancer is the most common cancer in women worldwide and second only to lung cancer as a most cancer-related killer in developed countries.[1] Breast cancer is a significant public health problem with estimated new cases worldwide, reaching 1,384,155 and nearly 459,000 deaths. It predicted that the incidence of breast cancer worldwide would earn around 3.2 million new points per year by 2050.[2] Breast cancer is the disease that most often raises new cancer cases in most countries (154 countries). Indonesia is included in 154 countries when viewed from the 2018 global statistical cancer pattern; there are approximately 2.9 million new breast cancer cases with a total mortality rate of 620 thousand.[3]

The success rate of breast cancer therapy has not been 100% certain to eliminate cancer, plus the side effects that arise can cause patients not to conform to treatment. Research is needed for alternative medicine that is more effective than previous treatments and has more minimal side effects.[3,4] Besides, several studies have shown that Indonesian people have more confidence in herbal medicines because herbal medicines are inherited based on the experience of parents in using these drugs, giving rise to a sense of trust in them.[5,6]

Indonesia is rich in natural ingredients that can prevent and treat cancer, one of which is soursop (*Annona muricata* L.), a family of Annonaceae. Soursop contains acetogenin, tannins, flavonoids. Acetogenin has a selective cytotoxic effect on cancer cells and multidrug-resistant cancer cells with minimal toxicity to healthy cells. Flavonoids have a metastatic inhibiting impact on the culture of breast, liver, colon, lung, and ovarian cancer cells. Tannins can inhibit the growth and angiogenesis of Caco-2 colon cancer cells; tannin derivatives have a selective cytotoxic effect on cancer cells by inducing apoptosis.[7–9]

One cancer treatment strategy to reduce side effects is to use a drug combination. One of the advantages of using various drugs is to increase the efficacy of the therapeutic effect. It also reduces the dose but increases or maintains the same effectiveness to avoid toxic effects. It also minimizes or slows drug resistance occurrence and is selective synergy/synergy efficacy (deadly synergy on cancer cells but not in normal cell host).[10–12] However, the combination of drugs or the use of drugs simultaneously does not always provide a synergistic effect. Interaction of drug combination can also produce an antagonistic response due to the opposite effect of each drug.[13] A drug interaction is defined as the "pharmacologic response" of a drug administered concomitantly with another substance that can alter the patient's response to the drug. Consequences of changes in response or reactions from drug-drug interactions (DDI) can be associated with decreasing in drug effect.[14] The purpose of this study was to look at the anticancer and co-chemotherapy activities of soursop leaf aqueous extract against breast cancer cells.

Methods

This study is an in vitro experimental study of MCF7 and T47D breast cancer cultures. The research activity was carried out at the Parasitology Laboratory of the Faculty of Medicine, Universitas Gadjah Mada Yogyakarta, in August 2018. The anticancer test was carried out using the tetrazolium 3-(4,5-dimethylthiazol-2-yl) 2,5-diphenyltetrazolium bromide (MTT), and cell viability was measured using an ELISA reader with wavelength λ=550–600 nm (595 nm). The test was carried out at soursop leaf aqueous extracts (SLAE) concentration series 250 μg/mL, 125 μg/mL, 62.5 μg/mL, 31.25 μg/mL, 15.625 μg/mL, 7.8125 μg/mL, and 3.906 μg/mL. Whereas doxorubicin was carried out in series of 100 μg/mL, 50 μg/mL, 25 μg/mL 12.5 μg/mL, 6.25 μg/mL, 3.125 μg/mL, and 1.56 μg/mL. Concentrations that can inhibit 50% of cells (IC_{50}) are determined using probit regression calculations using SPSS software. Then the determination of synergism is measured using a combination test with the concentrations series ½ IC_{50}, 3/8 IC_{50}, ¼ IC_{50}, and 1/8 IC_{50}, both SLAE and doxorubicin. Cell viability was determined using an ELISA reader with a wavelength of λ=550–600 nm (595 nm). Combination Index (CI) values were analyzed using Compusyn 1.0 software with the toxicity criteria based on Baharum et al.,[15] namely potent (20 μg/mL), moderate (>20–100 μg/ mL), weak (>100–1,000 μg/mL), and inactive (>1,000 μg/mL); and synergism using Chou-Talalay criteria, namely additive effect (CI=1), synergistic (C<1), and antagonist (C>1).[12]

This research consists of 2 stages. Phase I is intended to determine the anticancer effect of SLAE compounds on T47D and MCF-7 breast cancer cell cultures. Stage 2 determines the co-chemotherapy effect of SLAE with doxorubicin

(DOX) on T47D and MCF-7 breast cancer cell culture.

The Health Research Ethics Committee of the Universitas Islam Bandung Faculty of Medicine has approved this study with a health research approval number: 112/Komite Etik.FK/III/2018.

Results

This study presented the cytotoxic test results of SLAE compound against T47D and MCF-7 breast cancer cell cultures. The MTT method produced IC_{50} values of SLAE in T47D cell culture of 86,029 µg/mL, IC_{50} MCF-7 166.5 µg/mL, DOX at T47D 10.3 µg/mL, while IC^{50} DOX at MCF-7 was 26.8 µg/mL. The average IC^{50} values and the standard deviations of SLAE and DOX can be seen in Figure 1.

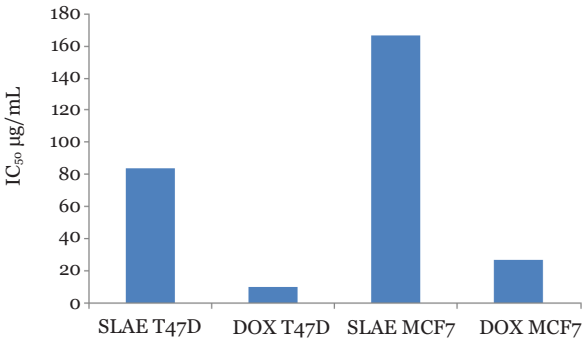

Figure 1 IC_{50} of Soursop Leaf Aqueous Extracts and Doxorubicin

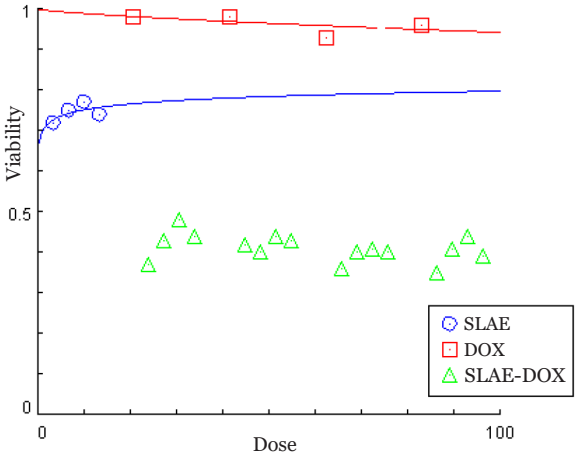

Figure 2 Effect Curve of SLAE, DOX, and SLAE-DOX Combination on MCF7

The results of a combination test of SLAE with DOX on MCF7 are presented in Table 1 and Figure 2. The combination index of SLAE compound and DOX on T47D is shown in Table 2 and Figure 3. Combination Index values indicate that the SLAE compound is antagonistic to DOX on MCF7 and T47D.

Discussion

In developing new anti-cancer drugs as candidates for cancer therapy agents, preclinical testing is crucial to understanding the potential

Table 1 Combination Index of SLAE Compound and DOX on MCF7

SLAE Concentration (µg/mL)	DOX Concentration (µg/mL)	Viability (%)	CI
13.4	62.44	0.4	2.3
13.4	41.63	0.44	2.39
0.44	20.80	0.47	1.67
10.05	83.25	0.41	1.2
10.05	62.44	0.41	3.6
10.05	41.63	0.48	1.2
10.05	20.80	0.41	3.1
6.7	83.25	0.41	2.44
6.7	62.44	0.4	3.5
6.7	41.63	0.4	3.5
6.7	20.80	0.43	1.19
3.35	83.25	0.35	1.12
3.35	62.44	0.36	7.67
3.35	41.63	0.42	8.53
3.35	20.80	0.37	5.27

Table 2 Combination Index of SLAE Compound and DOX on T47D

SLAE Concentration (µg/mL)	DOX Concentration (µg/mL)	Viability (%)	CI
5.15	43.01	0.33	2.3
5.15	32.26	0.39	7.2
5.15	21.5	0.36	12.74
5.15	10.75	0.35	15.46
3.86	43.01	0.31	26.1
3.86	32.26	0.36	9.5
3.86	21.5	0.38	6.5
3.86	10.75	0.39	5.4
2.57	43.01	0.35	7.7
2.57	32.26	0.33	11.5
2.57	21.5	0.32	14.13
2.57	10.75	0.33	11.51
1.29	43.01	0.32	7.11
1.29	32.26	0.36	3.24
1.29	21.5	0.3	10.7
1.29	10.75	0.32	7.09

for cytotoxic activity. Cytotoxic tests are used as an initial screening to determine the effect of a natural substance in inhibiting tumor cell growth. A compound has anti-cancer properties if it can hinder the development of 50% of tumor cell populations at specific concentrations. The requirement met for the cytotoxicity test system is that the test system must produce a reproducible dose-response curve with low variability. The response criteria must show a linear relationship with the number of cells, and the information obtained from the dose-response curve must be in line with the effect that appears. One method commonly used to determine cell numbers is the MTT.[16,17]

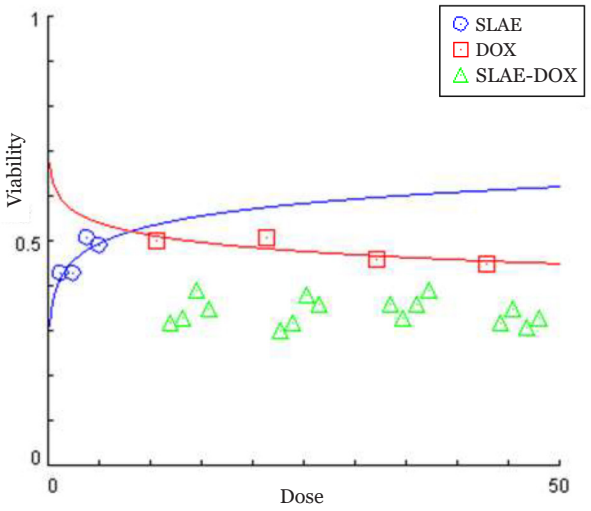

Figure 3 Effect Curve of SLAE, DOX, and SLAE-DOX Combination on T47D

The MTT method showed IC_{50} values of SLAE in T47D cell culture of 86.029 g/mL, and IC_{50} MCF-7 166.5 g/mL. This indicates weak cytotoxic activity against breast cancer cells.[15,18] It is similar to the study by Rady et al.,[19] which stated that soursop leaves have a cytotoxic effect on the liver (HepG2), breast (MCF-7), cervical (HeLa) cancer cells, and others. This cytotoxic effect occurs because of one of the bioactive components. Soursop is annonaceous acetogenins (AGE). Several purified AGEs showed cytotoxicity against various cancer cells, such as annonacin A or B showed cytotoxicity against HepG2; annomuricin A, B, or C against MCF-7 breast cells; annomuricin A, B, C or E against colonic cells HT-29 and pancreatic cells MIA Paca.[19,20]

Soursop leaves also trigger cell death through various mechanisms. Research shows increased apoptosis in MB-468 breast cancer cells through caspase three activation. In HT-29 colorectal cancer cells, leaf extract induces apoptosis through the accumulation of reactive oxygen species (ROS) followed by mitochondrial membrane potential (MMP) destruction and caspase activation. It also upregulated Bax and downregulated BCL-2.[19]

The problems faced in the application of

chemotherapy are chemotherapeutic agents that are toxic to healthy tissue, decreased immune system, and drug resistance occurs; for this problem, the application of co-chemotherapy or combination therapy is needed. Combination therapy can increase the effectiveness of anticancer agents, use lower anticancer doses, decrease toxicity to healthy tissue, slow down and inhibit drug resistance, and allow synergy efficacy in cancer cells. In determining whether soursop leaf aqueous extract can be a co-chemotherapy with doxorubicin and cisplatin, a potential combination test with isobologram.[10,12]

We did a combination test of doxorubicin and soursop leaf water extract in this study. The results of the combination index above 1 indicated that the soursop leaf extract and doxorubicin combination was antagonistic. These results are different from previous studies, which showed the synergistic effect of doxorubicin with soursop on 4T1 breast cancer cell culture accompanied by a decrease in ROS yields. It shows the potential of soursop as chemotherapy with antioxidant effects.[21] The difference may result from different tumor types or can also be caused by both drugs acting on the same receptor, resulting in competitive inhibitors.[22,23] This study has research limitations because it was only carried out on two cell line cultures and only used one soursop leaf preparation.

Conclusions

The conclusion of this study are soursop leaf aqueous extract has weak anticancer properties against MCF7 and T47D breast cancer cell culture and a combination of soursop leaf aqueous extract compounds and doxorubicin have an antagonistic effect against MCF7 and T47D breast cancer cells.

Conflict of Interest

The authors have no conflict of interest to declare.

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RESEARCH ARTICLE

Implementation of Environmental Health Management to Achieve Open Defecation Free in Tamansari Village in Bandung

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Abstract

Proper sanitation will ensure the community is healthy and reduce most infectious diseases' transmission, especially water-borne diseases. Open defecation has a significant effect on public health. Sanitation coverage data from the Ministry of Health Republic of Indonesia in 2018 shows that open defecation is still high, including in Bandung city. This study aims to analyze the implementation of environmental health management programs that have been implemented in Tamansari village in Bandung city. This research is a qualitative research conducted in Tamansari village in Bandung city. The data were collected from May to August 2021 through Focus Group Discussion with cadres and in-depth interviews with informants from the village head, a representative from a non-governmental group, and cadres. The results of this study indicate that the process of planning, organizing, mobilizing, and controlling has been running according to the theory. Obstacles faced by the village in achieving open defecation free include funds, land, community understanding, and sub-optimal supervision.

Keywords: Environmental health, management, open defecation

Penerapan Manajemen Kesehatan Lingkungan untuk Mencapai Bebas Buang Air Besar Sembarangan di Kelurahan Tamansari Bandung

Abstrak

Sanitasi yang layak akan memastikan masyarakat berada dalam lingkungan yang sehat dan mengurangi sebagian besar penularan penyakit infeksi terutama penyakit yang ditularkan melalui air. Buang air besar (BAB) sembarangan memiliki efek yang sangat besar bagi kesehatan masyarakat. Data cakupan sanitasi dari Kementerian Kesehatan Republik Indonesia tahun 2018 menunjukkan bahwa perilaku BAB sembarangan masih tinggi termasuk di Kota Bandung. Penelitian ini bertujuan menganalisis penerapan program manajemen kesehatan lingkungan yang telah dilaksanakan di Kelurahan Tamansari Kota Bandung. Penelitian ini merupakan penelitian kualitatif yang dilakukan di Kelurahan Tamansari Kota Bandung. Pengambilan data dilakukan pada bulan Mei hingga Agustus 2021 melalui *Focus Group Discussion* dengan kader dan wawancara mendalam dengan lurah, perwakilan kelompok swadaya masyarakat, dan kader. Hasil penelitian ini menunjukkan bahwa proses perencanaan, pengorganisasian, penggerakan, dan pengawasan sudah berjalan sesuai dengan teori. Kendala yang dihadapi oleh kelurahan dalam mencapai bebas BAB sembarangan antara lain dana, lahan, pemahaman masyarakat, dan pengawasan yang belum optimal.

Kata kunci: BAB sembarangan, kesehatan lingkungan, manajemen

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Introduction

Open defecation refers to the practice of defecating in fields, forests, bushes, open water, beaches, or other open places.[1–3] Open defecation has a significant effect on public health. Human waste contamination and poor hygiene behavior are still the highest causes of death in children, lack of nutrition, and stunting.[2,3]

Through Health Law Number 36 of 2009, the government of the Republic of Indonesia states that environmental health is held to realize a healthy environmental quality.[4] A healthy environment includes sanitation facilities and drinking water facilities that meet the requirements in settlements and public places.[5]

Health Law Number 36 of 2009 is in line with Blum's theory which states that environmental factors and behavioral factors are the most critical determinants of human health. Proper sanitation will ensure the community is in a healthy environment and reduce most of the transmission of infectious diseases.[6]

Based on data on sanitation coverage from the Ministry of Health in 2018, only 28 cities and one province managed to get the stop open defecation status in Indonesia. It shows that the behavior of open defecation is still high, including in Bandung city.[7]

Good environmental health management is needed to get the status of open defecation free. Therefore, this study aims to analyze the implementation of environmental health management programs implemented in a Tamansari village in Bandung city.

Methods

This research is a qualitative research conducted in Tamansari village in Bandung city. Data were collected through Focus Group Discussion with cadres and in-depth interviews with six people (the village head, representatives of non-governmental organizations, and cadres).

The results of the Focus Group Discussion and in-depth interviews were recorded, then the recordings were made into a transcript. The transcripts were then processed by grouping the statements based on the emerging themes. The existing themes are coded to facilitate data processing using Microsoft Word 2019. The data was taken from May to August 2021. The data taken included the management process and the obstacles in the village in achieving the open defecation free status. This study was approved by the Universitas Islam Bandung Health Research Ethics Committee.

Results

Researchers conducted in-depth discussions regarding the management process implemented to achieve the open defecation free predicate during in-depth interviews.

We should follow the planning, organizing, actuating, and controlling (POAC) theory in carrying out environmental health management. Planning includes determining organizational goals, establishing strategies to achieve these goals, and developing plans to integrate and coordinate administrative work. After that, the organizing step is carried out: dividing work among group members and making provisions in the necessary relationships. After organizing, the actuating step is carried out, aiming to make all group members work together to achieve the goal. And lastly, controlling is an activity that ensures that the work goes well by monitoring performance and taking necessary corrective actions.[8–11]

Respondents answered about the planning process, the organizing process, the implementation process, and the method of controlling the installation of communal bio tanks to achieve the open defecation free predicate.

In the planning stage, these results were explored:

"We do various breakthroughs, however important communal things can be built. We do not rely on the Bandung city government budget. However, we also apply for assistance to the central government through the Ministry of Public Works and Housing, and we also coordinate with the Citarum Harum Task Force...." (LRH.P1.1)

The village has invited various parties to assist in constructing a communal septic tank. The planning for installing this communal septic tank has several obstacles, including lack of funds, narrow land, and community rejection due to poor public understanding of the function of communal septic tanks.

"....we have coordinated with the Department of

Housing, Settlements, Land, and Landscaping Office in charge of this open defecation free program, a survey has been carried out together with Citarum Harum Task Force, and the Healthy Bandung Forum will be assisted with the piping process. Regional drinking water companies will also assist the drainage of this communal septic tank...." (LRH.O1.1)

Village has appointed parties invited to cooperate. The maintenance of the communal septic tank is handed over to the neighborhood units (*rukun tetangga*, RT) and community units (*rukun warga*, RW) without special management, as stated by the non-governmental group representative:

"....later, it will be handed over to the local RT and RW as beneficiaries, of course also with some things that were discussed first in the care and responsibility of the community and its management...." (KSM.01.1)

The 100% open defecation free status can be achieved by installing communal septic tanks and installing wastewater treatment plants (*instalasi pengolahan limbah*, IPAL) and independent septic tanks. However, installing a IPAL requires more funds and land. In contrast, installing a separate septic tank depends on land ownership and funds owned by residents. Therefore, the installation of bio tanks is still needed in this village area.

The beneficiary area of this communal bio tank must be higher than the installed communal bio tank. Therefore, communal bio tanks are stored underground so that they are lower than the toilets of the beneficiary residents. However, this village is a densely populated area on the banks of the river. Therefore, the installation of communal bio tanks by planting cannot be done because it will require more funds and energy to dismantle people's houses. Thus, the toilets of the beneficiary residents are higher than the communal bio tank. Therefore, the installed communal bio tank is placed on the river's banks that flows in the village.

The installation of communal bio tanks on the river banks also faces obstacles. The two bio tanks measuring five cubic meters cannot be brought to the riverbanks through residential areas because the public roads are insufficient. Therefore, the bio tanks are brought to the installation site through the river.

As previously stated, this village is densely populated with a narrow land area. Therefore, the area management must carry out a strategy to install bio tanks. The strategy that has been carried out is to install communal bio tanks beyond the capacity specified by the factory, as stated by the non-governmental organizations representative:

"....with the proper capacity, the regulation is for 80 people at most, but for what we install now, it is up to 120 people...." (KSM.A1.1)

When installing the communal bio tank, the toilet drains connected to the bio tank drains feces and drains bathwater and dishwashing water containing soap. The soap carried into the bio tank will affect the decomposing bacteria in the bio tank. To overcome the problem of excess capacity and water lines that are mixed with soap, non-governmental organizations overcomes it by increasing the frequency of providing decomposing bacteria and chlorine, as stated:

"....to get around that, we give the bacteria and chlorine more often, from once every six months to once a month, so that the bacteria are better able to break down the dirt whose water has been mixed with bath soap or dishwashing soap...." (KSM.A1.3)

Discussion

Robbins and Coulter[8] stated that planning activities involve determining organizational goals, establishing strategies to achieve these goals, and developing plans to integrate and coordinate organizational work. The planning step includes formulating what must be done and how.

In planning the construction of a communal septic tank, the local village head prioritizes constructing a communal septic tank in the riverbank area. This priority follows the results of Paladiang et al.'s[12] research, which states that there is a significant relationship between open defecation behavior and the distance of the house being close to the river.

The village is planning steps encountered several obstacles, including limited funds, narrow land, and inadequate public understanding of communal septic tanks.

This village's ownership of funds is an obstacle in achieving the open defecation free predicate. It follows the research results by Rathomi and Nurhayati,[13] which states that the cost factor is the main obstacle in having healthy latrines and the cause of open defecation practices. To overcome this, the local village head tries to find opportunities to cooperate with both the central government and seek CSR.

In addition to funding problems, the next problem faced in installing communal septic tanks in this village is limited land. It is also following Sugiharto and Nurhayati's[14] research which states that limited land is one of the obstacles in reducing open defecation behavior.

The obstacle in implementing the planning is the community's refusal due to a lack of public understanding about the function of the communal septic tank. It is in line with Rathomi and Nurhayati's[13] research, which concluded that people who are well informed with a positive attitude are more likely not to practice open defecation.

Robbins and Judge[15] state that organizing determines what tasks are to be done, who is to do them, how the tasks are to be grouped, who reports to whom, and where decisions are to be made.

In dealing with open defecation and communal bio tanks, the local village head has collaborated with related parties from the central government, regional drinking water companies, community organizations, and residents. In maintaining the communal bio tank that has been installed, non-governmental organizations will be formed, which will be handed over directly to the local RT and RW management. It is following the organizing process, according to a previous study. Thus, there are no significant obstacles when carrying out the organization in building a communal bio tank.[10]

A previous study expressed that actuating makes all group members want to work together and work sincerely and willingly to achieve goals following planning and organizing efforts.[10]

In their research, Nandita et al.[16] stated that the program implementation process was one of the factors that influenced the open defecation free program. Therefore, problems in actuating this program need special attention to achieve open defecation free status.

The implementation of the communal bio tank development is going well. All technical problems encountered in the field can be adequately discussed with all work equipment. In addition, residents involved in constructing communal bio tanks are given education and examples of bio tanks built to understand the functions and benefits of installing bio tanks to increase motivation at work.

The obstacles faced during the communal bio tank development implementation are technical constraints predicted from the planning process. The narrow land constraint can be overcome by building communal bio tanks on the riverbanks. Obstacles in mobilizing the bio tank because its size is not enough to enter the residents' housing can also be overcome by bringing the bio tank through the river.

Controlling is an activity that ensures that the work goes well by monitoring performance and taking necessary corrective actions.[11]

Non-governmental organizations carry out the controlling process of installing bio tanks and pipelines. In contrast, administrators from RT and RW carried out the controlling process for maintaining the installed bio tanks.

The obstacle faced in controlling is a monitoring process that has not been optimal in one of the installed bio tanks. It resulted in residents' latrines connecting to the bio tank to re-flow their waste into the river. Residents who were previously accustomed to defecating in the toilet returned to practicing open defecation. This finding follows the research results by Yulyani et al.,[17] which stated that the ownership of healthy latrines influences open defecation behavior in urban areas.

Conclusions

This study shows that the implementation of environmental health management to achieve open defecation free in Tamansari village has been running according to POAC theory. There are no new findings obtained from this study. Most of the obstacles are in the planning process, where funds, limited land, and people lack understanding about communal septic tanks. However, constraints in the planning process were successfully overcome with cooperation, modification of the installation of communal bio tanks, and education to the public. The next obstacle is in the controlling process, where there are incidents of communal bio tanks being damaged due to inadequate supervision. It has

been evaluated and corrected by appointing the management formed from the RT and RW, who are the beneficiaries of the communal bio tank.

Conflict of Interest

The authors declare no conflict of interest.

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