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RESEARCH ARTICLE

Combination of Gabapentin and Vitamin B12 Compared with Gabapentin Monotherapy on Pain Improvement of Diabetic Neuropathy Patients

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Abstract

Diabetic neuropathy is the most common microvascular complication of diabetes mellitus (DM) occurring in 60–70% of the world's DM population, 40% of the DM population in Asia, and 41% of the DM population in Indonesia. The primary treatment of diabetic neuropathy pain in Indonesia is gabapentin and vitamin B12. The study aimed to compare pain improvements in diabetic neuropathy patients. The drug used was a combination of gabapentin and vitamin B12 and gabapentin monotherapy. For the pain degree measurement, we used the visual analogue scale (VAS). This experimental study was a pretest-posttest randomized control trial using a single-blind method at Dr. M. Salamun Air Force Hospital Bandung from March to May 2017. Samples were 44, type two diabetic neuropathy patients. The Mann-Whitney test to compare pain improvement between 2 groups applied. The results indicated there were differences in pain improvement between diabetic neuropathy patients with gabapentin and vitamin B12 combination compare to gabapentin monotherapy (p=0.002). This result showed a synergistic effect of gabapentin as an inhibitor of neurotransmitter and vitamin B12 expenditure as an improvement in peripheral nerve cells. This study concluded that gabapentin and vitamin B12 combination is better in improving pain in diabetic neuropathy patients compared to gabapentin monotherapy.

Key words: Diabetes mellitus, diabetic neuropathy, gabapentin, pain repair, vitamin B12

Kombinasi Gabapentin dan Vitamin B12 Dibanding dengan Monoterapi Gabapentin terhadap Perbaikan Nyeri Pasien Neuropati Diabetik

Abstrak

Neuropati diabetik merupakan komplikasi mikrovaskular terbanyak diabetes melitus (DM) yang terjadi pada 60–70% populasi DM di dunia, 40% populasi DM di Asia, dan 41% populasi DM di Indonesia. Pengobatan utama nyeri neuropati diabetik di Indonesia adalah gabapentin dan vitamin B12. Tujuan penelitian ini membandingkan perbaikan rasa nyeri pada pasien neuropati diabetik. Obat yang diberikan adalah kombinasi gabapentin dan vitamin B12 serta monoterapi gabapentin. Pengukuran tingkat nyeri menggunakan *visual analogue scale* (VAS). Penelitian eksperimental ini adalah *pretest-posttest randomized control trial* dengan menggunakan metode *single-blind* yang dilakukan di RSAU Dr. M. Salamun Bandung dari bulan Maret hingga Mei 2017. Sampel berjumlah 44 jenis, dua pasien neuropati diabetik. Sampel berjumlah 44, pasien neuropati diabetik tipe dua. Uji Mann-Whitney dilakukan untuk membandingkan perbaikan nyeri antara 2 kelompok perlakuan. Hasil penelitian menunjukkan terdapat perbedaan perbaikan rasa nyeri pasien neuropati diabetik yang diberi pengobatan kombinasi gabapentin dan vitamin B12 dibanding dengan monoterapi gabapentin (p=0,002). Hasil ini menunjukkan efek sinergis gabapentin sebagai inhibitor neurotransmiter dan vitamin B12 yang berfungsi memperbaiki sel saraf tepi. Simpulan penelitian ini adalah pengobatan kombinasi gabapentin dan vitamin B12 lebih baik dalam memperbaiki rasa nyeri pada pasien neuropati diabetik dibanding dengan gabapentin saja.

Kata kunci: Diabetes melitus, gabapentin, neuropati diabetik, perbaikan nyeri, vitamin B12

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Introduction

Diabetic neuropathy is a common complication of diabetes mellitus that happens to 60–70% of total patients of diabetes mellitus in the world.[1] The prevalence of neuropathy and complications in the legs is counted high in the patients in Asia, which is about 40% of the total population of DM.[2,3] Around 41% of DM's patients have neuropathy complications in Indonesia.[4]

The symptoms caused are severe and acute pain like burnt, sore, allodynia, and electric shock. This pain has a significant effect on the patient's life quality.[5–8] Currently, there is still no curative diabetic neuropathy treatment. The treatment based on four pillars, such as blood glucose regulation approaching normal, therapy based on pathogenesis, symptomatic treatment, and avoiding risk factors and complications.[5,9,10]

The patient needs treatment pharmacologically to relieve symptoms, especially great pain.[11] Gabapentin is an anti-seizure medication that affects the treatment of neuropathic pain.[12–14] Gabapentin gives the effect as a substance that can increase gamma-aminobutyric acid (GABA) synthesis, non-N-methyl-D-aspartate (NMDA) receptor antagonist, and α2δ voltage-dependent calcium channels subunit bond that inhibits the release of excitatory neurotransmitters.[15,16] In most patients, it needs 1.8 gram/day to relieve pain symptoms.

Besides symptomatic treatment, neuropathy patients need a supplement. Vitamin B12 has an essential role in the metabolism of essential fatty acids as the preservation of nerve myelin. Prolonged vitamin B12 deficiency causes nerve cell degeneration and irreversible nerve damage. Diabetic neuropathy with or without vitamin B12 deficiency often treated with neuropathic vitamin for decades.[9,17]

The description above about the effect of both medicines on diabetic neuropathic, the researcher will compare gabapentin combination treatment with or without vitamin B12 to the pain relief in diabetic neuropathic's patients.

Methods

This experimental study was a pretest-posttest randomized control trial using a single blinding method. The 44 study respondents divided into two groups—the first group consumed gabapentin and vitamin B12 combination, and the second group had gabapentin monotherapy. The patients asked to take the drugs respective to the groups for eight weeks. The pain checks monitored using the monofilament and visual analogue scale (VAS) at the beginning and end of week 8. Subjects are diabetic neuropathic patients who seek treatment at Dr. M. Salamun Air Force Hospital Bandung from March to May 2017. Statistical analyses used were the Friedman test and Wilcoxon test. The study instrument used is monofilament.[18–20]

This study has been through ethical studies by the Health Research Ethics Committee of the Faculty of Medicine of Universitas Islam Bandung with letter number: 045/Komite Etik. FK/III/2017.

Results

Table 1 shows that gabapentin and vitamin B12 combination group have pain relief marked by average VAS score reduction in the 0 weeks until the 8th week.

Table 2 shows that the gabapentin monotherapy treatment group has pain relief marked by average VAS score reduction in the 0 weeks until the 8th week.

Based on Table 3 with the Friedman test, the results obtained on the gabapentin

Table 1 Average Result of VAS Score Check in the Gabapentin and Vitamin B12 Combination Group

VAS Score	Gabapentin and Vitamin B12 Combination Group	
	Average (SD)	Median (Min–Max)
VAS 0 week	7.45 (0.50)	7 (7–8)
VAS 4th week	7.36 (0.49)	7 (7–8)
VAS 8th week	6.55 (0.59)	6.5 (6–8)

Note: VAS=visual analogue scale

Table 2 Average Result of VAS Score Check in the Gabapentin Monotherapy Group

VAS Score	Gabapentin Group	
	Average (SD)	Median (Min–Max)
VAS 0 week	7.27 (0.63)	7 (6–8)
VAS 4th week	6.77 (0.61)	7 (6–8)
VAS 8th week	7.09 (0.52)	7 (6–8)

Note: VAS=visual analogue scale

Table 3 VAS Score Different Test Before Therapy, After 4, and 8 Weeks Therapy

VAS Score	p Value*
Gabapentin	<0.001
Gabapentin and vitamin B12 combination	<0.001

Note: * Statistic analysis with Friedman test, significant if p value≤0.05

Table 4 The Difference of Pain Relief Before Therapy, After 4 and 8 Weeks Therapy

Time	Gabapentin Monotherapy			Gabapentin and Vitamin B12 Combination		
	Average (SD)	ΔVAS Score	p Value*	Average (SD)	ΔVAS Score	p Value*
0 weeks	7.27 (0.63)	0.18	0.020	7.45 (0.50)	0.91	<0.001
8th week	7.09 (0.52)			6.54 (0.59)		

Note: *Data analysis uses Wilcoxon test, significant if p value≤0.05; Δ=difference between weeks

Table 5 Pain Relief Comparison between Gabapentin and Vitamin B Combination and Gabapentin Monotherapy

Pain Relief	Gabapentin Monotherapy			Gabapentin and Vitamin B12 Combination			p Value*
	Mean	SD	Median	Mean	SD	Median	
ΔVAS score of 0 week and 8th week	0.18	0.58	0.00	0.90	0.29	1.00	0.002

Note: *Mann-Whitney test, Δ=difference between weeks

monotherapy test and gabapentin and also vitamin B12 combination, which shows that each has a significant different VAS score on two measurements.

Table 4 shows that there is a significant average difference in pain relief between 0 week and 8th week in both groups. The gabapentin and vitamin B12 combination group has better average pain relief compared to the gabapentin monotherapy group.

Table 5 shows that there is a significant difference in pain relief between gabapentin and vitamin B12 combination group and gabapentin monotherapy (p value<0.002).

Discussion

In the gabapentin and vitamin B12 combination group, there is a significant pain relief difference (p value<0.001) between 0 week and eighth

week. This result was consistent with the study conducted by Mimenza Alvarado and Aguilar Navarro.[21] They stated that there is a significant pain relief difference (p value<0.001).

Gabapentin and vitamin B12 have synergistic workability. The gabapentin increases gamma-aminobutyric acid (GABA) synthesis, the receptor antagonist of N-methyl-D-aspartate (NMDA), and subunit bond of α2δ voltage-dependent calcium channels that inhibits the release of excitatory neurotransmitters. That mechanism causes stimulation inhibition and pain reduction in neuropathic patients who consume gabapentin. The role of vitamin B12 is to repair peripheral nerve cells by becoming a cofactor that facilitates homocysteine methylation for methionine, which activated to S-adenosyl-methionine, which donates the methyl group for methyl acceptors like myelin, neurotransmitter, and phospholipid membrane. The usage of gabapentin combined with vitamin B12 has a synergic effect to relieve the pain of diabetic neuropathic patients.[15,16,22]

In the gabapentin treatment groups, a significant pain relief difference is observed (p value=0.02) between 0 week and eighth week. This study is following the study conducted by Surcheva et al.,[23] which shows that there is a significant pain relief difference (p value=001). The difference in improvement observed during 0 week and eighth week.

Gabapentin is a medicine of choice which mitigates the pain that works on the central nervous system but has a side effect that is classified small. Gabapentin affects neurotransmitter inhibitors. Gabapentin has a modification effect of releasing GABA. The release of GABA happened either presynaptic or postsynaptic on the central or even the arrangement of peripheral nerves. Gabapentin increases GABA synthesis from glutamate and increases the release of GABA from astrocytes. Some researches show that there is a concentration increase of GABA in some regions of the brain after the administration of gabapentin so that glutamic acid decarboxylase increases and also decarboxylase glutamic acid enzyme destruction decreases which eventually increases the production of GABA.[15,16,23]

The pain relief observed in the gabapentin and vitamin B12 combination group and gabapentin monotherapy group. The pain relief is significantly better in the gabapentin and vitamin B12 combination group compared to the gabapentin monotherapy group with p value=0.002.

The finding is consistent with the study conducted by Mimenza Alvarado and Aguilar Navarro.[21] The gabapentin and vitamin B complex administration compare to pregabalin shows better pain relief. The significant difference in pain relief between the treatment group and the control group observed in the 0 week and eighth week (p value<0.001).

Gabapentin and vitamin B12 combination groups have better pain relief improvement than the gabapentin monotherapy group. The results caused by better and more optimal treatment mix in gabapentin and vitamin B12 combination group. The administration of gabapentin will give an inhibiting effect to release neurotransmitters so that it will reduce the pain in diabetic neuropathic patients. The usage combined with the administration of vitamin B12, which serves to maintain and repair peripheral nerve cells. The combination treatment effect will give better pain relief improvement.[23–25]

Conclusion

A combination of gabapentin and vitamin B12 showed better pain relief compared to gabapentin monotherapy in diabetic neuropathic patients.

Conflict of Interest

The authors declare that no conflict of interest in this study.

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References

1. Bansal D, Gudala K, Muthyala H, Esam HP, Nayakallu R, Bhansali A. Prevalence and risk factors of development of peripheral diabetic neuropathy in type 2 diabetes mellitus in a tertiary care setting. J Diabetes Investig. 2014;5(6):714–21.
2. Ramachandran A, Snehalatha C, Shetty AS, Nanditha A. Trends in prevalence of diabetes in Asian countries. World J Diabetes. 2012;3(6):110–7.
3. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE. Global

estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes Res Clin Pract. 2014;103(2):137–49.
4. Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia. Basic health research (Riskesdas) 2013 [Internet]. Jakarta: Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia; 2013 [cited 2017 June 15]. Available from: http://labdata.litbang.kemkes.go.id/ccount/click.php?id=10.
5. Malik VS, Popkin BM, Bray GA, Després JP, Willett WC, Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. Diabetes Care. 2010;33(11):2477–83.
6. Jin W, Patti ME. Genetic determinants and molecular pathways in the pathogenesis of type 2 diabetes. Clin Sci (Lond). 2009;116(2):99–111.
7. VA Center for Integrated Healthcare. Diabetic neuropathies: the nerve damage of diabetes [Internet]. July 2013 [cited 2017 June 16]. Available from: https://www.mirecc.va.gov/cih-visn2/Documents/Provider_Education_Handouts/Diabetic_Neuropathies_Version_3.pdf.
8. Chawla R. Complications of diabetes. New Delhi: Jaypee Brothers Medical Publishers; 2012.
9. Schreiber AK, Nones CF, Reis RC, Chichorro JG, Cunha JM. Diabetic neuropathic pain: physiopathology and treatment. World J Diabetes. 2015 Apr 15;6(3):432–44.
10. Yagihashi S, Mizukami H, Sugimoto K. Mechanism of diabetic neuropathy: where are we now and where to go? J Diabetes Investig. 2011;2(1):18–32.
11. Emerging Risk Factors Collaboration, Sarwar N, Gao P, Seshasai SR, Gobin R, Kaptoge S, Di Angelantonio E, et al. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet. 2010;375(9733):2215–22.
12. Wiffen PJ, Derry S, Moore RA, Aldington D, Cole P, Rice AS, et al. Antiepileptic drugs for neuropathic pain and fibromyalgia - an overview of Cochrane reviews. Cochrane Database Syst Rev. 2013;(11):CD010567.
13. Wiffen PJ, Derry S, Bell RF, Rice AS, Tölle TR, Phillips T, et al. Gabapentin for chronic neuropathic pain in adults. Cochrane Database Syst Rev. 2017;6:CD007938.
14. Murnion BP. Neuropathic pain: current definition and review of drug treatment. Aust Prescr. 2018 Jun;41(3):60–3.
15. Attal N, Cruccu G, Baron R, Haanpää M, Hansson P, Jensen TS, et al. EFNS guidelines on the pharmacological treatment of neuropathic pain: 2010 revision. Eur J Neurol. 2010;17(9):1113–23.
16. Rosenquist RW, Vrooman BM. Chronic pain managament. In: Butterworth JF, Mackey DC, Wasnick JD, editors. Morgan and Mikhail's Clinical Anesthesiology. 5th Edition. New York: McGraw-Hill Companies; 2013. p. 1023–86.
17. Agency for Healthcare Research and Quality, U.S. Department of Health & Human Services. Effectiveness of treatments for diabetic peripheral neuropathy [Internet]. May 13, 2016 [cited 2017 June 17]. Available from: https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/diabetic-neuropathy_research-protocol.pdf.
18. Baraz S, Zarea K, Shahbazian HB, Latifi SM. Comparison of the accuracy of monofilament testing at various points of feet in peripheral diabetic neuropathy screening. J Diabetes Metab Disord. 2014;13(1):19.
19. Wang F, Zhang J, Yu J, Liu S, Zhang R, Ma X, et al. Diagnostic accuracy of monofilament tests for detecting diabetic peripheral neuropathy: a systematic review and meta-analysis. J Diabetes Res. 2017;2017:8787261.
20. Dros J, Wewerinke A, Bindels PJ, van Weert HC. Accuracy of monofilament testing to diagnose peripheral neuropathy: a systematic review. Ann Fam Med. 2009 Nov-Dec;7(6):555–8.
21. Mimenza Alvarado A, Aguilar Navarro S. Clinical trial assessing the efficacy of gabapentin plus B complex (B1/B12) versus pregabalin for treating painful diabetic neuropathy. J Diabetes Res. 2016;2016:4078695.
22. Jayabalan B, Low LL. Vitamin B supplementation for diabetic peripheral neuropathy. Singapore Med J. 2016;57(2):55–9.
23. Surcheva S, Todorova L, Maslarov D, Vlaskovska M. Preclinic and clinic effectiveness of gabapentin and pregabalin for treatment of neuropathic pain in rats

and diabetic patients. Biotechnol Biotechnol Equip. 2017;31(3):568–73.
24. Vinik AI, Casellini CM. Guidelines in the management of diabetic nerve pain: clinical utility of pregabalin. Diabetes Metab Syndr Obes. 2013;6:57–78.
25. Lal R, Sukbuntherng J, Luo W, Tovera J, Lassauzet ML, Cundy KC. Population pharmacokinetics and pharmacodynamics of gabapentin after administration of gabapentin enacarbil. J Clin Pharmacol. 2013;53(1):29–40.

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RESEARCH ARTICLE

Comparative Study Gallbladder Contractility Index Using Ultrasound in Patients with and without Liver Cirrhosis

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Abstract

Liver cirrhosis leads to impairment of gallbladder contractility resulting in bile stasis and facilitate the development of gallstones that will aggravate the clinical symptoms of the patients. The gallbladder contractility index is an indicator of gallbladder motility measured using ultrasound as the radiological choice of modality. This study aims to determine differences in the gallbladder contractility index using ultrasound in patients with and without liver cirrhosis. This study was an observational study of comparative analytic with cross-sectional design with sampling conducted by consecutive admissions sampling at Dr. Hasan Sadikin General Hospital Bandung from December 2017 to February 2018. Statistical analysis than performed by using an independent t test to find out the difference of gallbladder contractility index in patients with and without liver cirrhosis. A total of 22 subjects, 12 men, 10 women, with the youngest 37 years old and the oldest 70 years old. The result of the study was obtained mean fasting gallbladder volume (35.56±22.16 mL) and postprandial (21.25±16.08 mL) in patients with liver cirrhosis higher than without liver cirrhosis with mean fasting gallbladder volume (16.50±4.14 mL) and postprandial (5.44±2.10 mL). The average gallbladder contractility index on patients with liver cirrhosis (41.64±24.52%) smaller than without liver cirrhosis (66.73±9.19%). The result of the statistical test showed that there was a significant difference in the gallbladder contractility index on patients with liver cirrhosis than without liver cirrhosis ($p=0.007$, $p\leq0.05$). In conclusion, there was a significant difference in the gallbladder contractility index that measured by using ultrasound between the patients with and without liver cirrhosis.

Key words: Contractility index, gallbladder, liver cirrhosis, ultrasound

Perbedaan Indeks Kontraktilitas Kandung Empedu Menggunakan Ultrasonografi pada Penderita Sirosis Hati dan tanpa Sirosis Hati

Abstrak

Sirosis hati menyebabkan gangguan indeks kontraktilitas kandung empedu yang mengakibatkan stasis cairan empedu dan memudahkan kejadian batu empedu yang akan memperberat gejala klinis pasien. Indeks kontraktilitas kandung empedu merupakan indikator motilitas kandung empedu yang diukur menggunakan ultrasonografi (USG) sebagai modalitas pilihan radiologi. Penelitian ini bertujuan mengetahui perbedaan indeks kontraktilitas kandung empedu menggunakan ultrasonografi pada pasien sirosis hati dan tanpa sirosis. Penelitian ini menggunakan studi observasional analitik komparatif dengan rancangan *cross-sectional* dan pengambilan sampel dilakukan secara *consecutive admissions sampling* di RSUP Dr. Hasan Sadikin Bandung dari bulan Desember 2017 hingga Februari 2018. Uji statistik menggunakan *independent t test*. Subjek penelitian berjumlah 22, laki-laki 12 dan perempuan 10, serta usia termuda 37 tahun dan tertua 70 tahun. Hasil penelitian didapatkan volume rerata kandung empedu puasa (35,56±22,16 mL) dan pascaprandial (21,25±16,08 mL) pada pasien sirosis hati lebih besar daripada tanpa sirosis hati dengan volume rerata kandung empedu puasa (16,50±4,14 mL) dan pascaprandial (5,44±2,10 mL). Indeks kontraktilitas rerata kandung empedu penderita sirosis hati (41,64±24,52%) lebih rendah dibanding dengan tanpa sirosis hati (66,73±9,19%). Hasil uji statistik menunjukkan terdapat perbedaan bermakna antara indeks kontraktilitas kandung empedu penderita sirosis hati dan tanpa sirosis hati ($p=0,007$; $p\leq0,05$). Simpulan, terdapat perbedaan bermakna antara indeks kontraktilitas kandung empedu menggunakan USG pada penderita sirosis hati dan tanpa sirosis hati.

Kata kunci: Indeks kontraktilitas, kandung empedu, sirosis hati, ultrasonografi

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Introduction

Liver cirrhosis is the third leading cause of death in patients who are 45–46 years old (after cardiovascular and cancer). Liver cirrhosis is a disease characterized by diffuse and chronic inflammation of the liver progressively with distorted images of the hepatic architecture and the formation of regenerative nodules.[1,2] Worldwide, liver cirrhosis ranks seventh as the cause of death. There are more male patients with liver cirrhosis compared with women with a ratio of about 1.6:1. The average age group is 30–59 years old, with a peak of around the age of 40–49 years old.[3,4] In 2015, the World Health Organization (WHO) reported that 720,000 deaths caused by liver cirrhosis in the world.[5]

In 2012, liver cirrhosis in Indonesia is the sixth cause of death, with 48.9 thousand deaths. The incidence of liver cirrhosis in Indonesia due to hepatitis B ranged between 21.2–46.9% and hepatitis C ranged 38.7–73.9%.[6,7] In Dr. Hasan Sadikin General Hospital Bandung hospitalized patients with liver cirrhosis in 2012 until September 2017 were about 365 people, and about 1,716 people went through internal medicine polyclinic.[8]

Patients with liver cirrhosis have a higher incidence and prevalence of gallstones than the general population, with a prevalence of 25–30%. Liver cirrhosis is one of the significant risk factors for the formation of gallstones.[9] Gallstones in patients with liver cirrhosis are asymptomatic and symptomatic to cause complications. In patients with liver cirrhosis, Child-Pugh A and B with symptomatic gallstones recommended doing cholecystectomy before the complication that will aggravate the patient clinical condition and before the severe condition of the liver symptoms.[10] The formation of gallstones in patients with liver cirrhosis is due to several factors; one of them is due to bile stasis caused by the decrease in gallbladder contractility index.[11]

The decrease in the gallbladder contractility index is due to the humoral, hypoalbuminemia, and also neurological disorders. Neurological disorders in patients with liver cirrhosis are in the form of neuropathy. The severity of this neuropathy is proportional to an increase in liver damage. The patients with liver cirrhosis, especially decompensated liver cirrhosis, usually have autonomic dysfunction directly affect the contractility of the gallbladder through the neural path.[12] Gallbladder contractility disorder in cirrhotic patients is also affected by the thickening of the gallbladder wall. This thickening is due to edema and structural changes in the gallbladder wall due to hypoalbuminemia and portal hypertension. In addition to the above, the disorder of gallbladder contractility in patients with liver cirrhosis also influenced by humoral changes.[13–17]

Humoral changes that occur in liver cirrhosis are due to cholecystokinin (CCK) receptor resistance in the gallbladder. Thus, the contraction of the gallbladder disrupted. Besides, decreased hepatic clearance also occurs in patients with liver cirrhosis, increasing the level of intestinal peptides that affect the relaxation of the gallbladder wall. Gallbladder contractility disorders in patients with liver cirrhosis assessed by evaluating the gallbladder contractility index using ultrasound.[13]

Ultrasound is the preferred modality for assessing the gallbladder contractility index by measuring the volume of the gallbladder, and postprandial. Ultrasound is a radiological modality that is accurate, noninvasive, cheap, easy to obtain, no radiation and repeated to assess the gallbladder contractility index.[12,14,18]

A research conducted by Buzaş et al.[19] suggested that the volume of gallbladder fasting and postprandial volume using ultrasound was higher in patients with liver cirrhosis. Loreno et al.[14] also suggest that there was a difference in the gallbladder contractility index in patients with liver cirrhosis compared with no liver cirrhosis. Acalovschi[13] suggests that there was a decreasing index of gallbladder contractility in patients with liver cirrhosis following the severity of cirrhosis. It is contrary to research conducted by Kul et al.,[12] suggesting that there was an increase in gallbladder contractility index in patients with liver cirrhosis compared with healthy control. Shirole et al.[11] suggest that patients with liver cirrhosis have a higher prevalence of the occurrence of gallstones than in a healthy population. One of the causes is a decrease in the gallbladder contractility index. Because of differences in the above studies, the researchers will determine differences in the gallbladder contractility index using ultrasound in patients with and without liver cirrhosis.

Methods

This study was an analytic observational study

with a cross-sectional design conducted from December 2017 to February 2018. Sampling was patients with liver cirrhosis and without liver cirrhosis in Dr. Hasan Sadikin General Hospital Bandung, who matched the inclusion criteria with consecutive admissions method (based on the order of the registered patient). The inclusion criteria were patients with adult liver cirrhosis diagnosed from the Gastroentero-hepatology clinic of Dr. Hasan Sadikin General Hospital Bandung and undiagnosed liver cirrhosis that had gone through ultrasound examination in the Department of Radiology Dr. General Hospital Hasan Sadikin and willing to follow the research. Exclusion criteria for this study were patients with a history of bile disease, gallbladder hydrops, diabetes mellitus, post gastric resection surgery, and patients who were pregnant.

Statistical analysis used to describe the difference of gallbladder contractility index using ultrasound in patients with and without liver cirrhosis. A statistical test using the parametric method, independent t test performed using SPSS version 22.0 for Windows at a 95% confidence level.

Ethical approval for this study has obtained from the Health Research Ethics Committee of Dr. Hasan Sadikin General Hospital Bandung with the letter number: LB.04.01/A05/EC/379/XII/2017.

Results

Table 1 shows that by gender, there were more male patients than females with and without liver cirrhosis who came to Dr. Hasan Sadikin General Hospital as many as 12 of 22.

The differences in gallbladder contractility index using ultrasound in patients with and without liver cirrhosis in Dr. Hasan Sadikin General Hospital can be seen in Table 2.

Based on Table 2, it can be seen that the average volume of fasting gallbladder using ultrasound on the liver cirrhosis patients is 35.56 mL, with a standard deviation of 22.16 mL. Patients without liver cirrhosis was 16.50 mL, with a standard deviation of 4.14 mL. The mean postprandial gallbladder volume using ultrasound in patients with liver cirrhosis was 21.25 mL, with a standard deviation of 16.08 mL,

Table 1 Characteristics of Study Subjects by Age and Gender in Patients with and without Liver Cirrhosis

Age and Gender	n=22	Average (SD)	Median (Min–Max)
Age (years)			
30–40	5	49.45 (9.53)	48 (37–70)
41–50	8		
>50	9		
Gender			
Male	12		
Female	10		

Table 2 The Differences in Gallbladder Contractility Index Using Ultrasound in Patients with and without Liver Cirrhosis

Gallbladder	Liver Cirrhosis Incident				p Value*
	Liver Cirrhosis		Without Liver Cirrhosis		
	Average	SD	Average	SD	
Fasting gallbladder volume	35.56	22.16	16.50	4.14	
Postpartum gallbladder volume	21.25	16.08	5.44	2.10	0.007
Gallbladder contractility index	41.64	24.52	66.73	9.19	

Note: *Independent t test

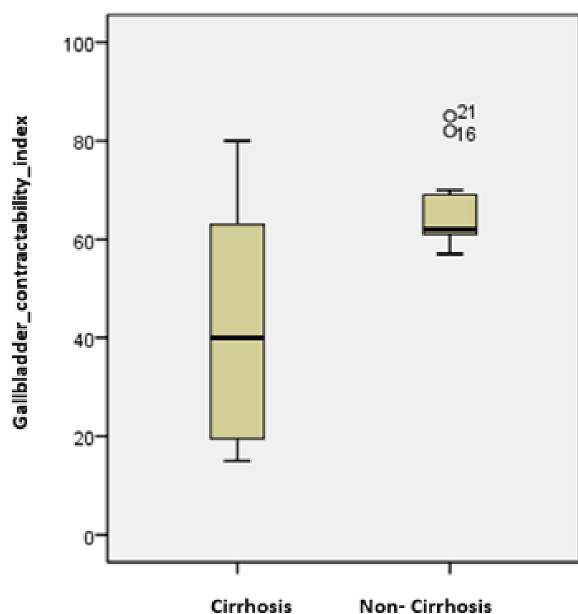

Figure The Differences in Gallbladder Contractility Index Using Ultrasound in Patients with and without Liver

whereas in patients without liver cirrhosis was 5.44 mL, with a standard deviation of 2.10 mL.

Based on Table 2, it can be seen that the average gallbladder contractility index using ultrasound in patients with liver cirrhosis was 41.64%, with a standard deviation of 24.52%. Patients without liver cirrhosis were 66.73%, with a standard deviation of 9.19%. The independent t test result on a 95% confidence degree shows that there was a significant difference in gallbladder contractility index using ultrasound in patients with and without liver cirrhosis ($p=0.007$, $p\leq0.05$).

The differences in gallbladder contractility index using ultrasound in patients with and without liver cirrhosis is in Figure.

Discussion

The results of age-based, the age distribution of most patients with liver cirrhosis in this study were in the age group >50 years. It is by the research conducted by Hussain et al.,[10] which states that patients with liver cirrhosis are more common in middle age and older age due to disease progression of liver cirrhosis that usually takes 5–10 years. Patients with liver cirrhosis in this study were mostly male. The results are consistent with Basic Health Research 2013 that patients affected by hepatitis are more likely to be men even when it is less significant and mostly work-related that often occurs in patients who work as farmers/laborers or fishermen.[20,21]

The results based on fasting gallbladder volume show that the average fasting gallbladder volume in liver cirrhosis patients was 35.56 mL, with a standard deviation of 22.16 mL. The results are higher than those without liver cirrhosis with an average fasting gallbladder volume of 16.5 mL and a standard deviation of 4.14 mL. It suggests that most of the volume of the fasting gallbladder in patients with liver cirrhosis is more significant than without liver cirrhosis. It is under research conducted by Buzaş et al.[19] and Loreno et al.[14] state that the average gallbladder volume of fasting patients with liver cirrhosis is higher than without liver cirrhosis. The mechanism of fasting gallbladder volume of patients with liver cirrhosis larger than without liver cirrhosis is suspected because increased intestinal peptides lead to the relaxation of gallbladder muscles and autonomic nervous disorders resulting in lower gallbladder contraction in the patients with liver cirrhosis.

The average postprandial gallbladder volume in liver cirrhosis patients is 21.25 mL with a standard deviation of 16.08 mL, while in the group without liver cirrhosis, the mean postprandial gallbladder volume is 5.44 mL and a standard deviation of 2.1 mL. It appears that the average of postprandial gallbladder volume in most liver cirrhosis patients tends to be higher than the average of postprandial gallbladder volume in patients without liver cirrhosis.[22]

Based on the average gallbladder contractility index, the index of biliary tactility in liver cirrhosis patients was 41.64%, with a standard deviation of 24.52%. In comparison, the average of gall gallbladder contractility in the group without liver cirrhosis was 66.73%, with a standard deviation of 9.19%. It is under research conducted by Loreno et al.[14] and Acalovschi,[13] who suggest that the gallbladder contractility index in patients with liver cirrhosis is lower than without liver cirrhosis.

Independent t test analysis at 95% confidence degree showed that there is a statistically significant difference between gallbladder contractility index using ultrasound in patients with and without liver cirrhosis ($p=0.007$, $p\leq0.05$). It is consistent with the research

conducted by Loreno et al.[14] and Acalovschi,[13] who suggest that there is a significant difference in the gallbladder contractility index of patients with and without liver cirrhosis.

The causes of gallbladder contractility index differences in patients with liver cirrhosis may due to a decrease in CCK receptor sensitivity in the gallbladder, autonomic neuropathy, hypoalbuminemia, and increased concentrations of intestinal peptides that affect gallbladder muscle relaxation.[13]

Conclusion

There was a significant difference in gallbladder contractility index using ultrasound in patients with and without liver cirrhosis in Dr. Hasan Sadikin General Hospital Bandung.

Conflict of Interest

There is no ethical/legal conflict involved in the article. All authors have no relevant financial interests related to the material.

References

1. Siregar GA, Tampubolon SE. Comparison of lipid profile between degrees of severity of hepatic cirrhosis in Haji Adam Malik General Hospital Medan. IOP Conf Ser Earth Environ Sci. 2018:125:012216.
2. Yeom SK, Lee CH, Cha SH, Park CM. Prediction of liver cirrhosis, using diagnostic imaging tools. World J Hepatol. 2015;7(17):2069–79.
3. Zatoński WA, Sulkowska U, Mańczuk M, Rehm J, Boffetta P, Lowenfels AB, et al. Liver cirrhosis mortality in Europe, with special attention to central and eastern Europe. Eur Addict Res. 2010;16(4):193–201.
4. Blachier M, Leleu H, Peck-Radosavljevic M, Valla DC, Roudot-Thoraval F. The burden of liver disease in Europe: a review of available epidemiological data. J Hepatol. 2013;58(3):593–608.
5. World Health Organization (WHO). Global hepatitis report 2017. Geneva: WHO; 2017.
6. Widjaja FF, Karjadi T. Pencegahan perdarahan berulang pada pasien sirosis hati. J Indon Med Assoc. 2011;61(10):417–24.
7. Nurdjanah S. Sirosis hati. In: Sudoyo AW, Setiyohadi B, Alwi I, Simadibrata KM, Setiati S, editors. Buku ajar ilmu penyakit dalam. 6th Edition. Jakarta: Interna Publishing; 2014. p. 1978–83.
8. Sistem Informasi Rumah Sakit (SIRS) RSUP Dr. Hasan Sadikin (RSHS). Pasien sirosis hati 2012–2017. Bandung: SIRS RSHS; 2017.
9. Li X, Guo X, Ji H, Yu G, Gao P. Gallstones in patients with chronic liver diseases. Biomed Res Int. 2017;2017:9749802.
10. Hussain A, Nadeem MA, Nisar S, Tauseef H. Frequency of gallstones in patients with liver cirrhosis. J Ayub Med Coll Abbottabad. 2014;26(3):341–3.
11. Shirole NU, Gupta SJ, Shah DK, Gaikwad NR, Sankalecha TH, Kothari HG. Cirrhosis of liver is a risk factor for gallstone disease. Int J Res Med Sci. 2017;5(5):2053–6.
12. Kul K, Serin E, Yakar T, Coşar AM, Özer B. Autonomic neuropathy and gallbladder motility in patients with liver cirrhosis. Turk J Gastroenterol. 2015;26(3):254–8.
13. Acalovschi M. Gallstones in patients with liver cirrhosis: incidence, etiology, clinical and therapeutical aspects. World J Gastroenterol. 2014;20(23):7277–85.
14. Loreno M, Travali S, Bucceri AM, Scalisi G, Virgilio C, Brogna A. Ultrasonographic Study of Gallbladder Wall Thickness and Emptying in Cirrhotic Patients without Gallstones. Gastroenterol Res Pract. 2009;2009:683040.
15. Butt Z, Hyder Q. Cholelithiasis in hepatic cirrhosis: evaluating the role of risk factors. J Pak Med Assoc. 2010;60(8):641–4.
16. Son JY, Kim YJ, Park HS, Yu NC, Ko SM, Jung SI, et al. Diffuse gallbladder wall thickening on computed tomography in patients with liver cirrhosis: correlation with clinical and laboratory variables. J Comput Assist Tomogr. 2011;35(5):535–8.
17. Mohammadi A, Ghasemi-Rad M, Mohammadifar M. Differentiation of benign from malignant induced ascites by measuring gallbladder wall thickness. Maedica (Buchar). 2011;6(4):282–6.
18. Popescu A, Sporea I. Ultrasound examination of normal gall bladder and biliary system. Med Ultrason. 2010;12(2):150–2.
19. Buzaş C, Chira O, Mocan T, Acalovschi M. Comparative study of gallbladder motility in patients with chronic HCV hepatitis and with HCV cirrhosis. Rom J Intern Med. 2011;49(1):37–44.
20. Indonesia Agency of Health Research

and Development, Ministry of Health of Republic of Indonesia. Basic health research (Riskesdas) 2013 [Internet]. Jakarta: Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia; 2013 [cited 2017 June 15]. Available from: http://labdata.litbang.kemkes.go.id/ccount/click.php?id=10.

21. Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia. Situasi dan analisis hepatitis [Internet]. 2014 September [cited 2018 February 20]. Available from: https://www.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin-hepatitis.pdf.
22. Abdelmaksoud MA, El-Shamy MH, Hussein HIM, Bihery AS, Ahmed H, El Hady HA. Frequency of cholelithiasis in patients with chronic liver disease: a hospital-based study. AJIED. 2016;6(3):134–41.

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RESEARCH ARTICLE

Lumbar Radiculopathy: a Descriptive Study on Red Flag and Neurologic Symptoms in Dr. Hasan Sadikin General Hospital Bandung

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Abstract

Over 80% of the adult population will experience an episode of low back pain (LBP). Low back pain is a pain in the lumbosacral region. When it progresses, which may be identified earlier with signs of a red flag, the manifestation might become radiculopathy. Radiculopathies are nerve root disease which may show signs of neurologic symptoms from the sensory, motoric, or autonomic origin. This study to help identify the clinical characteristics of a red flag in low back pain patients, which became lumbar radiculopathy for prognostic and diagnostic use. It is a descriptive quantitative cross-sectional study of medical records from patients hospitalized with complaints of low back pain with lumbar radiculopathy between January 2013–December 2015 in the Department of Neurology, Dr. Hasan Sadikin General Hospital, Bandung. It identifies a specific red flag and neurogenic symptoms. Patients most affected were housewives (26%), females (60%), and middle-aged adults (31%). The highest recorded symptom being sensory (76%), the highest progression was sensory to motoric (59%), affected by all three neurologic symptoms (39%), and trauma was the highest red flag recorded (48%). Low back pain patients who have signs of red flag show a high tendency to develop radiculopathy, which shows neurologic symptoms. If left untreated earlier, it may become a permanent disability.

Key words: Low back pain, radiculopathy, red flag

Radikulopati Lumbar: Studi Deskriptif Gejala Klinis *Red Flag* dan Gejala Neurologis di RSUP Dr. Hasan Sadikin Bandung

Abstrak

Lebih dari 80% populasi penduduk dewasa akan mengalami episode *low back pain* (LBP). *Low back pain* merupakan nyeri pada bagian tulang belakang regio lumbo-sakral. Pada saat rasa sakitnya bertambah berat, gejala berbahaya dapat menjadi awal perkembangan LBP menjadi radikulopati. Radikulopati merupakan penyakit saraf pada daerah radiks neuron berupa gejala sensorik, motorik, dan otonomik. Penelitian ini bertujuan mengidentifikasi karakteristik gejala klinis tanda berbahaya (*red flag*) pada pasien LBP yang berlanjut menjadi radikulopati lumbar sebagai alat bantu diagnostik dan prognostik. Penelitian ini menggunakan metode penelitian *cross-sectional* kuantitatif deskriptif dari rekam medis pasien yang dirawat dengan diagnosis LBP dan radikulopati lumbar antara bulan Januari 2013–Desember 2015 di Departemen Ilmu Penyakit Saraf, RSUP Dr. Hasan Sadikin, Bandung. Penelitian ini mengidentifikasi gejala klinis *red flag* spesifik dan neurologis. Pasien yang terkena terutama ibu rumah tangga (26%), wanita (60%), usia dewasa pertengahan (31%). Gejala yang tercatat paling banyak adalah sensorik (76%), perkembangan progresif sensorik ke motorik (59%), mengalami gangguan ketiganya (39%), dan trauma menjadi penyebab *red flag* yang paling tinggi (48%). Pasien LBP yang memiliki gejala tanda berbahaya (*red flag*) memiliki kecenderungan tinggi berkembang menjadi radikulopati yang menunjukkan gejala neurologis. Jika tidak diobati lebih awal, ini dapat mengakibatkan kecacatan permanen.

Kata kunci: *Low back pain*, radikulopati, *red flag*

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Introduction

Sometime during life, over 80 percent of the population will experience an episode of low back pain (LBP).[1] LBP defined as the complaint of pain in the area of spinal or paraspinal structures in the lumbosacral region.[2] According to the Global Burden of Disease Study 2015 (GBD 2015), the expert group stated that among the top ten high burden diseases and injuries, LBP is one of them with an average number of DALYs (disability-adjusted life years). It is higher than HIV, tuberculosis, road injuries, lung cancer, chronic obstructive pulmonary disease, and preterm birth complications.[3] Low back pain, if left untreated with the red flag, may cause a more severe medical condition. Low back pain remains a common condition among primary care patients with an estimated lifetime prevalence of 13.8% for chronic pain and 80% for any episode of pain.[4–6]

Low back pain affecting both men and women, with age, is the primary risk factor, as it occurs secondary to the degenerative process within the spinal column.[7] Symptoms typically begin in midlife, with men often affected in the 40s while women are affected in the 50s and 60s.[8,9] Females have a higher risk in specific populations, with physically demanding careers such as service in the military. Patients commonly present with back pain that is associated with their radiculopathy. By definition, radiculopathy describes pain that radiates down the legs and is often described by patients as electric, burning, or sharp. The most common underlying cause of radiculopathy is irritation of a particular nerve, which can occur at any point along the nerve itself and is most often a result of a compressive force. The diagnosis of the causative agent and subsequent treatment starts with a thorough physical exam.

The term red flags are symptoms and signs that show a possible manifestation of more serious medical conditions, which may cause permanent disability and, if not managed correctly, may even lead to death.[10] These red flags seen in LBP patients, when neglected without treatment, may become radiculopathy. Radiculopathies are a disease of nerve roots from inflammation or impingement from a tumor or a bony spur.[11] One form of radiculopathy is one that affects the lumbar region. The prevalence of lumbar radiculopathy varies from about 2.2–8%, and the incidence ranges from 0.7–9.6%. About 76.1% of lumbar radiculopathies involve the L5 and S1 nerve roots.[12] Lumbar radiculopathy refers to a pathologic process involving the lumbar roots causing radicular symptoms in a lower extremity. The nerve root pathology arises primarily from direct neural compression irrespective of whether the etiology is an acute herniated or displaced disc, bony spurs, foraminal stenosis, central stenosis, or hypermobility of a vertebral segment.[13]

While a substantial burden on our health-care system, low back pain is typically self-limited, with most cases resolving after conservative management in 6 to 8 weeks.[14] Most low back pain is nonspecific; patients with low back pain may have neurologic impairments or a severe underlying pathology that requires timely and accurate diagnosis. Low back pain that is due to severe pathology occurs between 1% and 4% of the time and has been generally classified as related to 4 etiologies: fracture, malignancy, infection, and cauda equina syndrome.[15–17] Appropriate identification of these diagnoses for their management is essential. Therefore, due to the prevalence, burden, and associated health-care cost of low back pain, it is paramount to know the characteristics to detect severe disease.

However, the data on LBP and its red flag, such as lumbar radiculopathy, is extremely limited in Indonesia, specifically in the Department of Neurology in Dr. Hasan Sadikin General Hospital, Bandung. This study conducted to help in finding out the clinical characteristics of a red flag in LBP patients with lumbar radiculopathy by identifying the red flag. The neurologic symptoms are sensory, motoric, or autonomic to help identify and diagnose that these symptoms are an underlying problem, which can become something even more severe if left untreated. This study aimed to help identify red flags in these patients and the possible neurologic symptoms to occur in them.

Methods

This study uses an observational descriptive quantitative cross-sectional study as a method of study. Medical records used in this study were from January 2013–December 2015. Subjects used for this study are LBP patients with lumbar radiculopathy that hospitalized in the Department of Neurology in Dr. Hasan Sadikin

General Hospital, Bandung.

A rough table is stating the needed characteristics such as occupation, sex, age, symptoms to appear, the progression of symptoms, and the red flag first created. The data obtained for the first symptoms to appear also classified into acute, sub-acute, and chronic. This data was obtained by cross-checking medical records for the required data from the history-taking as well as the physical exam portion of the medical record. Incomplete medical records, medical records that did not state the characteristics clearly, and patients who did not have signs of LBP with lumbar radiculopathy as well of the red flag excluded. The data tabulated and analyzed accordingly.

This study approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran, Bandung by ethics approval letter number: 571/UN6.C1.3.2/KEPK/PN/2016.

Results

In this study, the data used was secondary data from medical records of patients from the Department of Neurology in Dr. Hasan Sadikin General Hospital, Bandung. A total of 54 patient's data recorded fit the inclusion criteria. Based on the data, five tables created with the corresponding variables.

Based on the data obtained in the study from the occupational demography data (table not inserted), most of the patients who suffered from LBP with lumbar radiculopathy admitted into Dr. Hasan Sadikin General Hospital were housewives, 26% of the total patient population. The next majority was that the manual laborers were 17%. However, 17 patients did not have proper employment status and classified as N/A (not assessed). Other occupations which recorded were pensioners, security guards, policemen, students, privately employed staff, and self-employed staff.

Table 1 Distribution of LBP Patients with Lumbar Radiculopathy and Their Age

Range of Age (Years)	Number (n=54)	Percentage
11–20	1	2
21–30	9	17
31–40	5	9
41–50	11	20
51–60	17	31
61–70	9	17
71–80	1	2
81–90	1	2

From the data describes the gender demographic data of the patients (table not inserted), females have a higher tendency, which was a percentage of 60% to LBP with lumbar radiculopathy as compared to males at 40%.

Table 1 describes the distribution of age about LBP patients with lumbar radiculopathy, as obtained from the data. The age range between 51–60 years had the highest frequency of patients, with a percentage of 31%. The data does show that the middle-aged adults were more affected by LBP and lumbar radiculopathy as compared to those of younger age or older.

Table 2 shows the data for the first symptoms with lumbar radiculopathy, as well as the time for the manifestation. That be within the period of acute (less than three weeks), which showed 18% sensory, 5% motoric, and 2% autonomic.

Table 2 Distribution of LBP Patients with Lumbar Radiculopathy and Their First Symptom with the Duration for Manifestation of the Symptoms

Onset of Symptoms	Sensory (n=41) 76%	Motoric (n=12) 22%	Autonomic (n=1) 2%	Total (n=54)
<3 weeks	10 (18%)	3 (5%)	1 (2%)	14
3 weeks–3 months	15 (28%)	7 (13%)	0 (0%)	22
>3 months	16 (30%)	2 (4%)	0 (0%)	18

Table 3 Distribution of LBP Patients with Lumbar Radiculopathy and Their Progression from the First Symptom

Symptom Progression	Number (n=54)	Percentage
Sensory–motoric	32	59
Sensory–autonomic	11	20
Motoric–sensory	7	13
Motoric–autonomic	4	8

For the sub-acute phase (3 weeks to 3 months), 28% showed sensory symptoms, 13% motoric, and 0% autonomic. For chronic (more than three months), 30% showed sensory symptoms, 4% showed motorically, and no patients recorded with autonomic first symptoms.

Table 3 shows the progression of the symptoms from the first symptom to appear in the patients. The progression from a sensory symptom to a motoric symptom seems to be higher at 59%. Twenty percent of patients have a progression from sensory symptoms to autonomic symptoms. Progression from autonomic symptoms to sensory or motoric symptoms seems to be the lowest.

Table 4 describes the current condition of the patients, 12 (22%) had sensory problems only, 1 patient had an only motoric symptom, 12 (22%) patients had both sensory and motoric problems, sensory and autonomic dysfunction was recorded in 7 (13%) patients, 1 patient had motoric and autonomic problems, and 21 (39%) patients had all 3 problems.

Table 4 Distribution of LBP Patients with Lumbar Radiculopathy and Their Current Symptoms

Symptoms	Number (n=54)	Percentage
Sensory only	12	22
Motoric only	1	2
Sensory+motoric	12	22
Sensory+ autonomic	7	13
Motoric+ autonomic	1	2
Sensory+motoric+ autonomic	21	39

Table 5 Distribution of LBP Patients with Lumbar Radiculopathy and the Signs of Red Flag

Red Flag Category	Number (n=54)	Percentage
Cancer	18	33
Infection	8	15
Trauma	26	48
Neurogenic deficit	2	4

Table 5 describes the data obtained on the red flag signs of the patients divided into 4 sub-categories, which were cancer, infection, trauma, and neurologic deficits. It is seen that the common red flag seen in patients of LBP with lumbar radiculopathy has a red flag sign of trauma, which was 48%. Cancer-related signs were the next most seen in the patients with 33%. Neurogenic signs were recorded with 4%, and infection signs were recorded at 15%.

Table 6 describes the working diagnosis of the patients admitted to the hospital. Lumbar radiculopathy patients based on the cause being trauma is the highest, with 28%, the next was cauda equina syndrome based on cancer as the cause was the second highest with 24%. However, overall, the diagnosis for patients who come in with low back pain is almost similar.

Discussion

This study showed that patients with low back pain who had the red flag signs could progress to a more serious medical condition. The conditions could cause a neurologic dysfunction, may it be sensory, motoric, or even autonomic. Thus, the population observed were low back pain patients as a passage to the more severe condition becoming lumbar radiculopathy. The result was also to help strengthen the primary goal for both prognostic and diagnostic functions. The data showed that the majority of the patients admitted with low back pain and having a red flag have had a progression in symptoms from either sensory, motoric, or even autonomic. Most of the patients

Table 6 Distribution of LBP Patients with Lumbar Radiculopathy and Their Working Diagnosis

Symptoms	Number (n=54)	Percentage
Cauda equina syndrome based on trauma	8	15
Cauda equina syndrome based on cancer metastasis	13	24
Cauda equina based on spondylitis Tb	3	5
Low back pain based on degenerative, trauma, fracture	3	5
Low back pain based on sequel stroke	2	4
Lumbar radiculopathy based on trauma	15	28
Lumbar radiculopathy based on spondylitis Tb, infections	3	6
Lumbar radiculopathy based on cancer metastasis	5	9
Lumbar myeloradiculopathy based on spondylitis Tb	2	4

admitted did not only have one red flag but multiple red flags.

It observed that homemakers have the highest tendency to acquire LBP with radiculopathy with a percentage of 26%. The similar result showed by Bener et al.,[18] which stated that the prevalence of LBP patients was 53% of the population. In the study done by Akter,[19] homemakers are a risk factor for LBP due to the physical strain the reach doing household work such as standing for long periods or squatting for long periods.

The study showed that gender does also affect the prevalence of this problem as females had a higher prevalence (59%) to LBP with lumbar radiculopathy as compared to males. This data corresponds with the study done by Wang et al.,[20] which had stated that the prevalence of LBP was higher in females rather than males due to many factors, mainly hormonal. However, a study by Fillingim et al.[21] carried out in Sweden and Norway did suggest that although the prevalence of LBP is higher in females, Norway men had a higher lifetime prevalence of LBP.

Age was another factor that contributed to LBP in patients. Middle-age adults were the highest in the data recorded to have low back pain with radiculopathy. In this study, data showed that between the ages of 51–60 is the highest incidence of LBP with radiculopathy to 31%. However, the incidence of the problem begins to increase from the age of 31 years old and above. The result corresponded to the BP6.24 paper updated in 2013, stating the prevalence of LBP peaks between the ages of 35 to 55.[2] Aging factors such as osteoporosis, lack of exercise, obesity, smoking for a woman due to menopause causing estrogen production to decrease, causing bone formation to decrease as well.[22]

From the type of symptoms first appear in LBP patients with lumbar radiculopathy, out of 54 patients' 41 showed signs of sensory disturbance either from pain or numbness. Twelve patients showed signs of motoric disturbance, such as being unable to walk correctly or stand properly, and one patient had autonomic problems such as weak anal sphincter or unable to control bowel movements or urinary processes. This data shows that in the study done by Shankar et al.,[23] which stated that chronic LBP did have autonomic dysfunctions such as a reduced vagal tone and an increased sympathetic tone does not correspond with the findings from the study. For the time factor majority of the symptoms progressed from one category to another from a time frame of 3 weeks to 3 months. This study showed that sub-acute patients had the highest rate of symptoms showing, followed by chronic and acute. However, this does show that even though a patient is at the acute, sub-acute, or chronic stage, they may still develop the symptoms from either sensory, motoric, or even go to autonomic. Patients also can start with a motoric symptom and progress to sensory or autonomic dysfunctional conditions. The study relates to a study done by Friedman et al.[24] in which 30% of patients with acute LBP had a functional impairment three months later.

The data also was recorded to obtain the current condition of the patients. From that, 21

patients had shown all three signs of symptoms may it be sensory, motoric, or even autonomic. Twelve patients showed they had only sensory problems, and 12 showed they had both sensory and motoric problems, and seven patients had sensory and autonomic problems. No patients had only autonomic symptoms stating that patients usually started with at least a sensory or motoric problem before it progressed to autonomic. Patients also showed that even though they were in the acute, sub-acute, or even the chronic period, they still could progress to any other symptom. Gregory et al.[25] state that patients who come in with sensory problems can later develop into more severe motor and sensory problems.

From the first symptom to appear, there was a progression to another symptom in most of the patients. Most of the progression, however, started from sensory problems and later progressed to either motoric or autonomic problems. The highest rate of progression was from sensory to motoric seen in 32 patients (59%). The next highest progression was from sensory to autonomic, as seen in 11 patients (20%). However, the progression from motoric to another symptom was low as compared to sensory, and there was no progression from autonomic symptoms. The symptom is usually due to the affected part of the spinal route, whereby externally affected roots usually show symptoms of sensory problems. As it affects deeper into the spinal column, it affects motoric and autonomic functions as well.

Many of the patients had more than one red flag. The data obtained classified the red flag into four major categories, which were infection, trauma, neurogenic deficits, and cancer. According to the data obtained, the typical red flag seen in patients of LBP with lumbar radiculopathy has a 48% red flag sign of trauma, which was cancer-related signs were the next most seen in the patients with a 33%. Neurogenic signs recorded with 4% and infection signs recorded at 15%.

The working diagnosis of the patients recorded as well. The data showed that the majority of the patients had had a similar diagnosis, and the causative agent almost the same in many. Lumbar radiculopathy caused by trauma was the highest recorded in the patients with 15 people diagnosed. For patients diagnosed with cauda equina syndrome, many of them caused by a metastasis of some form of cancer followed by patients who had cauda equine caused by trauma. There were two patients diagnosed with lumbar myeloradiculopathy caused by spondylitis tuberculosis and low back pain caused by a stroke. Overall, it did prove that a previous study that disc degeneration was the leading cause of low back pain worldwide.[25]

Many patients diagnosed with this problem have not been treated to the full extent to fully cure their symptoms or prevent their symptoms from progressing, as seen in the data obtained from this study.

Conclusion

The clinical characteristics of the red flag were gender, middle-age adults, history of trauma, followed by cancer, infection, and neurogenic deficits. Low back pain patients who have signs of red flag show a high tendency to develop radiculopathy, which shows neurologic symptoms. If left untreated earlier, it may become a permanent disability. Intimate knowledge of the signs, symptoms, and red flag warning signs is a necessity.

Conflict of Interest

All authors declare to have not to conflict of interest in publishing this article.

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References

1. Ferguson SA, Merryweather A, Thiese MS, Hegmann KT, Lu ML, Kapellusch JM, et al. Prevalence of low back pain, seeking medical care, and lost time due to low back pain among manual material handling workers in the United States. BMC Musculoskelet Disord. 2019;20(1):243.
2. Duthey B. Background paper 6.24: low back pain. In: Kaplan W, Wirtz VJ, Mantel-Teeuwisse A, Stolk P, Duthey B, Laing R, editors. Priority medicines for Europe and

the world: 2013 updated. Geneva: WHO Press; 2013. p. 6.24-1–29.
3. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1545–602.
4. Raison NT, Alwan W, Abbot A, Farook M, Khaleel A. The reliability of red flags in spinal cord compression. Arch Trauma Res. 2014;3(1):e17850.
5. Delitto A, George SZ, van Dillen L, Whitman JM, Sowa G, Shekelle P, et al. Low back pain: clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopaedic section of the American Physical Therapy Association. J Orthop Sports Phys Ther. 2012;42(4):A1–57.
6. Hooten WM, Cohen SP. Evaluation and treatment of low back pain: a clinically focused review for primary care specialists. Mayo Clin Proc. 2015;90(12):1699–718.
7. Wong AY, Karppinen J, Samartzis D. Low back pain in older adults: risk factors, management options and future directions. Scoliosis Spinal Disord. 2017;12:14.
8. Stochkendahl MJ, Kjaer P, Hartvigsen J, Kongsted A, Aaboe J, Andersen M, et al. National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy. Eur Spine J. 2018;27(1):60–75.
9. Kreiner DS, Hwang SW, Easa JE, Resnick DK, Baisden JL, Bess S, et al. An evidence-based clinical guideline for the diagnosis and treatment of lumbar disc herniation with radiculopathy. Spine J. 2014;14(1):180–91.
10. Verhagen AP, Downie A, Popal N, Maher C, Koes BW. Red flags presented in current low back pain guidelines: a review. Eur Spine J. 2016;25(9):2788–802.
11. Yusuf M, Finucane L, Selfe J. Red flags for the early detection of spinal infection in back pain patients. BMC Musculoskelet Disord. 2019;20(1):606.
12. Tawa N, Rhoda A, Diener I. Accuracy of clinical neurological examination in diagnosing lumbo-sacral radiculopathy: a systematic literature review. BMC Musculoskelet Disord. 2017;18(1):93.
13. Berry JA, Elia C, Saini HS, Miulli DE. A review of lumbar radiculopathy, diagnosis, and treatment. Cureus. 2019;11(10):e5934.
14. Patrick N, Emanski E, Knaub MA. Acute and chronic low back pain. Med Clin North Am. 2016;100(1):169–81.
15. Williams CM, Henschke N, Maher CG, van Tulder MW, Koes BW, Macaskill P, et al. Red flags to screen for vertebral fracture in patients presenting with low-back pain. Cochrane Database Syst Rev. 2013;(1):CD008643.
16. Underwood M, Buchbinder R. Red flags for back pain. BMJ. 2013;347:f7432
17. Schoenfeld A, Laughlin M, Bader JO, Bono CM. Characterization of the incidence and risk factors for the development of lumbar radiculopathy. J Spinal Disord Tech. 2012;25(3):163–7.
18. Bener A, Dafeeah EE, Alnaqbi K. Prevalence and correlates of low back pain in primary care: what are the contributing factors in a rapidly developing country. Asian Spine J. 2014;8(3):227–36.
19. Akter S. Prevalence of low back pain among the housewives [dissertation]. Dhaka: Bangladesh Health Professions Institute (BHPI); 2014 [cited 2016 January 31]. Available from: http://dspace.crp-bangladesh.org:8080/xmlui/bitstream/handle/123456789/118/504%20Sonia%20Akter.pdf?sequence=1&isAllowed=y.
20. Wang C, Yu X, Yan Y, Yang W, Zhang S, Xiang Y, et al. Tumor necrosis factor-α: a key contributor to intervertebral disc degeneration. Acta Biochim Biophys Sin (Shanghai). 2017 Jan;49(1):1–13.
21. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley JL 3rd. Sex, gender, and pain: a review of recent clinical and experimental findings. J Pain. 2009;10(5):447–85.
22. Wáng YXJ, Wáng JQ, Káplár Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. Quant Imaging Med Surg. 2016;6(2):199–206.
23. Shankar N, Thakur ML, Tandon OP, Saxena AK, Arora S, Bhattacharya N. Autonomic status and pain profile in patients of chronic low back pain and following electro acupuncture therapy: a randomized

control trial. Indian J Physiol Pharmacol. 2011;55(1):25–36.
24. Friedman BW, Gensler S, Yoon A, Nerenberg R, Holden L, Bijur PE, et al. Predicting three-month functional outcomes after an ED visit for acute low back pain. Am J Emerg Med. 2017;35(2):299–305.
25. Gregory DS, Seto CK, Wortley GC, Shugart CM. Acute lumbar disk pain: navigating evaluation and treatment choices. Am Fam Physician. 2008;78(7):835–42.

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RESEARCH ARTICLE

Differences in Expulsion on Post-placenta Intrauterine Contraceptive Device between Mother with Vaginal and Cesarean Delivery

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Abstract

Intrauterine device (IUD) is a long term, highly effective, and reversible contraception method. In Indonesia, the number of IUD acceptors is still lower than other methods. An effort to improve the long term contraception is using post-placental IUD that can be a choice for postpartum mother who has limited access to another contraception service. The purpose of this study was to compare the incidence of expulsion in post-placental IUD insertion between mother with vaginal delivery and cesarean delivery. This study design was a comparative cross-sectional method with a consecutive sampling technique conducted at Dr. Hasan Sadikin General Hospital Bandung and Dr. Kariadi General Hospital Semarang from November 2017 to February 2018. Subjects were postpartum mothers who received post-placental IUD insertion at vaginal delivery and cesarean delivery. Samples were 96 women, consisting of 48 women with IUD insertion in vaginal delivery and 48 women with IUD insertion in cesarean delivery. Data obtained from interviews and transvaginal ultrasonography examination. The result showed there was a difference in expulsions incidence between IUD's insertion among vaginal delivery compared to cesarean delivery (p=0.041). It concluded that expulsion's to post-placental IUD insertion is higher in vaginal delivery compared to cesarean delivery.

Key words: Cesarean delivery, expulsion, post-placental IUD, vaginal delivery

Perbedaan Kejadian Ekspulsi pada Pemasangan Alat Kontrasepsi dalam Rahim Pascaplasenta antara Ibu dengan Persalinan per Vaginam dan Persalinan *Sectio Caesarea*

Abstrak

Alat kontrasepsi dalam rahim (AKDR) merupakan kontrasepsi jangka panjang, efektif dan reversibel. Di Indonesia, jumlah akseptor AKDR masih lebih rendah daripada metode lainnya. Salah satu upaya untuk meningkatkan penggunaan kontrasepsi jangka panjang, yaitu dengan AKDR pascaplasenta yang dapat menjadi alternatif bagi ibu pascasalin yang mempunyai akses terbatas untuk mendapatkan pelayanan kontrasepsi. Penelitian ini bertujuan membandingkan kejadian ekspulsi pada pemasangan AKDR pascaplasenta antara ibu dengan persalinan per vaginam dan persalinan *sectio caesarea*. Desain penelitian ini adalah *cross-sectional* komparatif dengan teknik pengambilan sampel *consecutive* yang dilaksanakan di RSUP Dr. Hasan Sadikin Bandung dan RSUP Dr. Kariadi Semarang dari bulan November 2017 hingga Februari 2018. Subjek penelitian adalah ibu pascasalin yang mendapatkan insersi AKDR pascaplasenta pada persalinan per vaginam dan persalinan sesar. Jumlah sampel 96 ibu, terdiri atas 48 ibu yang bersalin per vaginam dan 48 ibu yang bersalin sesar. Data didapatkan melalui wawancara dan pemeriksaan ultrasonografi transvaginal. Hasil penelitian menunjukkan terdapat perbedaan kejadian ekspulsi pada pemasangan AKDR antara ibu dengan persalinan per vaginam dan persalinan *sectio caesarea* (p=0,041). Simpulan, kejadian ekspulsi pada pemasangan AKDR pascaplasenta lebih tinggi pada ibu dengan persalinan per vaginam dibanding dengan persalinan *sectio caesarea*.

Kata kunci: AKDR pascaplasenta, ekspulsi, persalinan per vaginam, persalinan *sectio caesarea*

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Introduction

The use of contraceptives in Indonesia is still dominated by modern contraceptive methods that are short-term and contain a hormone that generally has a low levels continuation rate compared to long-term contraceptive methods.[1,2] The use of short-term contraceptives such as injections and pills is 40%, while the long-term contraceptive (vasectomy, tubectomy, intrauterine device, and implant) is 23.5%. The lower acceptance of long term contraception by women in Indonesia caused by some factors. These are the factor image of contraception, lack of information factor about benefits, effectiveness, and side effect of long term contraception.[1]

The indicators of successful family planning are contraceptive prevalence rate (CPR) and unmet need. The percentage of unmet needs in Indonesia increased by 8.5%. An increase in unmet need indicates a decrease in CPR, which means that contraceptive services and access to fertile-age couples to contraceptives are not enough.[1]

The main target of the family planning program is in the unmet need group and the postpartum mother, both in normal and cesarean delivery. One of the efforts to increase the coverage of family planning participation and to improve the quality of postpartum mother's health is to seek family planning after delivery. Postpartum family planning is the use of contraceptive methods immediately after delivery to 6 weeks (42 days).[2,3]

Population and family planning programs offer a range of relatively safe and effective contraceptive methods of postpartum delivery, one of which is the post-placebo intrauterine device (IUD). Following the Indonesian Health Technology Assessment issued by the Ministry of Health on family planning during the breastfeeding period, one of the efforts in increasing the use of long-term contraceptives aimed at postpartum mothers by using post-placebo IUD in regulating gestational distances without affecting the production of breast milk (*air susu ibu*/ASI).[1,4]

The results of the Indonesian Health Technology Assessment Indonesia study showed several levels of expulsion at the time of insertion. For insertion on premature post-placenta (10 minutes after placenta born) are 9.5–12.5%, immediately insertion after delivery (more than 10 minutes to 48 hours postpartum) are 25–37%, and insertion during the postpartum interval (>4 weeks postpartum) are 3–13%. Expulsion generally occurs during the first three months post-insertion and at most in the first 4–6 weeks. Expulsion is the exclusion of an IUD from within the uterus that can occur partly or entirely.[1,4]

Post-placental IUD insertion after vaginal delivery has an expulsion rate of up to 24%. However, observational studies show that the rate of expulsion in post-placental insertion after the cesarean section is much lower. In theory, it is because placement on the fundus is more likely to minimize the failure and likelihood that the cervix is less fully dilate.[5,6]

The purpose of this study was to compare the incidence of expulsion in post-placental IUD insertion between mother with vaginal delivery and cesarean delivery.

Methods

The design of this study was a comparative cross-sectional. This study conducted at Dr. Hasan Sadikin General Hospital Bandung and Dr. Kariadi General Hospital Semarang from November 2017 to February 2018. Samples selected by consecutive sampling technique, which meets the selection criteria. The inclusion criteria in this study were mothers who gave vaginal delivery and cesarean delivery. They received post-placebo IUD insertion with the duration of use at least 4–6 weeks post-insertion, using a CuT 380A IUD. The subject of the study was the mother who gets insertion post-placenta IUD, both vaginal delivery and cesarean delivery. The subjects used have met the inclusion and exclusion criteria with the sample number of 96 respondents.

The data used in this study are primary and secondary. Primary data were obtained from respondents through interview technique and transvaginal ultrasound examination to determine the location and position of IUD related to expulsion occurrence. In contrast, secondary data obtained from maternity register in the hospital.

The selection of study subjects was conducted by looking at the existing maternity registers in each study site that met the inclusion and exclusion criteria. After obtaining the data through the maternity registers, the researcher contacted each respondent by phone and mail to confirm whether the respondent was willing to include in the study. Respondents selected and willing to undergo the transvaginal ultrasound to observe

the location and position of the IUD recruited for the study. The transvaginal ultrasound examination aims to determine the occurrence of expulsion on post-placebo IUD insertion in the vaginal delivery and cesarean delivery mother. Transvaginal ultrasound examination performed by obstetric and gynecologist specialist on duty at the study site.

The processing of the data collected analyzed using SPSS version 17 applications. The statistical test used in this study is the chi-square test (×2) with a 95% confidence level and 0.05 significance level. As an alternative test, Fisher's exact test used if the chi-square test is not appropriate.

This study approved by the Health Research Ethics Committee of Faculty of Medicine of Universitas Padjadjaran Bandung with the letter number: 1228/UN6.C.10/PN/2017.

Results

Table 1 shows the frequency distribution of respondent characteristics on the insertion of a post-placental intrauterine contraceptive device between mothers with vaginal delivery and cesarean delivery. Age characteristics had p value=0.174 and parity p value=0.343.

Table 2 shows that there are differences in the occurrence of expulsion on the insertion of a post-placenta intrauterine contraceptive device between mothers with vaginal delivery and cesarean delivery with p value=0.041. All respondents who experienced the occurrence of expulsion in the vaginal delivery group of 4 (8%) respondents.

Table 3 shows the relationship between age and parity with expulsion occurrence. The result was the p value=0.638 on variable age and p value=0.934 on variable parity.

Discussion

The respondent characteristic shows that the majority of respondents aged 20–35 years, 40 respondents in the vaginal delivery group, and 39 respondents in the cesarean delivery group with p value=0.174. Based on parity in two groups, it was almost equal between the vaginal delivery group and cesarean delivery with p value=0.343. Based on these results, it can be concluded that

Table 1 The Frequency Distribution of Respondent Characteristic on Two Group

Respondent Characteristic	Groups		p Value*
	Vaginal Delivery (n=48)	Cesarean Delivery (n=48)	
Age (years)			
<20	1 (2%)	5 (11%)	0.174
20–35	40 (83%)	39 (81%)	
>35	7 (15%)	4 (8%)	
Mean (SD)	29.03 (6.5)	29.03 (6.5)	
Range	16–47	16–47	
Parity			
Primiparous	13 (27%)	15 (31%)	0.343
Multiparous	33 (69%)	33 (69%)	
Grand multiparous	2 (4%)	0 (0%)	

Note: *Chi-square test

Table 2 The Relationship between the Post-placental IUD on Cesarian Delivery and Vaginal Delivery with Expulsion Occurrence

Post-placental IUD Insertion	Expulsion Occurrence		p Value*
	Yes (n=4)	No (n=92)	
Vaginal delivery	4 (8%)	44 (92%)	0.041
Cesarean section	0 (0%)	48 (100%)	

Note: *Fisher exact test

Table 3 The Relationship between Age and Parity with Expulsion Occurence

Age and Parity	Expulsion Occurrence		p Value*
	Yes (n=4)	No (n=92)	
Age (year)			
<20	0	6	0.638
20–35	4	75	
>35	0	11	
Parity			
Primiparous	1	27	0.934
Multiparous	3	63	
Grand multiparous	0	2	

Note: *Chi-square test

age and parity are homogeneous and feasible to compare.[7,8]

From the statistics results by using Fisher exact test, obtained p value=0.041, it means that there are differences in the expulsion occurrence of post-placenta IUD insertion between mother with vaginal delivery and cesarean delivery. A percentage of vaginal deliveries with an expulsion occurrence is higher, found in 4 (8%) respondents than the cesarean delivery, in which all respondents had no expulsion. The results mean that the post-placenta IUD insertion in vaginal delivery has a higher occurrence of expulsion than in cesarean delivery with a difference in age and parity.[7–8] Expulsion occurrence is higher on vaginal delivery than cesarean delivery because there is maximal dilatation cervix than cesarean.[10,11]

Post-placental IUD expulsion in vaginal delivery occurs due to the cervical dilatation in the lower segment of the uterus as well as the development of a thin lower uterine segment.[12] It is estimated to be the cause of partial expulsion.[13–15] While the cesarean delivery that is not planned before and conducted while entering the active period has a high risk as well.[16] In this study, all cesarean delivery is upon indication and planned so that the risk of expulsion minimized because it does not pass through an active phase of delivery that the cervix is not fully dilated. Post-placental IUD insertion after vaginal delivery has been shown to have an expulsion rate of up to 24%. However, observational studies show that the rate of expulsion in post-placental insertion after cesarean is much lower. Theoretically, because placement on the fundus is more likely to minimize the failure and likelihood, the cervix is less fully dilate.[15]

The results of this study found that all respondents in a vaginal delivery experienced partial expulsion. Expulsion is the exclusion of an IUD from within the uterus that can occur partly or entirely. Partial expulsion is a condition in which the IUD stem located below the internal os and cervical canal. In contrast, total expulsion is a condition in which the IUD stems out from inside the uterus through the cervix e.g., in the vagina.[15,17,18]

In this study, transvaginal ultrasound to evaluate the expulsion confirmed by obstetric and gynecologist specialists. Observed on two respondents with the location of the IUD stem is under internal os, and on two other respondents, the IUD stem located in the cervical canal. The expulsion rate of the IUD via vaginal insertion was not only the one helped by midwives but also found in mothers helped by medical doctors too. The results of interviews showed that some respondents complained of pain during sex, experiencing spots (spotting), and feel the discomfort because the IUD strings are too long, which interfering with sexual activity.

The risk factors that may lead to an IUD expulsion include age, parity, insertion time (cervix dilatation), previous expulsion history, type and size of the IUD, insertion techniques, and the attending medical personnel.[18–21]

Another factor is age and parity. In this study, the majority of respondents who experienced the incidence of expulsion mostly aged 20–35 years with parity of 2–4 (multipara). There was no significant association with age and parity of the incidence of expulsion. The result of this study supported by the study of Sucak et al.[7] that mentioned there is no significant correlation between the age of respondents with the incidence of IUD expulsion, both from normal labor and cesarean ones. Although there is no statistically

significant relationship, it showed the percentage of incidence of expulsion higher at <35 years old more (5%) than age >35 years (none).[22–24]

In this study, there was no relationship between parity and expulsion occurrence. This study wasn't differenced with the study from Garishah[25] that there was a significant relationship between parity and the incidence of expulsion in post placental IUD insertion, with a greater percentage of multiparous (66.3%), primipara (33.7%), and grand multipara (25.9%). Parity is a risk factor for expulsion, the occurrence of expulsion increases in multiparous with vaginal delivery due to cervical dilatation in the lowest uterine segment. Unplanned section cesarea deliveries also have a high risk but the effect of cervical dilatation and expulsion is still not enough evidence.[7]

Conclusion

There was a difference in expulsion occurrence on post-placental intrauterine device contraceptive insertion between mother with vaginal delivery and cesarean delivery. The expulsion occurrence of vaginal delivery is higher than cesarean delivery.

Conflict of Interest

There is no conflict of interest at all authors.

References

1. Direktorat Jenderal Bina Gizi dan Kesehatan Ibu dan Anak, Kementerian Kesehatan Republik Indonesia. Pedoman pelayanan keluarga berencana pasca persalinan di fasilitas kesehatan [Internet]. Jakarta: Kementerian Kesehatan Republik Indonesia; 2014 [cited 2018 June 20]. Available from: http://kesga.kemkes.go.id/images/pedoman/Buku%20Pedoman%20KB%20Pasca%20Persalinan.pdf.
2. United Nations, Department of Economic and Social Affairs, Population Division. World contraceptive use 2018 [Internet]. New York: United Nations; 2018 [cited 2018 July 22]. Available from: https://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2018/UNPD_WCU2018_Country_Data_Survey-Based.xlsx..
3. Pasha O, Goudar SS, Patel A, Garces A, Esamai F, Chomba E, et al. Postpartum contraceptive use and unmet need for family planning in five low-income countries. Reprod Health. 2015;12(Suppl 2):S11.
4. Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia. Situasi dan analisis keluarga berencana [Internet]. 2014 June 29 [cited 2018 July 22]. Available from: https://pusdatin.kemkes.go.id/resources/download/pusdatin/infodatin/infodatin-kb.pdf.
5. Lester F, Kakaire O, Byamugisha J, Averbach S, Fortin J, Maurer R, et al. Intracesarean of the copper T380A versus 6 week postcesarean: a randomized clinical trial. Contraception. 2015;91(3):198–203.
6. Chhari A, Zutshi V, Sharma R, BatraS. Comparison of post placental IUD with interval IUD. Int J Reprod Contracept Obstet Gynecol. 2015;4(4):1090–3.
7. Sucak A, Ozcan S, Çelen Ş, Çağlar T, Göksu G, Danışman N. Immediate postplacental insertion of a copper intrauterine device: a pilot study to evaluate expulsion rate by mode of delivery. BMC Pregnancy Childbirth. 2015;15:202.
8. American College of Obstetricians and Gynecologists' Committee on Gynecologic Practice; Long-Acting Reversible Contraceptive Expert Work Group. Committee Opinion No 672: clinical challenge of long-acting reversible contraceptive methods. Obstet Gynecol. 2016;128(3):e69–77.
9. Letti Muller AL, Lopes Ramos JG, Martins-Costa SH, Palma Dias RS, Valerio EG, Hammes LS, et al. Transvaginal ultrasonographic assessment of expulsion rate of intrauterine device inserted in the immediate postpartum period: a pilot study. Contraception. 2005;72(3):192–5.
10. Affandi B, Adriaansz G, Gunardi ER, Koeno H. Buku panduan praktis pelayanan kontrasepsi. 3rd Edition. 4th Printing. Jakarta: PT Bina Pustaka Sarwono Prawirohardjo; 2014.
11. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. Obstetri Williams. 23rd Edition. Volume 1. Jakarta: EGC; 2012.
12. Kapp N, Curtis KM. Intrauterine device insertion during the postpartum period: a systematic review. Contraception. 2009;80(4):327–36.

13. Jatlaoui TC, Marcus M, Jamieson DJ, Goedken P, Cwiak C. Postplacental intrauterine device insertion at a teaching hospital. Contraception. 2014;89(6):528–33.
14. Rahaman M, Sood AK, Srivasta AK. Evaluation of spontaneous expulsion after immediate postpartum intrauterine contraceptive devices (PPIUCDs) insertion. IOSR-JDMS. 2017;16(5):60–3.
15. Putri FH. Pengaruh penjahitan AKDR terhadap insiden ekspulsi pada pemasangan AKDR CuT 380A pascasalin seksio sesaria [thesis]. Jakarta: Universitas Indonesia; 2014 [cited 2018 March 30]. Available from: http://lib.ui.ac.id/file?file=digital/2016-2/20391336-SP-Farani%20Harida%20 Putri.pdf.
16. Hubacher D, Reyes V, Lillo S, Pierre-Louis B, Zepeda A, Chen PL, et al. Preventing copper intrauterine device removals due to side effects among first-time users: randomized trial to study the effect of prophylactic ibuprofen. Hum Reprod. 2006;21(6):1467–72.
17. Goldthwaite LM, Sheeder J, Hyer J, Tocce K, Teal SB. Postplacental intrauterine device expulsion by 12 weeks: a prospective cohort study. Am J Obstet Gynecol. 2017;217(6):674.e1–8.
18. Fernandes JHA, Lippi U. A clinical and ultrasound study on the use of postplacental intrauterine device. Einstein (São Paulo). 2004;2(2):110–4.
19. Nowitzki KM, Hoimes ML, Chen B, Zheng LZ, Kim YH. Ultrasonography of intrauterine devices. Ultrasonography. 2015;34(3):183–94.
20. Lindheim SR, Uhler ML. Pelvic ultrasonography and sonohysterography. In: Falcone T, Hurd WW, editors. Clinical reproductive medicine and surgery. Philadelphia: Mosby Elsevier; 2007. p. 441–60.
21. Evans A. Postpartum contraception. Womens Health Med. 2005;2(5):23–6.
22. The ACQUIRE Project. The postpartum intrauterine device: a training course for service providers: participant handbook. New York: EngenderHealth/The ACQUIRE Project; 2008.
23. Eroğlu K, Akkuzu G, Vural G, Dilbaz B, Akin A, Taşkin L, et al. Comparison of efficacy and complications of IUD insertion in immediate postplacental/early postpartum period with interval period: 1 year follow-up. Contraception. 2006;74(5):376–81.
24. Fritz MA, Speroff L. Clinical gynecologic endocrinology and infertility. 8th Edition. Philadelphia: Wolters Kluwer; 2011.
25. Garishah GH. Hubungan antara paritas terhadap kejadian ekspulsi IUD pada akseptor IUD post placental delivery pada persalinan spontan di Kota Magelang [undergraduate thesis]. Yogyakarta: Universitas Muhammadiyah Yogyakarta; 2013 [cited 2018 October 19]. Available from: http://repository.umy.ac.id/handle/123456789/7117.

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RESEARCH ARTICLE

Eel Cookies Supplement and Incidence of Diarrhea in Children Aged 12–24 Months

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Abstract

Diarrhea is one of the main causes of death in infants and toddlers in Indonesia. The Indonesian eel is a source of animal protein that contains high nutrients, including vitamin A and zinc, so it can be used to boost immunity. The objective of this study was to analyze the effect of eel cookies on the incidence of diarrhea in children. This was a double-blind randomized control trial (RCT) posttest study on 44 children aged 12–24 months at Garuda Public Health Center, Bandung city, who were selected using the simple random sampling method. The study was conducted for 2 months from January to February 2017. Data were analyzed using the Wilcoxon test. Results showed that there was an effect of eel cookies in reducing diarrhea incidence in toddlers ($p<0.001$), with no diarrhea condition seen among the toddlers among 18 children who had a history of diarrhea in the past and among 20 other children with no history of past diarrhea. In conclusion, eel cookies can reduce the incidence of diarrhea in children aged 12–24 months. Hence, it can be used as a functional food to improve child immunity as one of the efforts to prevent infectious diseases, especially diarrhea.

Key words: Diarrhea, eel cookies, supplementation

Suplementasi *Cookies* Ikan Sidat terhadap Kejadian Diare pada Balita Usia 12–24 Bulan

Abstrak

Penyakit diare merupakan salah satu penyebab kematian utama pada bayi dan balita di Indonesia. Ikan sidat merupakan salah satu sumber protein hewani yang banyak mengandung vitamin A dan seng sehingga dapat meningkatkan kekebalan tubuh. Tujuan penelitian ini adalah menganalisis pengaruh pemberian *cookies* ikan sidat terhadap kejadian diare pada balita. Desain penelitian dengan *randomized controll trial* (RCT) *posttest group design* dengan *double blind*. Subjek penelitian adalah balita usia 12–24 bulan di Puskesmas Garuda Kota Bandung sebanyak 44 responden. Penelitian dilakukan selama 2 bulan mulai Januari–Februari 2017. Pengambilan sampel dilakukan secara acak sederhana. Analisis data menggunakan Uji Wilcoxon. Hasil penelitian menunjukkan pengaruh pemberian *cookies* ikan sidat terhadap penurunan kejadian diare pada balita ($p<0,001$), yaitu tidak ada perubahan kondisi balita dari tidak diare menjadi diare dan terdapat 18 balita yang pernah memiliki riwayat penyakit diare mengalami perubahan setelah diberikan perlakuan sehingga tidak mengalami diare, sedangkan 20 orang di antara yang tidak memiliki riwayat penyakit diare setelah mendapatkan perlakuan tetap tidak mengalami diare. Simpulan, terdapat pengaruh pemberian *cookies* ikan sidat terhadap penurunan kejadian diare pada balita usia 12–24 bulan. Oleh karena itu, *cookies* ikan sidat dapat digunakan sebagai makanan fungsional untuk meningkatkan imunitas anak sebagai upaya pencegahan terhadap penyakit infeksi terutama diare.

Kata kunci: *Cookies* sidat, diare, suplementasi

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Introduction

Diseases, particularly diarrhea, is a primary cause of death in babies and toddlers in Indonesia, contributing 31.4% and 25.2% of the total number of deaths, respectively. Diarrhea is closely related to the nutrition issue, especially malnutrition. Diarrhea in all ages is one of the top four causes of death (13.2%) with the rates of 214 per 1,000 people for all ages and 900 per 1,000 for toddlers in 2012. The highest incident of diarrhea for toddlers is seen in the 12 to 24-month-old age group (7.6%).[1,2]

Low nutrition status is a significant risk factor that may cause diarrhea for babies and toddlers.[3] The nutrition status related to malnutrition can increase the morbidity and mortality caused by the defense system of the human body, which continues to weaken and change body immunity.[4]

Nutrition status influences every single aspect of children's health, including growth, development, physical activities, and responses towards infectious diseases. The cause of malnutrition is lack of nutrients and lack of food absorption in the digestive system.[5] Several studies have revealed that macronutrient or micronutrient deficiency might cause vulnerabilities to infectious diseases, including diarrhea. An infectious disease occurs due to reduced body's immunity, including cell immunity and IgA secretion.

Eel is an alternative source of protein which is better than beef because it has low cholesterol content and cheaper. Indonesia has a significant potential for the fishery, yet it is not corresponding with the increase in domestic fish consumption.[6,7] The Indonesian eel (*Anguilla* spp.) is a fish that has an economic value both for local and foreign markets. The eel contains higher nutrients such as protein, fat, vitamin, and minerals such as phosphor, zinc, selenium, and iron when compared to other fish.[8–10]

One of the by-products of eels is eel flour.[11] This flour can be used as a material of food diversification as well as food supplements and functional food products. One of the forms of the functional food products made of eels is eel cookies.[11]

This study aimed to analyze the effect of eel-based cookies consumption on the reduction of diarrhea incidence among toddlers aged 12–24 months old.

Methods

This was an experimental double-blind, randomized control trial (RCT) post-test group study. Neither the researchers nor the subjects of this study knew which intervention was provided to a particular subject. Subjects were chosen using a random sampling method and divided into two groups, namely the experimental group which received eel cookies and the control group which received cookies without eel content. The observed variable was the incidence of diarrhea. The eel cookies formulation was performed using chemical analysis to determine the water content, ash content, fat, protein, carbohydrate, vitamin A, and zinc. The results of the analysis were used as the basis for the formulating cookies using the best formula and method, which should be suitable for cookies based on the nutritional value obtained from the list of food compositions. Experts then produced the cookies at the Baking Research and Development (BReAD) Unit of Bogor Agricultural University. The subjects in this study include toddlers ranging from 12 to 24 months old who lived in the area of the Garuda Public Health Center Bandung who met the inclusion criteria. This research was performed from January to February 2017.

The screening applied to the subjects through several stages. First, toddlers aged 12–24 months were registered and information on daily health care was obtained. These toddlers then received a physical check-up to determine their health status. Lastly, 40 research subjects were obtained and randomized to determine which toddlers went into the experimental group and which went to the control group.

Data collected consisted of cookies consumed during the intervention by the subjects. Data on cookies consumption were collected every week and recorded into the daily cookies consumption form. Food consumption was evaluated using the three-day estimated food recording method (2 days of consumption and one day without consumption) before consuming cookies and after 30 days of intervention. Data on food consumption were then converted into nutrient units and averaged to obtain daily consumption numbers. The Nutrisurvey 2007 application was used to convert basic data into nutrients data. The Wilcoxon test was chosen for statistical analysis.

The study protocol was approved by the

Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia through the issuance of the ethical clearance letter number: 22/UN6.C1.3.2/KEPK/PN/2017.

Results

The characteristics of the research subjects and the number of eel cookies consumed are presented in Table 1.

The difference in the average body weight and the protein, vitamin A, and zinc inputs before and after consuming the cookies are listed in Table 2.

The analysis of the effect of eel cookies on the reduction of diarrhea incidence is presented in Table 3.

Table 3 presents that eel cookies affect diarrhea incidence reduction with $p<0.001$ ($p=0.000$), meaning that there was no change in the condition of toddlers from not having diarrhea to having diarrhea. There were 18 toddlers with a history of diarrhea who did not experience diarrhea after the treatment. Besides, 20 toddlers without any history of diarrhea maintain the absence of diarrhea after receiving the treatment.

Discussion

Table 1 presents the characteristics of subjects by the child sex, maternal occupational status, and maternal education level. Child sex distribution was similar between the intervention and control groups. The maternal occupational status did not differ greatly between the two groups with most mothers did not work (80% vs 70% in the intervention group and control group, respectively). The highest maternal education level was high school graduates (45% in both groups). Most toddlers received exclusive breastfeeding (65% vs 80% in the intervention and control groups, respectively). The incidence of diarrhea before the treatment did not differ greatly between the two groups, with 55% had a history of diarrhea in the intervention group and 45% of the toddlers in the control group had a history of diarrhea.

Education influences knowledge. The mother's knowledge about diarrhea will play an important role in improving the risk factors in her family that will eventually reduce the frequency of diarrhea occurrence among her family members. Lower knowledge and understanding

Table 1 General Characteristics of Subjects and Their Parents

Characteristics	Group and Number of Subject	
	Eel Cookies (n=20)	Control Cookies (n=20)
Sex		
Male	9	9
Female	11	11
Mother’s occupational status		
Working mother	4	6
Non-working mother	16	14
Mother’s education status		
Elementary school	1	1
Junior high school	6	3
Senior high school	9	13
Higher education/equivalent	4	3
Breastfeeding		
Exclusive breastfeeding	13	16
Non-exclusive breastfeeding	7	4
Pre-intervention diarrhea occurrence		
Occur	11	9
Does not occur	9	11
Post-intervention diarrhea occurrence		
Occur	0	2
Does not occur	20	18

Table 2 Analysis of Difference in Body Weight, Protein Input, Vitamin A Input, and Zinc Input

Difference	Groups		p Value*
	Eel Cookies (n=20)	Controlled Cookies (n=20)	
Body weight			
Before	23.45	17.55	0.114
After	24.60	16.40	0.024
Protein input			
Before	21.78	19.23	0.489
After	23.68	17.33	0.086
Vitamin A input			
Before	17.28	23.83	0.072
After	23.83	17.18	0.072
Zinc input			
Before	21.50	19.25	0.579
After	23.25	17.75	0.126

Note: *Mann-Whitney test

of diarrhea can result in a poorer ability to apply diarrhea information in daily life. Good maternal knowledge about diarrhea is expected to further improve the ability of mothers in handling and preventing diarrhea.[12]

The result of the analysis showed that there were no differences in the characteristics of the child's body weight before cookies provision (p value=0.114). After an intervention, a significant difference was seen between the bodyweight of toddlers in the intervention group and the control group (p value=0.024).

Bodyweight is the most important and most commonly used anthropometric measure in newborns (neonates). During infancy, weight can be used to observe the physical growth rate and nutritional status. Bodyweight is chosen because it has the best parameters and it is easy to use, easy to understand, and provides an overview of the current nutritional status. Bodyweight is one of the parameters for determining one's nutritional status. Several studies suggested that nutritional status has a significant risk factor in causing diarrhea in infants and toddlers. A low nutritional status in infants and toddlers is an important risk factor that can lead to diarrhea, especially in children aged 0–24 months.

The result of the analysis of the characteristics of protein input in children before the intervention showed that no difference was seen between the intervention group and the control group (p=0.489). After the intervention, this situation did not change (p=0.086).

The main function of protein for the body is to form new tissues and maintain the existing tissues. Protein can also function as a type of fuel if the body's energy needs are not met by carbohydrates and fats. Protein can regulate the balance of fluids in tissues and blood vessels by causing a colloidal osmotic pressure that can draw fluid from the tissues into the blood vessels. Another function of the protein relates to child

Table 3 Analysis of Effect of Eel Cookies to the Reduction of Diarrhea Incidence

Diarrhea Occurrence Before and After	n=40	Mean Rank (Min–Max)	p Value*
Negative rank	0	0	0.000
Positive rank	18	9.50	
Equal	22		

Note: *Wilcoxon test

growth and the development of child hormones, enzymes, and antibodies. The body's ability to fight infection depends on its ability to produce antibodies against organisms that can cause infections or to foreign substances that enter the body. The body also has the ability to detoxify toxins, which is controlled by enzymes, especially those found in the liver. In a state of protein deficiency, the body's ability to inhibit the toxic effects of toxic substances may decrease.[13]

There was no difference seen in the characteristics of vitamin A input between the intervention group and the control group (p=0.072), which did not change after the intervention (p value=0.072).

Vitamins are essential substances that are needed to help nutrient absorption and metabolism processes. A vitamin deficiency will cause health problems. Therefore, a certain amount of daily vitamin inputs need to be obtained, ideally from food. Other than its effect on eye health, vitamin A also acts as an anti-infection agent. The body's immune system function is reduced in vitamin A deficiency, making it susceptible to infectious diseases. If this occurs on the surface of the intestinal wall, diarrhea will occur. Children under five are susceptible to vitamin A deficiency.[14]

Analysis of zinc input before intervention showed no difference between the intervention group and the control group (p value=0.0579). This stayed the same after the intervention (p value=0.128).

Zinc plays a role in immunity cells, namely in the function of the T cells and in the formation of antibodies by the B cells. Zinc also plays a role in several reactions that zinc deficiency will affect a lot of body tissues, especially during growth, and the body’s immunity, especially against infectious diseases such as diarrhea. Zinc affects both the gastrointestinal system and, indirectly, the immune system. Zinc also plays a role in maintaining the integrity of the intestinal mucus through its function in cell regeneration and cell membrane stability. Zinc deficiency damages the epidermis and gastrointestinal mucus, facilitating an invasion of germs in the gastrointestinal tract.[14]

The average inputs of protein, vitamin A, and zinc before and after the intervention were not significantly different between the intervention and the control groups. Toddlers aged 1–3 years are passive consumers, so the input of food consumed is still very dependent on what is provided by the mother or parents. The pattern of food consumption in children under five is also still strongly influenced by the pattern of food consumption of parents or families.

The statistical analysis of the effect of providing eel cookies to the incidence of diarrhea showed that eel cookies consumption reduced the incidence of diarrhea (p=0.000). No diarrhea incident happened during the study and 18 toddlers with a history of diarrhea became better after consuming the cookies, which was apparent from the lack of diarrhea incidence. The 20 toddlers without a history of diarrhea still maintain the absence of diarrhea incidence after consuming the cookies.

Diarrhea prevention is important because diarrhea can cause death and deficiencies in infants and children. Efforts to reduce the incidence of diarrhea in children require the right intervention so infants and children become healthy and infectious diseases that may cause diarrhea can be prevented. The proven interventions to prevent the occurrence of diarrhea include improving child nutrition through the promotion of exclusive breastfeeding and complementary foods, provision of clean and safe drinking water, hygienic and healthy living behavior supported by the community and families, good sanitation and child immunization, and vitamin A and zinc supplements.

Findings in this study are in line with Asfianti et al.[15] that suggested vitamin A and zinc supplement provision to children aged 12–60 months can reduce the incidence of diarrhea. The incidence of diarrhea has decreased from 28.40% to 26.1% after vitamin A and zinc supplements are provided. Adequate nutrients, especially vitamins and minerals, are important to maintain an optimum immune system. Because most vitamins and minerals cannot be synthesized by the body, the consumption of diverse and balanced foods is very important especially food that becomes the source of vitamins and minerals such as fruits, vegetables, and animal-based foods.[16]

A study by Widayani et al.[17] on vitamin A and iron-containing biscuits to children under five showed significantly higher hemoglobin, ferritin, retinol, and total G immunoglobin levels at the end of the intervention. Another study that involved providing biscuits enriched with albumin protein of cork fish in children aged 4–5 years showed an increase in energy, protein, zinc, and Fe levels.[18]

Providing eel cookies with formulated nutrients that include protein, vitamin A, and zinc is an effort to prevent infectious diseases, especially diarrhea. Eel cookies are a type of functional food that is enriched with eel head flour.

Conclusion

In summary, eel cookies provision affects the reduction of diarrhea incidence in children aged 12–24 months. Therefore, eel cookies can be used as a functional food to improve children's immune systems as an effort to prevent infectious diseases, especially diarrhea.

Conflict of Interest

The authors declare no conflict of interest.

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References

1. Kementerian Kesehatan Republik Indonesia. Profil kesehatan Indonesia tahun 2013. Jakarta: Kementerian Kesehatan Republik Indonesia; 2014.
2. Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia. Basic health research (Riskesdas) 2013 [Internet]. Jakarta: Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia; 2013 [cited 2017 July 22]. Available from: http://labdata.litbang.kemkes.go.id/ccount/click.php?id=10.
3. Adisasmito W. Faktor risiko diare pada bayi dan balita di Indonesia: systematic review penelitian akademik bidang kesehatan masyarakat. MJHR. 2007;11(1):1–10.
4. Khalili B, Hart A, Mardani M, Khalili M, Mcardle F, Cuevas L. Diarrhea-associated micronutrient deficiencies and risk of subsequent diarrhea in admitted children to Hajar hospital in Shahrekord, Iran. Arch Clin Infect Dis. 2007;2(3):121–8.
5. Rodríguez L, Cervantes E, Ortiz R. Malnutrition and gastrointestinal and respiratory infections in children: a public health problem. Int J Environ Res Public Health. 2011;8(4):1174–205.
6. Sokib N, Palupi NS, Suharjo B. Strategi peningkatan konsumsi ikan di Kota Depok, Jawa Barat. Manaj IKM. 2012;7(2):166–71.
7. Utami DP, Gumilar I, Sriati. Analisis bioekonomi penangkapan ikan layur (*Trichirus* sp.) di Perairan Parigi Kabupaten Ciamis. JPK. 2012;3(3):137–44.
8. Okfrianti Y, Kamsiah, Veli DG. Pengaruh penambahan tepung ikan sidat (*Anguilla* spp) pada pembuatan tortilla chips terhadap nilai gizi, kadar air dan daya terima organoleptik. JSPI. 2013;8(2):139–52.
9. Polak-Juszczak L, Robak S. Macro- and microelements in eel (*Anguilla anguilla*) from the northern regions of Poland. J Elementol. 2015;20(2):385–94.
10. Suseno SH. Fatty acid profiles of tropical eel (*Anguilla* sp.) by-products. Adv J Food Sci Technol. 2014;6(6):802–6.
11. Tarau E. Pengaruh kombinasi tepung ikan sidat (*Anguilla marmorata* (Q.) Gaimard.) dan tepung terigu terhadap kualitas biscuit crackers [undergraduate thesis]. Yogyakarta: Universitas Atma Jaya Yogyakarta; 2011 [cited 2018 February 20]. Available from: http://e-journal.uajy.ac.id/1547/.
12. Fathia H, Tejasari M, Trusda SAD. Hubungan tingkat pendidikan dan pengetahuan ibu tentang diare dengan frekuensi kejadian diare balita di wilayah kerja Puskesmas Tamansari Bandung Oktober 2013–Maret 2014. GMHC. 2015;3(1):13–8.
13. Yunita R, Anggraini M, Wiyono S. Hubungan antara asupan protein, zink, vitamin A dan kejadian infeksi saluran pernafasan akut (ISPA) non pneumonia pada balita di RW 06 Kelurahan Cempaka Putih Kecamatan Ciputat Timur Tangerang Selatan. Nutrire Diaita. 2014;6(2):99–113.
14. Arnisam, Salfiyadi T, Lura LS. Hubungan asupan mineral zinc (seng) dan vitamin A dengan kejadian diare pada balita di Kecamatan Seulimeum. INJ. 2013;4(3):66–73.
15. Asfianti F, Nazir HM, Husin S, Theodorus. Pengaruh suplementasi seng dan vitamin A terhadap kejadian ISPA dan diare pada anak. Sari Pediatri. 2013;15(2):93–8.
16. Siswanto, Budisetyawati, Ernawati F.

Peran beberapa zat gizi mikro dalam sistem imunitas. Gizi Indon. 2013;36(1):57–64.
17. Widayani S, Syarief H, Sulaeman A, Setiawan B, Muhilal. Efikasi dan preferensi biskuit yang difortifikasi vitamin A dan zat besi (Fe) dan kaitannya dengan konsumsi, status gizi, dan respons imun anak balita [dissertation]. Bogor: IPB; 2007 [cited 2018 April 30]. Available from: https://repository.ipb.ac.id/handle/123456789/40899.
18. Sari DK, Marliyati SA, Kustiyah L, Khomsan A. Role of biscuits enriched with albumin protein from snakehead fish, zinc and iron on immune response of under five children. Pakistan J Nutr. 2014;13(1):28–32.

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RESEARCH ARTICLE

Implementation of Importance-Performance Analysis (IPA) for Improving Medical Students' Quality of Service in Teaching Hospital

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Abstract

One of the most relevant elements for improving the quality of an organization is the recognition of customer satisfaction and perceived quality of services. During their clerkship, medical students are required to work with different medical specializations in rotation and treat patients under the supervision of the attending physicians. The purpose of the study is to explore the medical students' quality of service using the importance-performance analysis (IPA) diagram that focused on the conformance level (CLi) between the actual service performance score and patient expectation score. This was a cross-sectional study involving 160 patients and patient caregivers at the Department of Pediatric of West Java Provincial Al-Ihsan Regional General Hospital Bandung, who was a purposive sampling method to participate in the study during January 2018. Results showed that the total CLi was less than 100%. The CLi scores for responsiveness, empathy, assurance, and reliability components were 84.57%, 84%, 83.56%, and 83.45%, respectively. It can be concluded that the services provided were good, but have not yet been able to meet the expectation of the patients. Overall, the IPA is useful to identify areas for strategic focus in improving the quality of services provided by medical students to help the hospital managers and faculty of medicine develop education management strategies.

Key words: Clerkship, IPA, service quality

Penerapan *Importance-Performance Analysis* (IPA) untuk Meningkatkan Kualitas Pelayanan Mahasiswa Selama Kepaniteraan di Rumah Sakit Pendidikan

Abstrak

Salah satu elemen yang paling relevan untuk meningkatkan kualitas organisasi adalah mengetahui kepuasan dan kualitas layanan yang dirasakan oleh konsumen. Selama kepaniteraan, mahasiswa kedokteran diwajibkan untuk berotasi melalui berbagai spesialisasi medis dan merawat pasien di bawah pengawasan dokter. Tujuan penelitian ini mengetahui kualitas pelayanan mahasiwa kedokteran dengan menggunakan diagram *importance-performance analysis* (IPA) yang berfokus pada tingkat kesesuaian (Tki) antara skor kinerja layanan aktual dan skor harapan pasien. Penelitian ini merupakan penelitian *cross-sectional* yang melibatkan 160 pasien dan penunggu pasien di Departemen Ilmu Kesehatan Anak di RSUD Al-Ihsan Provinsi Jawa Barat Bandung dengan metode *purposive sampling* selama bulan Januari 2018. Hasil penelitian menunjukkan bahwa total Tki kurang dari 100%. Skor Tki untuk komponen respons, empati, *assurance*, dan reliabilitas masing-masing adalah 84,57%, 84%, 83,56%, dan 83,45%. Dapat disimpulkan bahwa faktor layanan yang diberikan baik, tetapi belum memenuhi harapan pasien. Meskipun demikian, IPA berguna untuk mengidentifikasi area untuk fokus strategis dalam meningkatkan kualitas layanan yang diberikan mahasiswa kedokteran untuk membantu manajer rumah sakit dan fakultas kedokteran mengembangkan strategi manajemen pendidikan.

Kata kunci: IPA, kepaniteraan, kualitas pelayanan

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Introduction

Consumer satisfaction in health care services is particularly important to create greater involvement of the clients during health care processes and also to achieve higher patient compliance and avoid dissatisfaction that may trigger them to seek treatment elsewhere.[1] One of the most relevant elements for improving the quality of an organization is the understanding of customer satisfaction and customer's perceived quality of services.[2] Zulkarnain et al.[3] suggested that patients with a lower educational background are generally more satisfied than those with higher education. Gaps are often observed between the expectation categories and overall perception of quality.

Service quality can be measured from the perspectives of patient perception, patient expectation, patient satisfaction, and patient attitude. Due to the intangibility, inseparability, heterogeneity, and perishability characteristics of services, it is very difficult to define service quality. In the context of increasing access to information, along with tougher competition, patients become more demanding than ever. The advances in technology also enable patients to make comparisons quickly and accurately between available services.[4] SERVQUAL is an instrument that is useful to measure the functional quality of the organization, which is defined as the manner in which the health care service is delivered to the patients. The functional quality cannot be sustained in a health care setting without accurate diagnoses and procedures.[5]

During the clerkship, medical students are required to work with different medical specializations in rotation and treat patients under the supervision of the attending physicians. The importance-performance analysis (IPA) enables the hospital management to evaluate and identify the major strengths and weaknesses in the performance that become the key success factors of the hospital and the importance of the quality of services provided by medical students. The importance-performance analysis is a useful tool for directing continuous quality improvement towards higher education.[6]

This study aimed to assess the performance and the importance of the quality of services provided by medical students, as well as to determine the quality of services provided by medical students based on the performance and importance through the use of the cartesian diagram which reflects patients and patient caregivers satisfaction with the services provided by medical students during the clerkship period.

Methods

This study was a cross-sectional method, and the analysis tool used in this study was the IPA diagram with the conformance level to compare the actual service performance score to the patient expectations score for services provided by medical students.[6] Responses obtained from 160 patients and caregivers purposively sampling at the Department of Pediatric of the West Java Provincial Al-Ihsan Regional General Hospital, which is the main teaching hospital of the Faculty of Medicine, Universitas Islam Bandung period January 2018.

A modified SERVQUAL instrument had developed with 13 matched pair items for expectation and perception, which represented four attributes that considered to have a high and significant correlation with patient satisfaction in the health care setting. The four attributes included in this instrument were responsiveness, assurance, empathy, and reliability dimension. Five-point Likert response format (ranging from strongly agree=5 to strongly disagree=1) was used instead of the seven-point scale format based on the results of discussion with experts and the hospital management (Table 1).[5,7,8]

The dimensions included in the questionnaire listed in Table 2.

This study was with a tentative population size. The sample size calculated using the Lemeshow formula as follows.[9]

$$n = \frac{Z^2 \times P\,(1-P)}{d^2}$$

Description: n=the required minimum sample size; Z=confidence level with the z score at 95%=1.96; P=estimates of the population proportion with the maximum estimated=0.5; d= alpha (0.10) or sampling error=10%

The calculation of the sample size gave a minimum sample size of 96 participants. The researchers then decided to use a sample size of 160 participants.

The IPA was performed by calculating scores of importance and performance of system attributes resulted from users' perceptions and depicted on a two-dimensional grid.[10–14]

The conformance level of the respondents was performed by comparing the service performance

assessment score to the actual score of the patient expectations by using the following formula.[15]

$$CLi = \frac{Xi}{Yi} \times 100\%$$

Description: CLi=conformance level of respondent; Xi=actual service performance assessment score; Yi=patient expectation score

Through the calculation of the conformance level, the quality of services provided by medical students in the teaching hospital can be assessed to understand whether the services provided were satisfactory or not.

To understand the meaning of the conformance level score of each service factor, a cartesian diagram was used. The horizontal axis (X) represented the actual service performance score while the vertical axis (Y) represented the patient expectation score. To make it simple, each service factor that influence patient satisfaction was determined using the formula below.[15]

$$X = \frac{\Sigma Xi}{n} \qquad Y = \frac{\Sigma Yi}{n}$$

The cartesian diagram was used to determine the service factors with high-performance according to the patients and the service factors that were expected to have the best performance by the patients. The formula used was as follow.[15]

$$X = \frac{\sum_{i=1}^{n} Xi}{K} \qquad Y = \frac{\sum_{i=1}^{n} Yi}{K}$$

Where K represented the number of service dimensions that could affect patient satisfaction. The cartesian diagram used to map service quality is shown in Figure 1.

The study protocol had approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Islam Bandung.

Results

The results showed the total CLi was <100%, where the CLi for the responsiveness, empathy, assurance, and reliability dimension was 84.57%, 84%, 83.56%, and 83.45%, respectively (Table 3).

Figure 2 described the IPA of the quality of services provided by medical students. Quadrant A of the diagram indicated a high patient expectation towards the service factors, but the actual performance of the service was poor (Figure 1). Hence, factors in this quadrant should become the top priority for correction and improvement. There were 3 (three) factors in this quadrant, namely responsiveness 4 (services provided quickly and responsively to patients), assurance 3 (serving patients promptly), and empathy 1 (spend adequate time to serve patients).

Quadrant B indicated a high patient expectation towards the service factor and high actual performance of the factors. Thus, these need to be maintained. achievement of these services factors must be maintained. This quadrant consisted of 5 (five) service factors, i.e. reliability 2 (asking for information to patients in a good and clear manner), empathy 2 (pay serious attention to patients), responsiveness 1 (willing to respond to patients' complaints) and 2 (receive and serve patients well).

Quadrant C indicated that patient expectation was low for the service factors and the actual performance of the service factors was also low. Thus, even though they were not really a priority, the performance of these factors was needed. There were 5 (five) the service factors in this quadrant, namely reliability 1 (say greetings "*assalamualaikum wr. wb.*" before asking for information to patients), reliability

Table 1 Scale Used in Questionnaire

Five-Points Likert Scale Responses				
1) Actual service performance variable (X)				
1	2	3	4	5
Disappointing	Poor	Good	Satisfactory	Highly satisfactory
2) Patient expectation variable (Y)				
1	2	3	4	5
Highly unimportant	Unimportant	Quite important	Important	Very important

Table 2 Questionnaire Dimensions

Reliability	
1	Say greetings "*assalamualaikum wr. wb.*" before asking for information to patients.
2	Asking for information to patients in a good and clear manner.
3	Describe actions that will be performed to patients (anamnesis).
4	Say "*alhamdulillahirabbilalamin*" after finishing the session with patients.
Responsiveness	
1	Willing to respond to patients' complaints.
2	Receive and serve patients well.
3	Provide fair and non-discriminatory services to patients.
4	Services provided quickly and responsively to patients.
Assurance	
1	Convincing attitude and ability to make patients feel safe.
2	Polite and friendly when serving patients.
3	Serving patients promptly.
Empathy	
1	Spend adequate time to serve patients.
2	Pay serious attention to patients.

3 (describe actions that will be performed to patients (anamnesis)), reliability 4 (say "*alhamdulillahirabbilalamin*" after finishing the session with patients), responsiveness 3 (provide fair and non-discriminatory services to patients) and assurance 1 (convincing attitude and ability to make patients feel safe).

Quadrant D presented service factors with low patient expectation but the high actual performance of service that the performance of the service indicators here was excessive and no further attention for improvement was needed. No service factor was assigned in this quadrant.

The service performance assigned to the right side of the average performance line or in quadrant B could be categorized as service factors with good performance based on the average performance value of 5 out of 13 service factors, or 38.5%. Since almost half of the service factor performance was in this category, it can be stated that the performance of services by the medical students during clerkship in the teaching hospital was generally good.

The cartesian diagram also enables us to understand the level of patient expectation towards high-quality service performance for each service factor. The upper the position of a factor on the cartesian diagram, which is parallel to the Y-axis, indicates that the service factor has received attention from the service provider because it is considered important. Therefore, service factors located in this area are considered to be satisfactory. Service factors above the

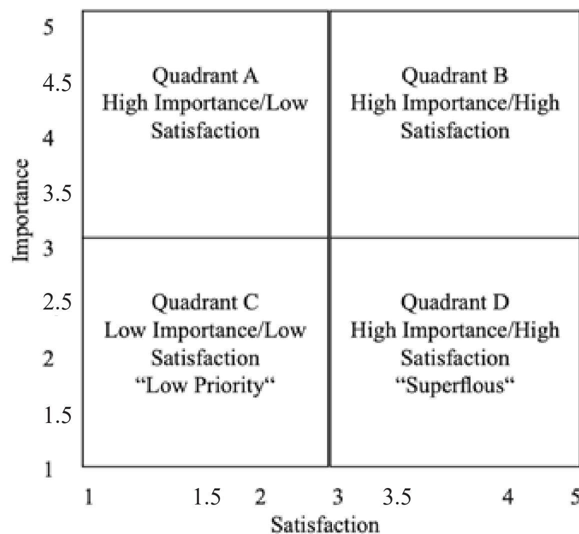

Figure 1 Cartesian Diagram[7]

Table 3 Conformance Level (Cli)

Dimension	CLi (%)
Responsiveness	84.57
Empathy	84
Assurance	83.56
Reliability	83.45

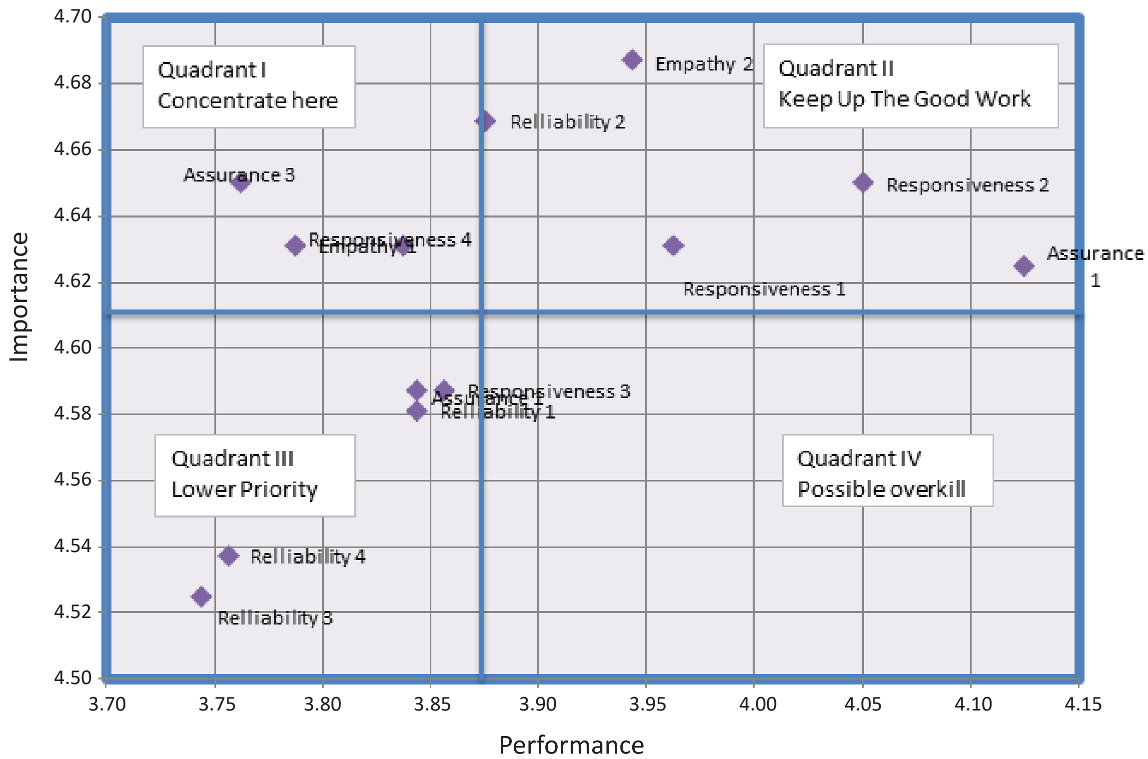

Figure 2 Importance-Performance Analysis (IPA) of the Quality of Services Provided by Medical Students During Clerkship in Teaching Hospital

average expectation line, or in quadrant A and B, are the focus of services performance development because they have exceeded the average expectations.

In terms of patient ratings, the best service performance dimension for services provided by medical students in Al-Ihsan Teaching Hospital at the time of the study was the responsiveness

Table 4 Average Score of Service Performance and Patients Expectation per Dimension

Instrument Number	Dimension	Number of per Dimensional Instrument	Performance		Expectation	
			Score	Average	Score	Average
1	Reliability	4	3.84	3.8	4.58	4.58
2			3.88		4.67	
3			3.74		4.53	
4			3.76		4.54	
5	Responsiveness	4	3.96	3.93	4.63	4.63
6			4.05		4.65	
7			3.86		4.59	
8			3.84		4.63	
9	Assurance	3	3.84	3.91	4.59	4.62
10			4.13		4.63	
11			3.76		4.65	
12	Empathy	2	3.79	3.87	4.63	4.66
13			3.94		4.69	

dimension a score of 3.93, which was the highest among all dimensions as depicted in Table 4. In contrast, the reliability dimension was considered as the poorest dimension, especially regarding describing actions that will be performed on the patients (anamnesis). The average score of service performance and patients expectation per dimension is shown in Table 4.

When patient expectation scores were ranked by dimension, the order of the scores was, from the highest to the lowest: empathy, responsiveness, assurance, and reliability. The sequence describes the level of patient expectation on service factors in each dimension. The higher the expectation score is, the more patients expect satisfactory service performance. In this study, patients expected the best service in the empathy dimension that comprised of adequate time to serve patients and pay serious attention to patients. However, the results as shown in Table 4 presented that the score for the service performance in the empathy dimension was still less than the scores in the assurance and responsiveness dimensions. This will lead to a reduced level of patient satisfaction despite the overall high service performance level achieved by the medical students.

Discussion

The service performances were good in general but still unable to meet the expectation of the patients. Medical students were seen to be willing to respond to patient complaints; receive and serve the patients well; ask for information to the patients in a good and clear manner; had a convincing attitude and make patients feel safe and pay serious attention to patients. This shows that the basic service elements were successfully implemented and should be maintained as very important and very satisfactory service elements.

On the other hand, there were also service factors that received high expectations from the patients but the actual performance was poor. These included the elements of services provided quickly and responsively to patients; serving patients promptly; and spend adequate time to serve patients. These service factors should be a top priority for correction and improvement.

Several factors underlie this poor performance including limited consultation time, too many patients visiting the pediatrics department, and the lack of privacy during medical student and patient interactions due to limited space.

Other factors were considered as less important by the patients and the implementation by the hospital was mediocre. These factors should become lower priorities for improvement because they were less important, even though they were less satisfactory. The factors considered in this group were greetings and salam in Islam. This is different with the study of Rafik and Priyono,[16] who is finding that the presence of good environment and Islamic value embodiment supporting learning programs on campus is the most significant trigger for the knowledge development.

This result is different from the findings of Zulkarnain et al.[3] where the responsiveness domain demonstrates the largest unfavorable gaps between performance and expectation, and the direction of the gaps indicates a higher perceived quality than expected. Campos et al.[17] also revealed different aspects of the attributes considered to be the most important, namely explanation and level of knowledge as well as attention dispensed by health professionals, which were included in the reliability dimension.

The biggest gap in the service performance from the perspective of patient expectation towards services provided by medical students is identified in the empathy dimension. In addition, there are gaps in the assurance and responsiveness dimensions, although not as big as in the empathy dimension. From the perspective of service performance, the responsive dimension is considered the best and the reliability dimension is considered the poorest.

The service factors that are considered to have met patients' expectation are the willingness to respond to patient complaints, ability to receive and serve patients well, ability to ask for information from patients in a good and clear manner, ability to show convincing attitude and make patients feel safe, and also ability to pay attention seriously to the patients. These factors need to be maintained.

In contrast, factors that are considered not satisfactory by patients due to the gap between patient expectation and actual performance of service are quick and responsive to patient, serve patients promptly, and adequate time for serving patients. These service factors should become the top priority for correction and improvement. Other factors also need to be improved, albeit in lower priority.

Once the patients' requirements have been clearly identified and understood, a manager will likely be in a better position to anticipate

and cater to their desires and needs rather than merely react to their dissatisfaction.[18] The role of the management here mainly includes training students in physical examination skills, patient expectation assessment, and relational and humanistic aspects of communication to show respect to individual patients.[19–21]

Evaluating a health care center's performance from the patient's point of view will improve the manager's understanding of customer satisfaction. Patients who are satisfied with their health care services are more likely to spread favorable word-of-mouth publicity.[22]

The IPA of the quality of services provided by the medical students during clerkship is useful for identifying areas that should become the strategic focus of the hospital managers and the faculty of medicine in developing education management strategies. Further studies are needed to determine the effectiveness of IPA of the quality of services provided by medical students during clerkship in a larger group. In addition, it is also necessary to study the effectiveness of this simulation model to improve a service quality in other teaching hospital departments in the future.

Conclusion

The service performances were good in general but still unable to meet the expectation of the patients. The biggest gap in the service performance from the perspective of patient is in the empathy dimension. The service factors that considered to meet patients' expectation is the willingness to respond to patient complaints, ability to receive and serve patients well, ability to ask for information from patients in a good and clear manner, ability to show convincing attitude and make patients feel safe, and also ability to pay attention seriously to the patients.

Conflict of Interest

All authors declare no conflict of interest.

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References

1. Coțiu MA. Consumer satisfaction in the healthcare sector. A critical review of some empirical studies. IJEPT. 2014;4(2):168.
2. Rodrigo-Rincón I, Reyes-Pérez M, Martínez-Lozano ME. Personalizing the reference level: gold standard to evaluate the quality of service perceived. Rev Esp Med Nucl Imagen Mol. 2014;33(2):65–71.
3. Zulkarnain AK, Kristina SA, Saraswati MS. Perceived service quality and patient satisfaction at pharmacy department in Yogyakarta Indonesia. Value Health. 2017;20(9):A157.
4. Sachdev SB, Verma HV. Relative importance of service quality dimensions: a multisectoral study. J Serv Res, 2004;4(1):94–116.
5. Akhade GN, Jaju SB, Lakhe RR. Healthcare service quality dimensions in various countries. IOSR-JNHS. 2016;5(3):70–6.
6. O'Neill MA, Palmer A. Importance-performance analysis: a useful tool for directing continuous quality improvement in higher education. Qual Assur Educ. 2004;12(1):39–52.
7. Hindarwati EN, Jayasari A. Analisis kualitas pelayanan PT Jasa Raharja dengan metode SERVQUAL. BBR. 2004;5(2):626–37.
8. Sarjono H, Natalia. SERVQUAL dalam pelayanan kelas pada laboratorium manajemen. Binus Business Rev. 2014;5(1):404–17.
9. Lwanga SK, Lemeshow S. Sample size determination in health studies: a practical manual. Geneva: WHO; 1991.
10. Martilla JA, James JC. Importance-performance analysis. J Mark. 1977;41(1):77–9.
11. Ainin S, Hisham NH. Applying importance-performance analysis to information systems: an exploratory case study. JIITO. 2008;3:95–103.
12. Cohen JF, Coleman E, Kangethe MJ. An importance-performance analysis of hospital information system attributes: a nurses' perspective. Int J Med Inform. 2016;86:82–90.
13. Sukumaran AKS, Anushan SCS, Alamelu R, Thiyagarajan S. Diagnosing SWOT through importance-performance analysis. Res J Appl Sci Eng Tech. 2015;9(9):792–6.
14. Aggelidis VP, Chatzoglou PD. Hospital information systems: measuring end user computing satisfaction (EUCS). J Biomed Inform. 2012;45(3):566–79.
15. Supranto J. Pengukuran tingkat kepuasan

pelanggan untuk menaikkan pangsa pasar. 4th Printing. Jakarta: Rineka Cipta; 2011.
16. Rafik A, Priyono A. A new insight into alumni satisfaction model for Islamic higher education institutions (IHEI). Manag Res Rev. 2018;41(12):1411–37.
17. Campos DF, Negromonte Filho RB, Castro FN. Service quality in public health clinics: perceptions of users and health professionals. Int J Health Care Qual Assur. 2017;30(8):680–92.
18. Fornell C. A national customer satisfaction barometer: the Swedish experience. J Mark. 1992;56(1):6–21.
19. Wykurz G, Kelly D. Developing the role of patients as teachers: literature review. BMJ. 2002;325(7368):818–21.
20. Hammond M, McLean E. What parents and carers think medical students should be learning about communication with children and families. Patient Educ Couns. 2009;76(3):368–75.
21. Ericson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. Acad Med. 2004;79(10 Suppl):S70–81.
22. Rodrigo-Rincón I, Reyes-Pérez M, Martínez-Lozano ME. Personalizing the reference level: gold standard to evaluate the quality of service perceived. Rev Esp Med Nucl Imagen Mol. 2014;33(2):65–71.

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RESEARCH ARTICLE

Relationship of Soil-transmitted Helminth and *Enterobius vermicularis* Infection with Anemic in Students in Aceh Besar

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Abstract

Helminthiasis is a disease caused by parasites in the form of worms, one of which is the type of soil-transmitted helminth (STH), *A. lumbricoides*, *T. trichiura*, *N. americanus*, and *A. duodenale* which infect humans through soil transmission. *Enterobius vermicularis* is the most common intestinal parasite in the whole world. Worms that live in the human intestine can cause malnutrition and anemic. This study aims to determine the relationship STH and *Enterobius vermicularis* infection with anemic of students in several elementary schools in Aceh Besar regency, Aceh province. This study was an analytical study using a cross-sectional study design conducted from May to November 2015. The sample consisted of the total sampling of 736 elementary school students, as well as using the inquiry method of Kato with stool specimens, cellophane tape anal swab, and hemoglobin. The correspondents who suffered from anemia and STH type helminthiasis, namely ancylostomiasis 7/7 students (100%, p=0.000); trichuriasis 30/58 students (51.7%, p=0.000) and 28 students not anemic (48.3%); and ascariasis 13/22 students (59.9%, p=0.002) and 9 students not anemic (41.1%). In enterobiasis infection, anemic students were 46/146 students (31.5%) and nonanemic students were 100 students (68.5%, p=0.634). In conclusion, all STH types related to the anemic status of the correspondent, and no correlation between anemic and infection of enterobiasis.

Key words: Anemic, *Enterobius vermicularis*, soil-transmitted helminth

Hubungan Infeksi *Soil-Transmitted Helminth* dan *Enterobius vermicularis* dengan Anemia pada Siswa di Kabupaten Aceh Besar Provinsi Aceh

Abstrak

Kecacingan adalah penyakit yang disebabkan oleh parasit berupa cacing, salah satunya jenis soil-transmitted helminth (STH), yaitu *A. lumbricoides*, *T. trichiura*, *N. americanus*, dan *A. duodenale* yang menginfeksi manusia melalui transmisi tanah. *Enterobius vermicularis* adalah parasit usus yang paling umum di seluruh dunia. Cacing yang hidup di usus manusia ini dapat menyebabkan kurang gizi dan anemia. Penelitian ini bertujuan mengetahui hubungan infeksi STH dan *Enterobius vermicularis* dengan anemia pada siswa sekolah dasar di Kabupaten Aceh Besar, Provinsi Aceh. Penelitian ini merupakan penelitian analitik menggunakan rancangan *cross-sectional study* yang dilaksanakan dari bulan Mei sampai November 2015. Sampel berupa *total sampling* 736 siswa sekolah dasar, serta menggunakan metode pemeriksaan Kato dengan spesimen feses, *cellophane tape anal swab*, dan hemoglobin. Koresponden yang menderita anemia dan kecacingan jenis STH, yaitu *ancylostomiasis* 7/7 siswa (100%, p=0,000); *trichuriasis* 30/58 siswa (51,7%; p=0,000) dan 28 siswa tidak anemia (48,3%); serta askariasis 13/22 siswa (59,9%; p=0,002) dan 9 siswa tidak anemia (41,1%). Pada infeksi enterobiasis, siswa yang anemia adalah 46/146 siswa (31,5%) dan tidak anemia 100 siswa (68,5%; p=0,634). Simpulan, semua kecacingan jenis STH berhubungan erat dengan status anemia pada koresponden, serta tidak terdapat hubungan antara anemia dan infeksi enterobiasis.

Kata kunci: Anemia, *Enterobius vermicularis*, *soil-transmitted helminth*

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Introduction

World Health Organization (WHO) reported that the case of helminthiasis in the world is still high. In the world, over 1 billion people infected by ascariasis, 795 million by trichuriasis, 500 million by enterobiasis, and 740 million by ancylostomiasis.[1] Helminthiasis is a disease caused by parasites in the form of worms. One of the causes of helminthiasis is soil-transmitted helminth (STH), which is the worm that lives in the intestine that transmitted to humans through soil contaminated feces containing infectious worm eggs.[2,3] Worms classified as STH were Ascaris lumbricoides, Trichuris trichiura, Necator americanus, Ancylostoma duodenale, and Strongyloides stercoralis.[1–5]

The STH infection is a chronic infection caused by parasitic worms with a high prevalence and mostly affects children under five and elementary school-age children. The contamination of worm eggs occurs because of soil contamination by feces. It eases the transmission of eggs from the ground to humans through hands contaminated by parasitic worm eggs, and then it goes into the mouth with food.[6–8]

Worms that live in the human intestine make a substantial contribution to the cases of other diseases. Examples of diseases caused by the worm are malnutrition because of roundworm infestations and anemia caused by hookworms. Roundworm consumes carbohydrates and proteins in the intestine before being absorbed by the body. Hookworms suck blood in the intestine, causing iron deficiency anemia (microcytic hypochromic). The symptom of anemia is pale and lethargic. These worms harm the growth and development of humans.[7,9–11]

Enterobius vermicularis is the most common intestinal parasite in the whole world. Enterobiasis is also a family disease that is easy to spread its eggs through clothing and other household appliances. Children aged 5–11 years more often experience *E. vermicularis* worms because of the lack of personal hygiene compared to adults who are more able to maintain cleanliness.[12]

In Indonesia, the prevalence of children with helminthiasis in 2008 is around 24.1%. Distribution of the prevalence of helminthiasis caused by ascariasis was 14.5%, trichuriasis was 13.9%, and ancylostomiasis was 3.60%.[13] The results of a survey conducted by the Research and Development Center for Animal Source Disease Control (*Balai Penelitian dan Pengembangan Pengendalian Penyakit Bersumber Binatang*) Tanah Bumbu in 2008 in South Kalimantan found that out of 1,964 examined children, 451 children (22.9%) were positive for helminthiasis. The most infection was ascariasis in 192 people (42.5%), trichuriasis found in 167 people (37%), ancylostomiasis (hookworm) in 63 people (13.9%), and enterobiasis in 15 people (7.93%).[14]

In the previous research at the Elementary School Gedong Bina Remaja in Semarang city, the result of the examination between helminthiasis and anemic showed that the percentage of respondents with anemia was higher (46.7%) compared to the one without anemia (11.8%).[9]

According to a study in Makassar City, the number of students suffering from severe helminthiasis with anemic was 27 people (27.8%), mild infections, and anemic 63 people (64.9%), non-infected and anemic seven people (7.21%) of the 97 students.[15]

Anemia is a public health problem throughout the world, with an estimated prevalence of 24.8%. Anemic can be defined as a condition in which the erythrocyte mass of circulating hemoglobin mass cannot fulfill its function to provide oxygen to body tissues. In Indonesia, the prevalence of anemia in school-aged children reaches 29%.[16,17] Anemia because chronic bleeding, one of which is due to worm infections, is generally more tolerable because the body will gradually compensate.[15,18]

Hemoglobin is a protein that is substantial in iron. It has an affinity, combining power, toward oxygen, and it can form oxyhemoglobin in red blood cells. Through this function, oxygen carried from the lungs to the tissues. The hemoglobin also functions to maintain the red blood cells normal shape.[17]

This study aims to determine the relationship of STH infection and *E. vermicularis* with anaemic of students in several primary schools in Aceh Besar regency, Aceh province.

Methods

This study was analytical research using a cross-sectional study design. The location of the study was in 10 elementary schools in Aceh Besar regency, Aceh province which conducted from May to November 2015. The sample was all students in the first and second degrees.

Stool specimen collected and anal swab performed. The fecal examination used the Kato method and cellophane tape for anal swab for *Enterobius vermicularis* to determine the

student's worm status. The specimens examine to determine hemoglobin degree to define anemic status.

In this study, the researcher tries to associate between the dependent variable (STH and *Enterobius vermicularis*) with the independent variable (hemoglobin).

The data were analyzed using SPSS version 20 for Windows. The data correlation used a chi-square correlation test with a significance level determined error of α=5% (0.05).

The study protocol had approved by the Health Research Ethical Committee, Faculty of Medicine, Universitas Sumatera Utara, Medan, with letter number: 503/KOMET/FK USU/2015.

Results

The result of the study found that the mostly respondents from class 1 of elementary school as many as 381 respondents (51.8%). Most of the respondents were female, with a percentage of 52.9%. Respondents suffering from helminthiasis were 233 students (31.7%) of 736 students (Table 1).

The highest number of STH helminthiases was trichuriasis with 58 respondents (7.9%) and enterobiasis with 146 respondents (19.8%). The other 87 students (11.9%) positively infected by STH and 146 students (19.8%) were positive to enterobiasis (Table 2).

Of the 87 students suffered from STH, 22 infected by ascariasis (3.0%), and 13 of 22 had anemia (p=0.002). Students infected by trichuriasis were 58 students (7.9%), 30 of 58 students had anemia (p=0.000). Those suffering from ancylostomiasis were 7 students (1.0%), all student suffering from anemia (p=0.000). 146 students (19.8%) infected by enterobiasis, 46 of 146 students suffer from anemic (p=0.634).

The students non-suffering from helminthiasis were 503 students (68.3%), suffering from anaemic were 124 students (24.7%), and non-suffering from anaemic were 379 students (75.3%, Table 3).

Discussion

From the results of fecal specimens and anal swabs, the prevalence of helminthiasis in elementary school students in Aceh Besar regency was 233 (31.7%). Providing students with albendazole 400 mg of worm medicine twice a year is effective in eradicating helminthiasis.[19] Several factors greatly influence the spread of worm infections including climate—such as rainfall, behavior, household conditions, poverty, and slum environment.[20]

The number of students suffering from helminthiasis was 87, while the ones with trichuriasis were 58 students (7.9%). Treatment with albendazole 400 mg orally with a single dose is not sufficient. According to the Centers for Disease Control and Prevention (CDC),[21] patients with *T. trichiura* should be treated with albendazole 400 mg for three consecutive days.

Ascariasis infection found in 22 students (3.0%) and ancylostomiasis infection found in 7 students (1.0%). A patient infected by ascariasis and ancylostomiasis treated with albendazole 400 mg (single dose). According to research by Dewayani et al.[19] in children of Public Elementary School I in the village of Tanjung Anom, Pancur Batu sub-district, Deli Serdang regency, North Sumatra, the success of a single dose of albendazole 400 mg reaches 100% cure rate. However, according to Annisa et al.[22] in children in Perokonda village, Southwest Sumba, the effectiveness of a single dose of albendazole for the treatment of ascariasis was only 69%.

Enterobiasis infection from laboratory tests using the anal swab examination method found in 146 students (19.8%) from 736 students. These worms generally infect children whose personal hygiene and live in an unfavorable environment. Bad personal hygiene and sanitation such as rarely changing bedsheets, sleeping in groups, exchanging clothes, and the frequency of changing underwear also speeds up the transmission of enterobiasis.[12] Also, the lack of children's knowledge on the transmission and prevention of helminthiasis causes enterobiasis infection. Enterobiasis can occur through 3 paths, which are from hand to mouth (autoinfection), by

Table 1 Characteristic of Respondents

Characteristic	n=736	Percentage
Class		
1	381	51.8
2	355	48.2
Gender		
Male	347	47.1
Female	389	52.9
Worm infestation		
Positive	233	31.7
Negative	503	68.3

Table 2 Characteristic of Respondents

Infection Type	n=233	Percentage (31.7)	Anemic (n=96)	Nonanemic (n=137)	p Value
Ascariasis	22	3.0	13	9	0.002
Trichuriasis	58	7.9	30	28	0.000
Ancylostomiasis	7	1.0	7	0	0.000
Enterobiasis	146	19.8	46	100	0.634

breathing air contaminated with *E. vermicularis* eggs infectious, and transmission by retro-infection which is the transmission that occurs in the patient.[23]

All respondents who had ancylostomiasis were also anemic (100%). These indicate that there was a close relationship between ancylostomiasis and anemia. Ancylostomiasis can cause anemic hemorrhage (blood loss) because ancylostomiasis sucks blood as much as 0.005–0.1 mL/worm/day.[24]

Trichuriasis in respondents suffering from anemic were 30 students (52%) out of 58 students (p=0.000), 28 students were not anemia (48%). This worm also sucks the blood of the host as many as 0.005 mL/worm/day so that anemia occurs. This study indicates that there was a significant relationship between trichuriasis as the cause of anemia in children.[23]

Respondents with ascariasis were 13 students out of 22 students (p=0.002). This worm sucks the essence of food from the patient's body that the patients were malnourished and consequently experiencing nutritional anemic. From these results, it shows that there is a close relationship between ascariasis and anemic in respondents who are the object of research. According to Ideham and Pusarawati,[25] *A. lumbricoides* can cause protein-energy malnutrition (PEM). In children with ascariasis, they can lose 4 grams of protein from a diet containing 35–50 grams of protein/day.

In students with enterobiasis, anemic found in 46 of 146 students, and nonanemic were 100 students (p=0.634). This worm does not cause anemia in patients because this worm does not suck blood from the patient's body. Enterobiasis only causes pruritus perianal, anxiety, loss of appetite, insomnia, and irritability, especially in children with high parasitic infections. This worm also causes children to become lazy and often sleepy because they cannot sleep well at night.[12]

Table 3 Hemoglobin Level of Students with No Helminthiasis

Category	n=503	Percentage
Anemic	124	24.7
Nonanemic	379	75.3

Conclusion

This study concluded that all STH types related to the anemic status of the children and that there is no correlation between anemia and infection of enterobiasis.

Conflict of Interest

There is no conflict of interest at all authors.

References

1. World Health Organization (WHO). WHO plans major scale-up of interventions for soil-transmitted helminthiases (intestinal worms) [Internet]. 2012 June 8 [cited 2015 November 4]. Available from: https://www.who.int/neglected_diseases/STH_scale_up_2012/en/.
2. World Health Organization (WHO). Soil-transmitted helminth infections [Internet]. 2015 March 30 [cited 2015 November 6]. Available from: https://www.who.int/news-room/fact-sheets/detail/soil-transmitted-helminth-infections.
3. World Health Organization (WHO). Soil-transmitted helminthiasis: eliminating soil-transmitted helminthiasis as a public health problem in children: progress report 2001–2010 and strategic plan 2011–2020. Geneva: WHO Press; 2012.
4. Parija SC, Chidambaram M, Mandal J. Epidemiology and clinical features of soil-

transmitted helminths. Trop Parasitol. 2017;7(2):81–5.
5. Khurana S, Sethi S. Laboratory diagnosis of soil transmitted helminthiasis. Trop Parasitol. 2017;7(2):86–91.
6. Safar R. Parasitologi kedokteran: protozoologi, helmintologi, entomologi. Bandung: Yrama Widya; 2010.
7. Ali AR. Penyakit cacing pada anak SD di Polewali Mandar tahun 2006–2007 [Internet]. 2009 February 19 [cited 2015 April 4]. Available from: https://arali2008.wordpress.com/2009/02/19/penyakit-cacing-anak-sd-di-polewali-mandar-tahun-2006-2008/.
8. Baharuddin. Pengaruh perilaku higienitas terhadap kejadian kecacingan pada murid sekolah dasar negeri di Kecamatan Meurebo Kabupaten Aceh Barat. Master [thesis]. Medan: Universitas Sumatera Utara; 2010 [cited 2016 January 2]. Available from: http://repository.usu.ac.id/handle/123456789/23779.
9. Ali MA, Sugiyanto Z, Suharyo. 2011. Hubungan infeksi helminthiasis dengan kadar hemoglobin (Hb) pada siswa SD Gedong Bina Remaja Kota Semarang 2011. Jurnal Visikes. 2012;11(2):80–7.
10. Tan X, Cheng M, Zhang J, Chen G, Liu D, Liu Y, et al. Hookworm infection caused acute intestinal bleeding diagnosed by capsule: a case report and literature review. Korean J Parasitol. 2017;55(4):417–20.
11. Centers for Disease Control and Prevention (CDC). Parasites - trichuriasis (also known as whipworm infection) [Internet]. January 10, 2013 [cited 2016 January 2]. Available from: https://www.cdc.gov/parasites/whipworm/index.html.
12. Chu TB, Liao CW, Nara T, Huang YC, Chou CM, Liu YH, et al. *Enterobius vermicularis* infection is well controlled among preschool children in nurseries of Taipei City, Taiwan. Rev Soc Bras Med Trop. 2012;45(5):646–8.
13. Departemen Kesehatan Republik Indonesia. Profil kesehatan Indonesia 2008. Jakarta: Departemen Kesehatan Republik Indonesia; 2009.
14. Balai Penelitian dan Pengembangan Pengendalian Penyakit Bersumber Binatang (Balai Litbang P2B2) Tanah Bumbu. Hasil survei tinja pada anak sekolah di SD Batuah I Pagatan, Kecamatan Kusan Hilir. Batulicin: Balai Litbang P2B2 Tanah Bumbu; 2009.
15. Ibrahim IA. Ascariasis dan trichuriasis sebagai faktor penentu kejadian anemia gizi besi anak SD di permukiman kumuh Kota Makassar. MGP. 2012;8(1):48–54.
16. Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia. Basic health research (Riskesdas) 2013 [Internet]. Jakarta: Indonesia Agency of Health Research and Development, Ministry of Health of Republic of Indonesia; 2013 [cited 2017 June 15]. Available from: http://labdata.litbang.kemkes.go.id/ccount/click.php?id=10.
17. Hoffbrand AV, Mass PAH. Essential haematology. 6th Edition. Oxford: Blackwell Publising; 2011.
18. Raspati H, Reniarti L, Susanah S. Anemia defisiensi besi. In: Permono HB, Sutaryo, Ugrasena IDG, Windiastuti E, Abdulsalam M, editors. Buku ajar hematologi-onkologi anak. 2nd Printing. Jakarta: Badan Penerbit IDAI; 2006. p. 30–43.
19. Dewayani BS, Situmeang R, Sembiring T, Hamid ED, Pasaribu S, Lubis CP. Albendazole pada soil transmitted helminthiasis. 2004 [cited 2016 January 2]. Available from: http://repository.usu.ac.id/handle/123456789/2015.
20. Chaiyos J, Suwannatrai K, Thinkhamrop K, Pratumchart K, Sereewong C, Tesana S, et al. MaxEnt modeling of soil-transmitted helminth infection distributions in Thailand. Parasitol Res. 2018;117(11):3507–17.
21. Centers for Disease Control and Prevention (CDC). Parasites - trichuriasis (also known as whipworm infection): treatmeant [Internet]. January 10, 2013 [cited 2016 January 2]. Available from: https://www.cdc.gov/parasites/whipworm/treatment.html.
22. Annisa I, Damayanti R, Trianto DM, Wiratama MP, Wahdini S, Sungkar S. Pengaruh pengobatan albendazol dosis tunggal terhadap infeksi soil-transmitted helminth dan status gizi anak di Desa Perokonda, Sumba Barat Daya. eJKI. 2017;5(2):114–20.
23. Sutanto I, Ismid IS, Sjarifuddin PK, Sungkar S. Buku ajar parasitologi kedokteran. 4th Edition. Jakarta: Badan Penerbit Fakultas Kedokteran Universitas Indonesia; 2011.
24. Irianto K. Parasitologi medis (medical parasitogy). Bandung; Alfabeta; 2013.
25. Ideham B, Pusarawati S. Helmintologi kedokteran. Surabaya: Airlangga University Press; 2007.

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RESEARCH ARTICLE

Dermatoglyphics Pattern on Breast Cancer Patients in Dharmais Cancer Hospital

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Abstract

Dermatoglyphics is a study of the epidermal ridge in fingers, palms, soles, toes, and formed under genetic control at the beginning of the development of the fetus around 6–7 weeks and continues until 20–21 weeks. The development of the breast begins in a 6-week-old fetus in the epidermis and at the bottom of the mesenchyme. The development of the finger ridges and breast occurs at six weeks of gestation, and the abnormal genomes can be detected at this period and observed through dermatoglyphics. The purpose of this study was to determine the dermatoglyphic patterns of breast cancer patients in Dharmais Cancer Hospital from 12 December 2018 to 1 January 2019. The study was a descriptive study with a purposive sampling method for the determination of the sample. The quantitative data collected using questionnaires while the prints of dermatoglyphic patterns were from the fingertips of the respondent. From 100 respondents, the left-hand fingers and right-hand fingers dominated by radial loop pattern with the most significant percentage on the middle finger 62% and 77%, respectively. While the ring finger dominated by the plain whorl pattern 43%. In conclusion, the dermatoglyphics pattern on breast cancer patients in Dharmais Cancer Hospital dominated by a radial loop pattern.

Key words: Breast cancer, dermatoglyphics, Dharmais Cancer Hospital

Pola Dermatoglifi Tangan Pasien Kanker Payudara di Rumah Sakit Kanker Dharmais

Abstrak

Dermatoglifi merupakan ilmu yang mempelajari tentang pola sulur pada jari, telapak tangan, telapak kaki, dan jari kaki yang terbentuk di bawah kontrol genetik pada awal perkembangan usia janin sekitar 6–7 minggu serta terus berkembang sampai usia 20–21 minggu. Perkembangan payudara dimulai pada janin berusia 6 minggu dalam bentuk gumpalan padat yang berada di epidermis dan di bagian bawah mesenkim. Perkembangan sulur dermal dan payudara terjadi pada usia kehamilan enam minggu dan genom tidak abnormal dapat dideteksi pada periode ini dan dapat teramati melalui dermatoglifi. Tujuan penelitian ini mengetahui pola dermatoglifi pada pasien kanker payudara di Rumah Sakit Kanker Dharmais dari tanggal 12 Desember 2018 hingga 1 Januari 2019. Penelitian ini merupakan studi deskriptif dengan metode *purposive sampling* untuk penentuan sampel. Data kuantitatif diperoleh dengan menggunakan kuesioner, sedangkan cetakan pola dermatoglifi berasal dari ujung jari tangan responden. Dari 100 responden, jari tangan kiri dan jari tangan kanan didominasi oleh pola *radial loop* dengan persentase terbesar pada jari tengah sebesar 62% dan 77% masing-masing. Sementara jari manis didominasi oleh pola *plain whorl* sebesar 43%. Simpulan, pola dermatoglifi pada pasien kanker payudara di Rumah Sakit Kanker Dharmais didominasi oleh pola *radial loop*.

Kata kunci: Dermatoglifi, kanker payudara, Rumah Sakit Kanker Dharmais

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Introduction

Dermatoglyphics is a study of the epidermal ridge in fingers, palms, soles, and toes.[1–7] Dermatoglyphics was formed under genetic control at the beginning of pregnancy development around 6–7 weeks in the form of volar pads and continues to develop and then will form on the surface of the skin until the age of 20–21 weeks, but can be affected by environmental factors during the first trimester of pregnancy.[1–4] This pattern will become permanent after four months of pregnancy and will not change throughout life.[8]

Early development of the breast begins in the 6-week-old fetus in the epidermis and at the bottom of the mesenchyme. The development of the finger ridges was in the form of volar pads and occurred at six weeks of gestation and will reach maximum size at 12–13 weeks of gestation. The genetic information that is in the normal and abnormal genomes can be detected in this period and can be observed through dermatoglyphics.[9]

The dermatoglyphic study used to prove whether specific fingerprint patterns correlate with several diseases. Some diseases reported correlating with fingerprint patterns such as down syndrome, mental retardation, multiple sclerosis, and thalassemia.[10] Raizada et al.[11] researched dermatoglyphics to carcinoma breast patients in India to determine whether dermatoglyphics could be used for screening or guide future research for breast cancer. In their research, it found that there were significant dermatoglyphic differences between breast cancer patients and healthy people. Sukre et al.[12] conducted a similar study, the results of their study showed that dermatoglyphics among breast cancer patients with healthy people were different too. The result of their research, it was stated that there was a significant difference percentage in finger pattern found in breast cancer patients where the whorl pattern on the right-hand thumb was 52% while the whorl pattern on the right hand of healthy people was 38%.

Breast cancer is a malignancy in breast tissue that can originate from the ductal epithelium or lobule.[13] Breast cancer generally occurs in women, at least about one-third of women who have cancer is breast cancer.[14]

Based on estimated data from the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) in 2012, breast cancer was the highest incidence of cancer worldwide in women as many as 1,671,149 (25% of all incident breast cancer cases), while the death is 521.907.[15] In the Asian continent, breast cancer was also the highest incidence of breast cancer in women at 650,983 (21%) of the female population, while the mortality rate is second only to lung cancer, which is 231,013 (13%) of female residents.[16] In the Indonesian region, according to 2014 Country Profiles WHO estimates, the incidence of breast cancer in women was first in 48,988 (30,5%) of the total population, whereas the highest mortality rate is 19,750 (21.4%).[17]

Breast cancer is a genetic disease that may show a typical dermatoglyphic pattern in the risk group. Breast cancer is most common in women from the age group of 45–55 years and dermatoglyphics can help identify an increased risk of developing breast cancer in women. Dermatoglyphic can also be the earliest diagnostic tool for breast cancer.[12] The study of the dermatoglyphic pattern is simple, does not need repetition, does not require much time, is not invasive, and inexpensive.[18] The purpose of this study was to determine the dermatoglyphic pattern on breast cancer patients at Dharmais Cancer Hospital.

Methods

This study using descriptive study and determination of sample was using purposive sampling. The quantitative data obtained from questionnaires and the results dermatoglyphic patterns used printed fingertips of the respondent. This study was carried out on 12 December 2018–1 January 2019 at Dharmais Cancer Hospital, Jakarta. The sample was 100 respondents, and the data collected after the subject agreed and signed informed consent. The target population in this study were breast cancer patients who were seeking treatment at Dharmais Cancer Hospital. The samples used in this study were respondents who met the criteria, which were breast cancer patients who had upper limbs, mainly hands without any deformity on one of the fingers. They were willing and filled out the research questionnaire and present it at the time of sampling. The type of fingerprint pattern in this study divided into eight categories, plain whorl, double loop whorl, central pocket loop whorl, accidental whorl, plain arch, tented arch, radial loop, and ulnar loop. The type of data used in this study is quantitative data from the results of the questionnaire. Cross-sectional data analysis used descriptive statistical techniques that were

processed using SPSS version 22.0.

This study had approved by the Health Research Ethics Committee of the Faculty of Medicine of the University of YARSI by ethical approval letter number: 230/KEP-UY/BIA/IX/2018.

Results

The following is a data distribution of fingerprint patterns on the right and left hand is in Table 1.

Based on Table 1, the frequency distribution type of fingerprint pattern of breast cancer patients consisted of radial loop 53.8%, plain whorl 23.2%, double loop whorl 8.3%, plain arch 5.7%, central pocket loop whorl 3.7%, ulnar loop 3.6%, tented arch 1.0%, and accidental whorl 0.7%. The left-hand fingers dominated by a radial loop pattern (Figure a) with the most significant percentage on the left middle finger, which was 62%. The right hand dominated by a radial loop with the highest found on the right middle finger that was 77% while the ring finger dominated by the plain whorl (Figure b) pattern that was 43%.

In this study, respondents were grouped based on data on age, gender, ethnicity of the father, and ethnic group. The following is the distribution of respondent data based on demographic data in Table 2.

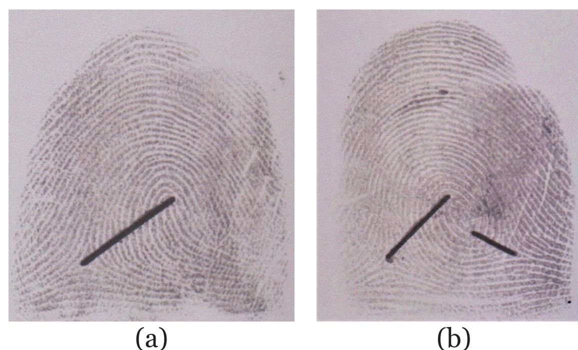
Based on Table 2, breast cancer patients were all females (100%) and over 40 years old (88%). Based on the ethnic characteristics of parents, the respondents in this study dominated by Javanese parents.

Discussion

The dermatoglyphics pattern of breast cancer patients in Dharmais Cancer Hospital dominated by radial loop patterns. Madhavi et al.[18] conducted

Table 1 Frequency Distribution of Finger Ridges

Finger Ridges	Frequency of Finger Ridges										Total (%)
	Left Hand (n=100)					Right Hand (n=100)					
	Thumb	Index Finger	Middle Finger	Ring Finger	Little Finger	Thumb	Index Finger	Middle Finger	Ring Finger	Little Finger	
Plain whorl	24	23	15	33	15	25	24	12	43	18	23.2
Double loop whorl	20	8	6	3	8	19	6	3	6	4	8.3
Central pocket loop whorl	1	5	4	4	4	1	6	0	6	6	3.7
Plain arch	7	9	7	5	9	3	6	4	5	2	5.7
Tented arch	0	2	1	2	2	0	1	1	0	1	1.0
Radial loop	44	38	62	52	59	51	50	77	39	66	53.8
Ulnar loop	2	13	5	1	2	1	6	3	1	2	3.6
Accidental whorl	2	2	0	0	1	0	1	0	0	1	0.7



(a) (b)

Figure (a) Radial Loop Pattern and (b) Plain Whorl Pattern on Right Hand Breast Cancer Patients in Dharmais Cancer Hospital

Table 2 Demographics based on Age, Father and Mother Tribe

Categories	Breast Cancer n=100 (%)
Age (years)	
≤40	12
>40	88
Gender	
Women	100
Father's tribe	
Sunda	28
Jawa	39
Betawi	11
Sumatera	16
Sulawesi	2
Kalimantan	3
Flores	1
Mother's tribe	
Sunda	29
Jawa	36
Betawi	11
Sumatera	17
Sulawesi	2
Kalimantan	4
Flores	1

a study of fingerprint patterns between breast cancer patients and non-cancer people in India. The results of their study showed that breast cancer patients' right hand were dominated by the whorl pattern, which was equal to 53.2%, whereas, in healthy people, the whorl pattern was 15.8%. While in the left-hand, breast cancer patients dominated by the whorl pattern, which was equal to 56%, and in healthy people, the whorl pattern was only 16.2%. The results of their study did not specifically mention which whorl pattern in breast cancer patients. Lavanya et al.[9] also conducted a similar study in India. The results of the study showed that breast cancer patients dominated by the whorl pattern, which equal to 53.3% and in healthy people 23.3%. Therefore, based on the results of the above studies, the finger pattern of breast cancer patients in this study and India had different dominance. Radial loop patterns dominated the breast cancer dermatoglyphics in this study, while whorl patterns dominated the fingerprint pattern of breast cancer in India. The differences in the results of these studies may differ due to environmental, ethnic, and racial influences.[14]

This study found that breast cancer patients were all female (100%) and over 40 years old (88%). According to YKPI,[19] being a woman and increasing age would increase the incidence of breast cancer.[20] Breast cancer is cancer that is more common in women.[21] Women are 100 times more at risk of breast cancer than men.[22] At the age of ≥40 years, the hormone progesterone cannot be produced in sufficient quantities so that the production of the hormone estrogen cannot be resisted.[23] These theories support the result of this study.

Based on the ethnic characteristics of the respondent's parents, the respondents in this study dominated by parents who were Javanese. *Pusat Data dan Statistik Pendidikan dan Kebudayaan* (PDSPK) stated that is most tribes in Indonesia are Javanese.[24]

Purbasari and Sumadji[25] researched on fingerprint pattern in ethnic groups. In their research, it mentioned that people who were Javanese and female sex dominated by a loop pattern of 62.38%.

Conclusion

The dermatoglyphic pattern of breast cancer patients at Dharmais Cancer Hospital was a radial loop pattern.

Conflict of Interest

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

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References

1. Abilasha S, Harisudha R, Janaki CS. Dermatoglyphics: a predictor tool to analyze the occurrence of breast cancer. IJMRHS. 2013;3(1):28–31.
2. Pakhale SV, Borole BS, Doshi MA, More VP. Study of the fingertip pattern as a tool for the identification of the dermatoglyphic trait in bronchial asthma. J Clin Diagn Res. 2012;6(8):1397–400.
3. Raizada A, Johri V, Ramnath T, Chowdhary D, Garg R. A cross-sectional study on the palmar dermatoglyphics in relation to

carcinoma breast patients. J Clin Diagn Res. 2013;7(4):609–12.
4. Sharma A, Sood V, Singh P, Sharma A. Dermatoglyphics: a review on fingerprints and their changing trends of use. CHRISMED J Health Res. 2018;5(3):167–72.
5. Singh S, Khurana AK, Harode HA, Tripathi A, Pakhare A, Chaware P. Study of fingerprint patterns to evaluate the role of dermatoglyphics in early detection of bronchial asthma. J Nat Sci Biol Med. 2016;7(1):43–6.
6. Vaidya P, Mahale S, Badade P, Warang A, Kale S, Kalekar L. Dermatoglyphics in periodontics: an assessment of the relationship between fingerprints and periodontal status - a cross-sectional observation study. Indian J Dent Res. 2017;28(6):637–41.
7. Kc S, Maharjan N, Adhikari N, Shrestha P. Qualitative analysis of primary fingerprint pattern in different blood group and gender in Nepalese. Anat Res Int. 2018;2018:2848974.
8. Singh A, Gupta R, Zaidi SHH, Singh A. Dermatoglyphics: a brief review. Int J Adv Integr Med Sci. 2016;1(3):111–5.
9. Lavanya J, Saraswathi P, Vijayakumar J, Prathap S. Analysis of dematoglyphic traits in patients with breast cancer. J Pharm Biomed Sci. 2012;23(24):1–5.
10. Jamalian M, Mesri M, Vishteh HRK, Solhi H, Salehpour R. Fingerprints: a simple method for screening hemophilic patients. Bangladesh Med Res Counc Bull. 2014;40(2):85–8.
11. Raizada A, Johri V, Ramnath T, Chowdhary DS, Garg RP. A cross-sectional study on the palmar dermatoglyphics in relation to carcinoma breast patients. J Clin Diagn Res. 2013 Apr;7(4):609–12.
12. Sukre SB, Laeeque M, Mahajan A, Shewale SN. Dermatoglyphics in the identification of women either with or at risk of breast cancer. IJBMS. 2012;3(5):160–5.
13. Moore KL, Dalley AF. Anatomi berorientasi klinis. 5th Edition. Jilid 1. Jakarta: Penerbit Erlangga; 2013.
14. Sariri E, Kashanian M, Vahdat M, Yari S. Comparison of the dermatoglyphics characteristics of women with and without breast cancer. Eur J Obstet Gynecol Reprod Biol. 2012;160(2):201–4.
15. International Agency for Research on Cancer (IARC) World Health Organization (WHO). Cancer fact sheets: breast cancer [Internet]. 2016 [cited 2018 September 25]. Available from: https://gco.iarc.fr/today/data/pdf/fact-sheets/cancers/cancer-fact-sheets-15.pdf
16. International Agency for Research on Cancer (IARC) World Health Organization (WHO). Population fact sheets: Asia [Internet]. 2012 [cited 2018 September 25]. Available from: https://documentcloud.adobe.com/link/track/?pageNum=1&uri=urn%3Aaaid%3Ascds%3AUS%3Aa0b12e73-ac7a-45ea-ae11-ce06671e5f39.
17. World Health Organization (WHO). Cancer country profiles: Indonesia [Internet]. 2014 [cited 2018 September 25]. Available from: https://www.who.int/cancer/country-profiles/idn_en.pdf..
18. Madhavi D, Dorairaj S, Dorairaj SSJ, Kommuru H. Dermatoglyphic study in breast carcinoma patients. IJSR. 2016;5(10):837–40.
19. Yayasan Kanker Payudara Indonesia (YKPI). Tentang kanker payudara: penjelasan umum [Internet]. 2015 [cited 2019 January 9]. Available from: https://pitapink-ykpi.or.id/tentang-kanker-payudara/.
20. Sjamsuhidajat R, Prasetyono TOH, Rudiman R, Riwanto I, Tahalele P. Buku ajar ilmu bedah. 4th Edition. Volume 2. Jakarta: EGC; 2017.
21. Kumar V, Abbas AK, Aster JC, Ham M, Saraswati M. Buku ajar patologi Robbins. 9th Edition. Philadelphia: Saunders; 2015.
22. Sihombing M, Sapardin AN. Faktor risiko tumor payudara pada perempuan umur 25–65 tahun di lima kelurahan Kecamatan Bogor Tengah. Kespro. 2014;5(3):175–84.
23. Irawan ED, Wahyuningsih, Fatimah FS. Hubungan antara usia menarche dan riwayat keluarga dengan kejadian kanker payudara pada wanita usia 35–60 tahun di Ruang Kemoterapi RSUD Panembahan Senopati Bantul Yogyakarta [undergraduate thesis]. Yogyakarta: Universitas Alma Ata; 2017 [cited 2019 January 12]. Available from: http://elibrary.almaata.ac.id/707/1/naspub%20eko.pdf.
24. Pusat Data dan Statistik Pendidikan dan Kebudayaan (PDSPK) Kementerian Pendidikan dan Kebudayaan Republik Indonesia. Analisis kearifan lokal ditinjau dari keragaman budaya [Internet]. Jakarta:

PDSPK Kementerian Pendidikan dan Kebudayaan Republik Indonesia; 2016 [cited 2019 January 13]. Available from: http://publikasi.data.kemdikbud.go.id/uploadDir/isi_F9B76ECA-FD28-4D62-BCAE-E89FEB2D2EDB_.pdf.
25. Purbasari K, Sumadji AR. Variasi pola sidik jari mahasiswa berbagai suku bangsa di Kota Madiun. Florea. 2017;4(2):47–54.

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RESEARCH ARTICLE

The Quality of Life on Asthmatic Adolescent and Its Correlation with the Severity and Control of Asthma

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Abstract

Asthma is considered a global health problem that, if not managed properly, can reduce the sufferers' quality of life. The purpose of the study was to evaluate the quality of life from the perspectives of asthma severity and the asthma control level. A cross-sectional study was conducted from February to June 2018 on asthmatic adolescents aged 12–14 years old in two public junior high schools in Bandung city, Indonesia. The diagnosis, history of asthma, severity, and asthma control were established based on the National Asthma Guidelines from the Indonesian Pediatric Society, Global Initiative for Asthma (GINA), asthma control test (ACT), and ISAAC questionnaire. Statistical analysis performed using SPSS v.20 with Spearman's rho to determine the significance. The gender distribution of the 98 subjects was almost similar with slightly more girls (51%). The median age was 13±1 years with average ACT, FVC, and PAQLQ(S) total scores of 20±4, 78±16%, and 5.3±1.3, respectively. The domain scores for symptoms, activity limitations, and emotional function were 4.9±1.4, 5.0±1.3, and 5.7±1.1, respectively. There are correlations between the total PAQLQ(S) score and asthma severity ($p<0.001$, $r=-0.5$) and the level of asthma control ($p<0.001$, $r=0.6$). In summary, the quality of life has a relationship with asthma severity and the level of asthma control. Asthma management should not only focus on medication but also ways to maintain a good quality of life.

Key words: Adolescents, asthma, PAQLQ(S), quality of life

Kualitas Hidup Remaja Asma dan Hubungannya dengan Kekerapan Gejala dan Derajat Kendali Asma

Abstrak

Asma masih menjadi masalah kesehatan penting yang jika tidak ditangani baik, asma dapat menurunkan kualitas hidup anak. Tujuan penelitian ini menilai kualitas hidup dan hubungannya dengan kekerapan gejala dan derajat kendali asma. Penelitian *cross-sectional* ini dilaksanakan dari bulan Februari hingga Juni 2018 pada remaja asma berusia 12–14 tahun di dua SMPN di Kota Bandung, Indonesia. Diagnosis, riwayat asma, kekerapan gejala, dan derajat kendali asma berdasar atas Pedoman Nasional Asma Anak Ikatan Dokter Anak Indonesia, *Global Initiative for Asthma* (GINA), *asthma control test* (ACT), dan kuesioner dari ISAAC. Analisis statistik menggunakan SPSS v.20 dengan uji *Spearman's rho* untuk menentukan signifikansi. Distribusi gender dari 98 subjek penelitian hampir sama dengan sedikit lebih banyak perempuan (51%). Usia rerata subjek 13±1 tahun dengan skor rerata ACT, FVC, PAQLQ(S) masing-masing 20±4, 78±16%, dan 5,3±1,3. Skor domain gejala, keterbatasan beraktivitas, dan fungsi emosi masing-masing 4,9±1,4; 5,0±1,3; dan 5,7±1,1. Terdapat hubungan skor total PAQLQ(S) dengan kekerapan gejala ($p<0{,}001$; $r=-0{,}5$) dan dengan derajat kendali asma ($p<0{,}001$; $r=0{,}6$). Simpulan, kualitas hidup berhubungan dengan kekerapan gejala dan derajat kendali asma. Pengelolaan asma sebaiknya tidak hanya memperhatikan pengobatan, tetapi juga menjaga kualitas hidup yang baik.

Kata kunci: Asma, kualitas hidup, PAQLQ(S), remaja

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Introduction

Asthma is a disease caused by chronic inflammation of the respiratory tract that has various symptoms and is characterized by a history of wheezing, chest tightness, and time and intensity-based coughing accompanied by limited expiratory airflow.[1] Asthma symptoms are chronic or recurrent and reversible. They are also more severe at night or in early mornings, usually arose when there is a trigger.[2]

The prevalence of asthma is 1–18% of the population in many countries.[1] In Indonesia, the prevalence of asthma among adolescents aged 13–14 years old is 2.6 to 24.4%.[2] A previous study stated that the prevalence of asthma among adolescents aged 13–14 years old in Jakarta is 12.2%.[3] The global community has agreed on the target to decrease the prevalence of asthma by 2025;[4] however, in the last two decades, the prevalence of asthma has continued to increase, especially in developing countries.[2,5] Globally, asthma is ranked 16th among the leading causes of years lived with disability and 28th among the leading causes of the burden of disease.[6]

The reason why asthma is still a global common heath problem is that it has not been managed properly; therefore, it reduces the quality of children's life, restricts their daily activities, disturbs sleeping, increases the rate of absenteeism of school, and decrease academic achievement. If asthma is not well-controlled, it can increase health costs.[2] Childhood asthma is linked to many physical health and psychosocial health conditions, which may cause significant decreases in the health-related quality of life of the children and their caregivers.[7]

Quality of life assessment is a multidimensional assessment as it does not only assess the effect of treatment on the physical or psychological aspects of the patients but also describes the health condition of the patients and families during or after treatment.[8] Thus, the determination of the quality of life of these patients can make the treatment decision making easier hence new solutions can be offered to the treatment team.[9]

A previous study suggested that the rate of impaired quality of life in asthma is relatively high (26.8–35%) with the degree of partly controlled and uncontrolled asthma variable becomes the risk factor for the low quality of life.[8] Children and adolescents with controlled asthma with intermittent asthma attacks and a history of low drug use have a better quality of life.[10,11] Controlled and partly controlled asthma children presented a total value of Pediatric Asthma Quality of Life Questionnaire (PAQLQ) that is higher than those with uncontrolled asthma ($p<0.001$). The group with mild asthma also had a higher total PAQLQ value, symptom domain, and emotional function domain compared to the moderate and severe asthma groups ($p<0.001$).[10]

The purpose of this study was to evaluate the quality of life of asthmatic adolescents and the correlation between the quality of life and the severity and level of asthma control.

Methods

A cross-sectional observational study on 98 adolescents with asthma aged 12–14 years old in two junior high schools in Bandung was conducted from February to June 2018. The inclusion criteria for this study were male and female adolescents with asthma aged 12–14 years old and parents or caregivers of asthmatic children who were willing to participate in this study. Participants were excluded if they had an acute attack or exacerbation of asthma, fever, coughing, and runny nose during the study. Those who could not do spirometry examination and had cognitive and motoric limitations were also excluded.

Asthma diagnosis and history were made based on the Global Initiative for Asthma (GINA), National Asthma Guidelines Indonesian Pediatric Society (Pedoman Nasional Asma Anak Ikatan Dokter Anak Indonesia/PNAA-IDAI), and questionnaires from the International Study of Asthma and Allergies in Childhood (ISAAC). The criteria for asthma severity were made based on the PNAA-IDAI with the following categories: intermittent (episodes of asthma symptoms <6 times per year or distance between symptoms ≥6 weeks), mild persistence (episodes of asthma symptoms >1 time per month, <1 time per week), moderate persistence (episodes of asthma symptoms >1 time per week, but not every day), and severe persistence (episodes of asthma symptoms occur almost every day). The degree of asthma control is categorized based on the PNAA-IDAI and asthma control test (ACT) for 12 years old into uncontrolled, partly controlled, and controlled with or without drugs. Asthma was considered to be controlled if the score was 25. A score of between 20–24 represented asthma that was partly controlled while a score of <19 indicated that the asthma was uncontrolled.

The quality of life was assessed based on the Pediatric Asthma Quality of Life Questionnaire (Standardized) (PAQLQ(S)) that consists of 23 questions in three domains, namely symptoms, activity, and emotional function. A scale of 1 to 7 was used, with 1 indicated severe interference, and 7 indicated no interference. The quality of life of adolescents with asthma was classified into the following categories: minimum or no impairment (score ≥6.0), moderate impairment (score 3.0–5.9), and severe impairment (score <3.0).

Examination of pulmonary function using spirometry conducted to determine the force expiratory volume 1 minute (FEV1) and force vital capacity (FVC) values as well as the FEV1/FVC ratio. Data were analyzed using SPSS v.20 software, and the significance of variables was identified using the Spearman 's rho test.

This study had approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Islam Bandung, Indonesia, through the issuance of the ethical clearance number: 313/Komite Etik.FK/III/2018.

Results

There were 105 students identified with asthma from a total of 2,579 students (4.1%). By applying the inclusion and exclusion criteria using the consecutive sampling approach, 98 research subjects were obtained.

The number of female subjects (51%) was slightly higher than the male subjects while the mean age of these subjects was 13±1 years. The average ACT score was 20±4 and the FVC value was 78±16%. The total score for PAQLQ(S) was 5.3±1.3 while the PAQLQ(S) scores for the symptom domain, activity limitation domain, and emotional function domain were 4.9±1.4, 5.0±1.3, and 5.7±1.1, respectively.

The characteristics of the study subjects based on the asthma severity, asthma control level, and quality of life are listed in Table 1.

Based on Table 1, most subjects had intermittent asthma (43%), partly controlled asthma (55 people), and moderate impairment.

The correlation between the components of quality of life and asthma severity as well as between quality of life and asthma control level can be seen in Table 2 and Table 3. The total PAQLQ(S) score and the PAQLQ(S) scores for all domains in severe persistent asthma group were lower than those in other severity levels of asthma. In severe persistent asthma, the quality was severely impaired (2.9±0.6), as described in Table 2.

There was a correlation between the total quality of life score (PAQLQ(S)) and the asthma severity ($p<0.001$, $r=-0.5$). Subjects with intermittent asthma had a higher total PAQLQ(S) score and overall domain scores. The less the frequency of symptoms is the higher the total PAQLQ score.

Table 3 shows that the mean total PAQLQ(S) score in the uncontrolled asthma group was lower (4.6[0.9]) than in the controlled asthma group (5.9[2.4]). There was a strong correlation between the total score of the quality of life (PAQLQ(S)) and the asthma control level ($p<0.001$, $r=0.6$). Subjects with uncontrolled asthma had a lower total PAQLQ(S) score and overall domain score.

Discussion

The results of this study revealed that the majority of subjects experienced intermittent asthma. A study by Banasiak[12] also found that most subjects had intermittent asthma in primary care. A previous study identified that children treated by asthma specialists were more likely to have severe persistent asthma and poorly controlled asthma compared with those seen by primary care physicians.[13] This study was conducted in the community so the results will be different if the study was done in a tertiary referral hospital

Table 1 Distribution of Asthma Severity, Asthma Control Level, and Quality of Life

Variables	n=98 (%)
Asthma severity	
Intermittent	42 (43)
Mild persistence	35 (36)
Moderate persistence	17 (17)
Severe persistence	4 (4)
Asthma control	
Controlled	37 (38)
Partly controlled	55 (56)
Uncontrolled	6 (6)
Quality of life (PAQLQ(S))*	
Without and minimal impairment	34 (35)
Moderate impairment	61 (62)
Severe impairment	3 (3)

Note: *PAQLQ(S)= Pediatric Asthma Quality of Life Questionnaire (Standardized)

Table 2 Correlation between Quality of Life Domain (PAQLQ(S)) Score and Asthma Severity

PAQLQ(S) Score	Asthma Severity				r	p*
	Intermittent	Mild Persistence	Moderate Persistence	Severe Persistence		
Total						
Mean (SD)**	5.8 (1.4)	5.1 (0.9)	4.9 (0.9)	3.9 (0.3)	−0.5	<0.001
Symptoms						
Mean (SD)	5.5 (1.3)	4.6 (1.2)	4.5 (1.2)	2.9 (0.6)	−0.4	0.001
Activity limitations						
Mean (SD)	5.6 (1.3)	4.7 (1.1)	4.6 (1.1)	3.3 (0.9)	−0.4	0.001
Emotional function						
Mean (SD)	6.1 (1.1)	5.4 (0.9)	5.3 (0.7)	4.1 (0.5)	−0.5	<0.001

Note: *Spearman's rho; **SD: standard deviation; significantly statistic ($p<0.05$)

where asthma cases with different severity are seen.

This study indicated that the majority of the study subjects with partly controlled and intermittent asthma. Silva et al.[14] also found that the majority of subjects in his study had partly controlled asthma. A previous study stated that most of its subjects had controlled asthma and other studies found that the majority of subjects experienced mild asthma.[15,16] Banjari et al.[17] found that most subjects in their study experienced uncontrolled asthma, while a different study found that the majority of patients with asthma were uncontrolled before being given inhaler therapy for six weeks.[18] Another study also found that only 12% of the subjects had controlled asthma.[19] The percentage of asthma control level varies in different countries, which might depend on the method used, the sample size, and the assessment tools used in the respective country. One study has shown that the subjects of the study, recruited from the pulmonology clinic, experienced severe and uncontrolled asthma. This will certainly be different if the subjects were recruited from general practitioner clinics, general pediatricians, and family doctors as they may only have mild asthma (controlled asthma).[17]

The findings of the current study suggested that the quality of life is related to asthma severity and asthma control level in adolescents. Intermittent and controlled asthma presents a higher total PAQLQ(S) score compared to severe and uncontrolled persistent asthma. Matsunaga et al.[10] also stated that the quality of life is directly related to controlled asthma and severity of asthma in children and adolescents, which is better in controlled asthma and mild asthma. In controlled and partly controlled asthma,

Table 3 Correlation between the Quality of Life Domain Score (PAQLS(S)) and Asthma Control Level

PAQLQ(S) Score	Asthma Control Level			r	p*
	Controlled	Partly Controlled	Uncontrolled		
Total				0.6	<0.001
Mean (SD)**	5.9 (2.4)	5.7 (1.1)	4.6 (0.9)		
Symptoms				0.6	<0.001
Mean (SD)	5.8 (2.4)	5.5 (1.0)	4.1 (1.2)		
Activity limitations				0.5	<0.001
Mean (SD)	5.8 (2.4)	5.4 (1.0)	4.3 (1.1)		
Emotional function				0.5	<0.001
Mean (SD)	5.8 (2.4)	6.0 (0.8)	5.0 (0.9)		

Note: *Spearman's rho; **SD: standard deviation; significantly statistic ($p<0.05$)

the PAQLQ(S) and overall domain scores were higher than uncontrolled asthma (p<0.001).[10] Uncontrolled asthma that is identified through frequent waking up at night, frequent wheezes, visits to the emergency rooms (ER), or hospital admission is associated with poor quality of life of both asthmatic children and their caregivers.[20]

Previous studies also found that groups with controlled asthma had higher PAQLQ scores.[21,22] El-Gilany et al.[23] also found that patients with controlled asthma have significantly better total score and domain scores from the three domains. Also, patients with severe asthma have significantly worse total and categorical PAQLQ scores.[23]

There is a strong correlation between the PAQLQ score and the asthma control test (ACT) score in moderate to severe asthma.[18] Several previous studies also indicate a strong correlation between ACT and PAQLQ,[24,25] that the degree of controlled asthma can affect the total score of quality of life for parents, children, and adolescents with asthma.[26] Management of asthma should not only be seen as a medical treatment. It should also include psychological supports and counseling to maintain the quality of life.[27]

This study has a limitation in not examining other factors related to the quality of life of asthmatics adolescents.

Conclusion

Quality of life is correlated with asthma severity and asthma control level in adolescents.

Conflict of Interest

Authors declare no conflict of interest in this article.

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References

1. Global Initiative for Asthma (GINA). Global strategy for asthma management and prevention. 2020 Update [Internet]. Bethesda: GINA; 2020 [cited 2020 April 14]. Available from: https://ginasthma.org/wp-content/uploads/2020/04/GINA-2020-full-report_-final-_wms.pdf.
2. Rahajoe N, Kartasasmita CB, Supriyatno B, Setyanto DB. Pedoman nasional asma anak. 2nd Edition. 2nd Printing. Jakarta: Ikatan Dokter Anak Indonesia; 2016.
3. Yunus F, Rasmin M, Sutoyo DK, Wiyono WH, Antariksa B, Fitriani F, et al. Prevalens asma pada siswa usia 13–14 tahun berdasarkan kuesioner ISAAC di Jakarta. J Respir Indo. 2011;31(4):176–80.
4. Global Asthma Network. The global asthma report 2014. Auckland, New Zealand: Global Asthma Network: 2014 [cited 2020 January 13]. Available from: http://www.globalasthmanetwork.org/publications/Global_Asthma_Report_2014.pdf.
5. Global Initiative for Asthma (GINA). Pocket guide for asthma management and prevention for adults and children older than 5 years: a pocket guide for health professionals. Update 2020. Bethesda: GINA; 2020 [cited 2020 April 13]. Available from: https://ginasthma.org/wp-content/uploads/2020/04/Main-pocket-guide_2020_04_03-final-wms.pdf.
6. Global Asthma Network. The global asthma report 2018. Auckland, New Zealand: Global Asthma Network: 2018 [cited 2020 April 14]. Available from: http://www.globalasthmareport.org/Global%20Asthma%20Report%202018.pdf.
7. Qu CX, Zhang ZK. Current views of pediatric asthma. Eur Rev Med Pharmacol Sci. 2017;21(4 Suppl):106–8.
8. Wigoeno Y, Sekartini R, Setyanto DB, Hadinegoro SRS. Assessing the quality of life of asthmatic children using the PedQL™. Paediatr Indones. 2011;51(5):245–51.
9. Kouzegaran S, Samimi P, Ahanchian H, Khoshkhui M, Behmanesh F. Quality of life in children with asthma versus healthy children. Open Access Maced J Med Sci. 2018;6(8):1413–8.
10. Matsunaga NY, Ribeiro MAGDO, Saad IAB, Morcillo AM, Ribiero JD, Toro AADC. Evaluation of quality of life according to asthma control and asthma severity in children and adolescents. J Bras Pneumol. 2015;41(6);502–8.
11. Miadich SA, Everhart RS, Borschuk AP, Winter MA, Fiese BH. Quality of life in children with asthma: a developmental perspective. J Pediatr Psycol. 2015;40(7):672–9.

12. Banasiak NC. Implementation of the asthma control test in primary care to improve patient outcomes. J Pediatr Health Care. 2018;32(6):591–9.
13. Nyenhuis SM, Akkoyun E, Liu L, Schatz M, Casale TB. Real-world assessment of asthma control and severity in children, adolescents, and adults with asthma: relationships to care settings and comorbidities. J Allergy Clin Immunol Pract. 2020;8(3):989–96.
14. Silva AAMD, Maciel ÁCC, Furtado PR, Tomaz RR, Macêdo TMF, Mendonça KMPP. Applicability of a generic questionnaire for quality of life assessment for asthmatic children. Rev Paul Pediatr. 2018;36(2):207–13.
15. Halwani R, Al-kufeidy R, Muharib BA, Alkhashram FM, Hussain SIB, Alhenaki RS, et al. Impact of asthma on the quality of life of adolescent patients from Saudi Arabia. J Lung Dis Treatment. 2016;2(3):1000114.
16. BinSaeed AA, Torchyan AA, Alsadhan AA, Almidani GM, Alsubaie AA, Aldakhail AA, et al. Determinants of asthma control among children in Saudi Arabia. J Asthma. 2014;51(4):435–9.
17. Banjari M, Kano Y, Almadani S, Basakran A, Al-Hindi M, Alahmadi T. The relation between asthma control and quality of life in children. Int J Pediatr. 2018;2018:6517329.
18. Karadeniz P, Özdoğan Ş, Ayyıldız-Emecen D, Öncül Ü. Asthma control test and pediatric asthma quality of life questionnaire association in children with poor asthma control. Turk J Pediatr. 2016;58(5):464–72.
19. Al Zahrani SS, El Morsy EMA, Dorgham LS. The impact of bronchial asthma on quality of life among affected children and adolescents in Taif city, Saudi Arabia. Life Sci J. 2014;11(6):283–91.
20. Ibrahim NK, Alhainiah M, Khayat M, Abulaban O, Almaghrabi S, Felmban O. Quality of life of asthmatic children and their caregivers. Pak J Med Sci. 2019;35(2):521–6.
21. Al-Gewely MS, El-Hosseiny M, Abou Elezz NF, El-Ghoneimy DH, Hassan AM. Health-related quality of life in childhood bronchial asthma. Egypt J Pediatr Allergy Immunol. 2013;11(2):83–93.
22. Voorend-van Bergen S, Vaessen-Verberne AA, Landstra AM, Brackel HJ, van den Berg NJ, Caudri D, et al. Monitoring childhood asthma: web-based diaries and the asthma control test. J Allergy Clin Immunol. 2014;133(6):1599–605.
23. El-Gilany AH, El Desoky T, El-Hawary AK, Farrag M. Quality of life of children with bronchial asthma and their caregivers: a hospital-based study. Prog Med Sci. 2018;2(1):1–8.
24. Nordlund B, Konradsen JR, Pedroletti C, Kull I, Hedlin G. The clinical benefit of evaluating health-related quality-of-life in children with problematic severe asthma. Acta Paediatr. 2011;100(11):1454–60.
25. Amaral LM, Moratelli L, Palma PV, Leite IC. The quality of life of Brazilian adolescents with asthma: associated clinical and sociodemographic factors. J Asthma. 2014;51(6):660–6.
26. Costa DD, Pitrez PM, Barroso NF, Roncada C. Asthma control in the quality of life levels of asthmatic patients' caregivers: a systematic review with meta-analysis and meta-regression. J Pediatr (Rio J). 2019;95(4):401–9.
27. Nair S, Nair S, Sundaram KR. A prospective study to assess the quality of life in children with asthma using the pediatric asthma quality of life questionnaire. Indian J Allergy Asthma Immunol. 2014;28(1):13–8.

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RESEARCH ARTICLE

The Effect of Health Education with Flashcard Media on Improvement of Knowledge and Reduction of Anxiety Degree in Adolescents Primigravida

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Abstract

The education about the reproductive health of pregnancy is needed to increase knowledge and reduce anxiety in adolescent primigravida, one of them is by conducting flashcard media. Flashcards are pictorial media in the form of cards that have words; it's proven to be able to create fun learning, attracts attention, and stimulates critical thinking. The purpose of the study was to analyze the effect of education with flashcard media on knowledge and anxiety degree in adolescent primigravidas. The research method used in this study was a one-group pretest-posttest quasi-experimental design. The number of samples as many as 30 people (<20 years old) at Sawah Lebar Public Health Center and Padang Serai Public Health Center in Bengkulu city from May to July 2018, by using consecutive sampling. The data of this study obtained from pretest and posttest questionnaires of knowledge, and Zung Self-rating Anxiety Scale (ZSAS), Shapiro-Wilk, Wilcoxon, and chi-square test statistics. The results showed a significant increase in knowledge before and after the intervention of p value=0.001 (p<0.05), an increase in the average score of knowledge of series one card amounts to 35.0% and knowledge of series 2–3 card amounted to 30%. A significant decrease in anxiety degree of 9.2% after the treatment (p<0.05). In conclusion, flashcards can increase knowledge and reduce the anxiety of adolescents primigravida mothers so that health workers use this educational approach appropriately.

Key words: Adolescent primigravida, anxiety, education, flashcard, knowledge

Pengaruh Edukasi Kesehatan dengan Media *Flashcard* terhadap Peningkatan Pengetahuan dan Penurunan Derajat Kecemasan pada Primigravida Remaja

Abstrak

Edukasi tentang kesehatan reproduksi kehamilan penting untuk meningkatkan pengetahuan dan mengurangi kecemasan pada primigravida remaja, salah satunya dengan media *flashcard*. *Flashcard* adalah media bergambar dalam bentuk kartu yang dilengkapi kata-kata; terbukti mampu menciptakan pembelajaran yang menyenangkan, menarik perhatian, dan merangsang untuk berpikir kritis. Penelitian ini bertujuan menganalisis pengaruh edukasi dengan media *flashcard* terhadap pengetahuan dan derajat kecemasan pada primigravida remaja. Metode yang digunakan dalam penelitian ini adalah *one-group pretest-posttest quasi-experimental design*. Jumlah sampel 30 orang (<20 tahun) di Puskesmas Sawah Lebar dan Puskesmas Padang Serai di Kota Bengkulu dari bulan Mei hingga Juli 2018 dengan menggunakan *consecutive sampling*. Data penilaian didapat dari kuesioner *pretest* dan *posttest* pengetahuan, *Zung Self-rating Anxiety Scale* (ZSAS), Shapiro-Wilk, Wilcoxon, dan statistik uji *chi-square*. Hasil penelitian menunjukkan peningkatan yang signifikan pada pengetahuan sebelum dan sesudah intervensi nilai p=0,001 (p<0.05), kenaikan skor rerata pengetahuan kartu seri 1 (35,0%) serta pengetahuan kartu seri 2–3 (30%). Penurunan signifikan derajat kecemasan 9,2% setelah perlakuan (p<0,05). Simpulan, *flashcard* mampu meningkatkan pengetahuan dan menurunkan kecemasan ibu primigravida remaja sehingga pendekatan edukasi ini dianggap efektif bagi pemberi asuhan.

Kata kunci: Edukasi, *flashcard*, kecemasan, pengetahuan, primigravida remaja

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Introduction

Indonesia is the 7th country with a high prevalence of young marriage in the world.[1] The regional average rate of births per 1,000 females 15–19 years of age is 48, with the estimated median age at first marriage is 20.4 years for women.[2]

There are many health consequences of early marriage, partly because young mothers are immature and lack access to social and reproductive services. Examples of such problems are increased risks for sexually transmitted diseases, cervical cancer, and transmission of HIV infection, bleeding, miscarriage, death during childbirth, and anemia during pregnancy, as well as increased risks of preeclampsia and eclampsia, obstetric fistula, and obstructed labor. Girls' offspring are at increased risk for premature birth, low birth weight, asphyxia, congenital neonatal infections, and death as neonates, infants, or children.[3-5]

The role of psychological factors in the healthy behaviors of pregnant women is a significant issue.[6] During pregnancy, women experience hormonal changes, which include estrogen and progesterone, which will cause various complaints such as nausea, vomiting, cravings, and emotional instability; the most prominent is anxiety.[7–9] Lack of knowledge and planning for the pregnancy of mothers about reproductive health problems and changes that occur during pregnancy will undoubtedly increase the anxiety that can increase the risk of pregnancy failure.[8]

When sensory systems detect information or stimulus in the brain, it will create a learning process in a person. The results of processing are stored in memory in the form of knowledge,[10] and improvement in the learning process can even reduce anxiety by up to 72% in middle and high school students tested in the final semester.[11]

The provision of care related to psychological aspects is still very minimal in Indonesian society, especially in conducting antenatal care examinations. The importance of health education in adolescent primigravida will increase their knowledge in dealing with pregnancy and make themselves ready to adapt well. Anxiety during pregnancy can be managed and controlled.[12,13]

Effective education needs the media to facilitate the delivery of information and attract the attention of the audience, one of which is the image media or visual media. Flashcard is visual media in the form of picture cards that are equipped with words and measuring 10×12.5 cm or 25×30cm. In individual learning, this chosen media can involve more senses following the theory of learning, that humans use 75% visual and 13% audio.[11,12]

Flashcard is an effective way used in the teaching and learning process, because it creates fun learning, provides meaningful experience, develops critical thinking skills in life as well as social skills. Flashcard is useful to facilitate repetition because it can translate abstract ideas into a more realistic form. Flashcard makes it easier for educators to provide small pieces of information memorably and interestingly with affordable materials and are easily available in textbooks and magazines. Moreover, it can also save time and energy; attract attention; clarify a problem in various fields, and are used by all ages. Flashcard media can also create fun learning, provide a meaningful experience, develop critical thinking skills in life and social skills.[16–19]

The purpose of the study was to analyze the effect of education with flashcard media on knowledge and anxiety degree in adolescent primigravidas.

Methods

The research method used in this study was a one-group pretest-posttest quasi-experimental design, conducted in one group of adolescent primigravida, without a control group. The study was in the working area of Sawah Lebar Public Health Center and Padang Serai Public Health Center in Bengkulu city from May to July 2018. The samples in this study were taken by using consecutive sampling or based on the order of arrival of patients who meet the inclusion criteria.[20] The number of samples was 30 teenage mothers (<20 years old), pregnant in the second and third trimesters, and experienced mild to moderate anxiety.

The researchers directly involved not only as of the providers of health education but also for collecting data directly. The activities were carried out in several places, for example, in the public health center, midwife's house, and cadre's house. During activities, the respondents divided into small groups consisting of 6–8 people per group.

The stages of this study activities comprise of three phases. In phase one, knowledge pretest of series one card (maternal pregnancy and infants growth and development) and anxiety questionnaires administered to the respondents,

then the respondents were given the face-to-face education by using the flashcard media with the lecture and discussion method for ±120 minutes.

In phase two (one week later), knowledge pretest of series 2–3 cards (series 2: stages of growth and development of infants, series 3: physiological changes, breast care, and breastfeeding techniques of the puerperal mother) administered to the respondents. Afterward, continued by another session for ±120 minutes, while the posttest conducted at the end of the meeting. The level of knowledge converted into a value of 100. It is categorized into a level of knowledge of good if reached 76–100%, adequate if the score is 56–75%, and inadequate if the value is <56%.

In phase three (one week later), the researchers went to the respondent's house to administer an anxiety posttest. Data analysis of this study used the Shapiro-Wilk test for data normality test, significance test to compare knowledge and anxiety pretest-posttest. The characteristics of the study group analyzed using the Wilcoxon test and chi-square test (x2) with significance criteria of $p<0.05$, which means the result is significant.[21]

The instruments used in this study were knowledge questionnaires of series one card, series 2–3 cards, and Zung Self-rating Anxiety Scale (ZSAS). The researchers developed information in the flashcard media by referring to several references, with the flashcard design was done by an expert from Visual Communication Design of Institut Teknologi Bandung. Before used, the contents of the flashcard discussed and tested by several experts in educational psychology and a media design expert for the visual approach.

The protocol of this study has approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran Bandung, with letter number: 548/UN6.KEP/EC/2018.

Figure Flashcard Media

Results

Table 1 shows the average age of mothers is 19 years old, mostly in the second trimester of pregnancy, with the education level of high school, dominantly homemakers/unemployed, and the economic status of less than Bengkulu regional minimum wage (*upah minimum regional*/UMR).

Table 2 shows the comparison of the knowledge scores and the knowledge levels of one card series and a 2–3 card series. Knowledge scores are significant differences between groups before and after reproductive health education was given with flashcard media. An average increase observed to 35.3% in the knowledge score of one card series and 30.2% in the knowledge score of 2–3 card series. Knowledge levels were a significant difference in the before and after results. The group with the reproductive health education treatment with flashcard media, increase from inadequate and adequate knowledge to a good level in all 30 participants.

There was a significant difference in the groups before and after reproductive health education with flashcard media to the degree of anxiety (Table 3). Before being educated, mothers who experienced mild anxiety were 24 people, and who experienced medium anxiety

Table 1 Characteristics of Research Subjects

Variables	n=30
Age (years)	
Mean±Std	19.40±0.968
Median	20.00
Range (min–max)	16.00–20.00
Age of pregnancy	
Trimester II	19
Trimester III	11
Last education	
Elementary school	1
Middle school	2
High school	27
Job status	
Employed	25
Unemployed	5
Economic status	
Less than UMR	17
More than UMR	13

Table 2 Differences in Knowledge Score and Knowledge Level of Series 1 Card and Series 2–3 Cards on Interventions before and after the Provision of Reproductive Health Education with Flashcard Media

Variables	Groups (n=30)		p Value
	Pretest	Posttest	
Knowledge score			
Knowledge of series 1 card			
Mean (SD)	55.0	90.3	<0.000[*]
Median	56	89	
Range (min–max)	44–72	83–100	
Knowledge of series 2–3 cards			
Mean (SD)	60.0	90.2	<0.000[*]
Median	61	89	
Range (min–max)	44–72	83–94	
Knowledge level			
Card series 1			
Inadequate	13	0	0.000[**]
Adequate	17	0	
Good	0	30	
Card series 2–3			
Inadequate	5	0	0.000[**]
Adequate	25	0	
Good	0	30	

Note: [*]Wilcoxon test, [**]Shapiro-Wilk test

was 6 people. After being educated, mothers who were no anxiety were 20 people, who experienced mild anxiety were 10 people, and there were no more mothers with medium anxiety.

There is no statistically significant relationship between the level of knowledge and the degree of anxiety before (Table 4) and after (Table 5) treatment. The result from the knowledge of series one card was; mothers with an adequate knowledge level who experienced mild anxiety were 15 people and who experienced medium anxiety were two people. On the knowledge of series 2–3 cards, mothers with an adequate knowledge level who experienced mild anxiety were 20 people, and who experienced medium anxiety are five. Whereas, in the posttest treatment group, the level of good knowledge was proven to reduce the degree of anxiety of mothers who initially had medium or mild anxiety to be not anxious, but there were still 10 mothers who experienced mild anxiety.

Discussion

The process of learning or thinking that occurs in the memory system of the human brain produces a model of information processing in the learning process (theory learning). When an individual receives certain information or stimulus, it will be detected by sensory systems in the brain. It

Table 3 Differences of ZSAS's Anxiety Degree on Interventions before and after the Provision of Reproductive Health Education with Flashcard Media

ZSAS's Anxiety Degree	Groups (n=30)		p Value[*]
	Pretest	Posttest	
No anxiety	0	20	0.000
Mild anxiety	24	4	
Medium anxiety	6	6	

Note: [*]Chi-square/Fisher exact test

Table 4 Relationship between Level of Knowledge and ZSAS's Anxiety in Both Groups before the Provision of Reproductive Health Education with Flashcard Media

Knowledge Level	ZSAS Anxiety Pretest Group (n=30)		Total	p Value*
	Mild Anxiety	Medium Anxiety		
Card series 1				
Inadequate	9	4	13	0.240
Adequate	15	2	17	
Total	24	6	30	
Card series 2–3				
Inadequate	4	1	5	0.360
Adequate	20	5	25	
Total	24	6	30	

Note: *Chi-square/Fisher exact test

will create a learning process of an individual, and the results of processing stored in memory in the form of knowledge, that will be used later in a real event.[10] This sensory system is composed of receptors and connecting neurons from the five senses (hear, see, smell, taste, and feel), and the area that processes visual information is the occipital lobe and actively connected to the prefrontal cortex as the center of rational thinking.[10,22]

The tool serves to facilitate the continuity of the learning process based on the principle that the knowledge possessed by every human being is received or captured through the senses, where someone can remember 50% of what was seen and heard. The result is consistent with Dale's learning experience, which stated that in learning, humans use 75% visual and 13% audio sensory, so the more senses are used to receive information, the more clear the knowledge obtained.[14,15,19,23]

Based on the study conducted by Pipitcahyani and Safitri,[17] the results showed a significant difference between the flipchart groups and the flashcard group, an increase in knowledge in the intervention group reached 90% and in the control group was only 30% in mothers who had a good level of knowledge.

At present, we did not find any theories or other studies that conflicted with the effectiveness and the use of flashcard learning media. As Muhson said,[24] learning media is a tool that can be manipulated and used to affect student's minds, feeling, attention, and attitude. Flashcards can help the learning process easier. A similar study that supports that opinion suggested that in balancing the functions of the left brain and the right brain with a flashcard media is quite sufficient to boost the ability of children, this even considered as one of the right stimuli in the child's brain to be given as early as possible.[16]

Anxiety is an emotional experience that arises because of an unclear threat or something that is not objective, both from outside and within the individual.[25] Anxiety is closely related to the hypothalamic-pituitary-adrenal axis, which can cause stress hormone release, including

Table 5 The Relationship between the Level of Knowledge of the Card Series 1,2,3 on Anxiety in the Group after was Given Reproductive Health Education with Flashcard Media

Knowledge Level	ZSAS Anxiety Posttest Group (n=30)		Total	p Value*
	No Anxiety	Mild Anxiety		
Card series 1				
Good	20	10	30	0.720
Total	20	10	30	
Card series 2–3				
Good	20	10	30	1.000
Total	20	10	30	

Note: *Chi-square/Fisher exact test

adrenocorticotropic hormone, cortisol, beta-endorphin, growth hormone (GH), prolactin, and luteinizing hormone (LH) or follicle stimulating hormone (FSH). If these stress hormones appear excessively, it will affect the increased risk of congenital abnormalities in the fetus. The risks are labio-palate, risk of birth with a caesarian, labor with a tool, premature birth, low birth weight (LBW), stunting, behavior, and emotional disorders of children in the long run.[26,27] Also, at risk for complications of labor and postpartum.[28]

Before the release of these hormones, anxiety was initially centered and sourced from the brain. A good level of knowledge in a person will reduce anxiety. In adolescent primigravidas, the information about reproductive health is still very minimal, and it will increase anxiety.

Knowledge form through the learning process. Knowledge of cognitive ability is a fundamental domain for the formation of one's actions.[29] Through reproductive health education with flashcard media, it can divert attention and activate thinking functions in the brain (active prefrontal cortex function), which is the cognitive center of the individual.[22,30]

This theory supported by Bak and Mastalerz,[31] which stated there was a relationship between age and the subjective assessment or education of women and fear of childbirth. Education differentiates the ability to apply in practice the knowledge and skill learned in Lamaze classes. The older the woman is, the more likely she is to experience anxiety as she approaches or during birth. Both older women and younger women need more mental support to increase their awareness and capabilities because anxiety during pregnancy can lead to premature birth and low birth weight, also another complication risk.

Another study that supports is Agarwal et al.[11] stated that with an increase in the learning process, it could reduce anxiety by up to 72% in middle and high school students tested in the final semester. A similar study that was conducted by Ossai, also showed that the learning affects the degree of anxiety and achievement of students, one of them with flashcard training that students can learn in improving their ability to process information and think critically.[32]

In this study, the use of flashcard learning media in the delivery of reproductive health education is very influential on changes in the degree of anxiety. These changes related to increased knowledge experienced by mothers. Although after statistical tests, there is no meaningful relationship between anxiety and maternal knowledge. The results might be caused by mothers who still experience mild anxiety, and there is no control group as a comparison.

However, in the further development of this study, it is necessary to have a control group with a different treatment. Role-playing simulation method, video, and card games involving many family members were some examples. If this media is applied directly in real life, the absorption of knowledge obtained will be better, and the use of the media will be more optimal.

Conclusion

The flashcard as a tool of learning is effective in increasing the level of knowledge and reduce the anxiety of adolescents primigravida mothers.

Conflict of Interest

TAll authors stated that there was no conflict of interest in this article.

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References

1. United Nations International Children's Emergency Fund (UNICEF) Indonesia. Child marriage in Indonesia: progress on pause [Internet]. 2016 November [cited 2019 January 20]. Available from: https://www.girlsnotbrides.org/wp-content/uploads/2016/11/UNICEF-Indonesia-Child-Marriage-Research-Brief-1.pdf.
2. Statistics Indonesia (BPS), National Population and Family Planning Board (BKKBN), Ministry of Health (Kemenkes), ICF. Indonesia demographic and health survey 2012. Jakarta: BPS, BKKBN, Kemenkes, ICF; 2013.
3. Gipson JD, Koenig MA, Hindin MJ. The

effects of unintended pregnancy on infant, child, and parental health: a review of the literature. Stud Fam Plann. 2008;39(1):18–38.
4. Hanum Y, Tukiman. Dampak pernikahan dini terhadap kesehatan alat reproduksi wanita. JKSS. 2015;13(2):36–43.
5. Lee-Rife S, Malhotra A, Warner A, Glinski AM. What works to prevent child marriage: a review of the evidence. Stud Fam Plann. 2012;43(4):287–303.
6. Omidvar S, Faramarzi M, Hajian-Tilak K, Nasiri Amiri F. Associations of psychosocial factors with pregnancy healthy life styles. PLoS One. 2018;13(1):e0191723.
7. Bustos M, Venkataramanan R, Caritis S. Nausea and vomiting of pregnancy - what's new? Auton Neurosci. 2017;202:62–72.
8. World Health Organization (WHO). Mental health aspects of women's reproductive health: a global review of the literature. Geneva: WHO Press; 2009.
9. Susanti NN. Psikologi kehamilan. Jakarta: EGC; 2008.
10. Solso RL, Maclin OH, Maclin MK. Psikologi kognitif. 8th Edition. Jakarta: Penerbit Erlangga; 2008.
11. Agarwal PK, D'Antonio L, Roediger HL III, McDermott KB, McDaniel MA. Classroom-based programs of retrieval practice reduce middle school and high school students' test anxiety. J Appl Res Mem Cogn. 2014;3(3):131–9.
12. Larasati IP, Wibowo A. Pengaruh keikutsertaan senam hamil terhadap kecemasan primigravida trimester ketiga dalam menghadapi persalinan. JBK. 2012;1(1):26–32.
13. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. Curr Opin Psychiatry. 2012;25(2):141–8.
14. Daryanti, Firman, Neviyarni. Peran media pembelajaran dalam meningkatkan kemampuan siswa menulis. J Basicedu. 2019;3(4):2089–94.
15. Permatasari I. Pengaruh media pembelajaran audio-visual dan media cetak terhadap minat belajar siswa kelas VIII pada mata pelajaran fiqih di MTS Ma'arif Udanawu Blitar [undergraduate thesis]. Tulungagung: Institut Agama Islam Negeri Tulungagung; 2017 [cited 2019 February 28]. Available from: http://repo.iain-tulungagung.ac.id/6891.
16. Hayati N. Menstimulus otak kiri dan otak kanan anak dengan flash card [Internet]. Yogyakarta: Universitas Negeri Yogyakarta; 2007 [cited 2019 March 8]. Available from: http://staff.uny.ac.id/sites/default/files/Artikel%20Flash%20Card.pdf.
17. Pipitcahyani TI, Safitri CA. The effectiveness of "flash card" in improving mothers' knowledge on pregnancy. Proc Int Conf Appl Sci Health. 2017;2:151–7.
18. Lutfitasari H, Meikawati W, Salawati T. Efektivitas penyuluhan gizi dengan media flash card dan poster dalam peningkatan pengetahuan siswa tentang keamanan makanan jajanan sekolah (studi pada siswa SDN Pandean Lamper 03 Semarang) [undergraduate thesis]. Semarang: Universitas Muhammadiyah Semarang; 2017 [cited 2019 April 10]. Available from: http://repository.unimus.ac.id/1041.
19. Mahnun N. Media pembelajaran (kajian terhadap langkah-langkah pemilihan media dan implementasinya dalam pembelajaran). An-Nida'. 2012;37(1):27–34.
20. Swarjana IK. Statistik kesehatan. Yogyakarta: Penerbit ANDI; 2016.
21. Dahlan MS. Statistik untuk kedokteran dan kesehatan: deskriptif, bivariat, dan multivariat. 6th Edition. 3rd Printing. Jakarta: Epidemiologi Indonesia; 2015.
22. Kuswana WS. Taksonomi berpikir. Bandung: Rosda; 2011.
23. Masters K. Edgar Dale's Pyramid of Learning in medical education: a literature review. Med Teach. 2013;35(11):e1584–93.
24. Muhson A. Pengembangan media pembelajaran berbasis teknologi informasi. JPAI. 2010;8(2):1–10.
25. Badrya L. Perbedaan tingkat kecemasan antara mahasiswa kedokteran laki-laki dan perempuan angkatan 2011 FKIK UIN Syarif Hidayatullah Jakarta dalam menghadapi ujian OSCE [undergraduate thesis]. Jakarta: Universitas Islam Negeri Syarif Hidayatullah; 2014 [cited 2019 May 3]. Available from: http://repository.uinjkt.ac.id/dspace/handle/123456789/25818.
26. Leigh B, Milgrom J. Risk factors for antenatal depression, postnatal depression and parenting stress. BMC Psychiatry. 2008;8:24.
27. Glover V. Stress in pregnancy can change fetal and child development. In: Leach P, editor. Transforming infant wellbeing: research,

policy and practice for the first 1001 critical days. Abingdon: Routledge; 2017. p. 98–106.
28. Zhao Y, Munro-Kramer ML, Shi S, Wang J, Zhao Q. Effects of antenatal depression screening and intervention among Chinese high-risk pregnant women with medically defined complications: a randomized controlled trial. Early Interv Psychiatry. 2019;13(5):1090–8.
29. Bascandziev I, Tardiff N, Zaitchik D, Carey S. The role of domain-general cognitive resources in children's construction of a vitalist theory of biology. Cogn Psychol. 2018;104:1–28.
30. Sadock BJ, Sadock VA, Ruiz P. Kaplan and Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry. 11th Edition. Philadelphia: Wolters Kluwer; 2015.
31. Bąk B, Mastalerz M. Effectiveness of childbirth classes in reducing anxiety before birth depending on age and education. Med Stud. 2016;32(1):10–7.
32. Ossai OV. Influence of study skills on test anxiety and levels and achievement of senior secondary school students in english language [thesis]. Nsukka, Nigeria: University of Nigeria Nsukka; 2012.

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RESEARCH ARTICLE

Effect of *Phaleria macrocarpa* (Scheff.) Boerl Dry Extract to the Level of Malondialdehyde

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Abstract

Increased age causes an increase in degenerative diseases. Antioxidants in the body unable to neutralize the increased concentration of free radicals. The flesh of the *Phaleria macrocarpa* (Scheff.) Boerl contains flavonoids which have antioxidant effects. At present, there are still very limited clinical trials of *Phaleria macrocarpa* (Scheff.) Boerl. This study was an experimental pretest and posttest involving 30 healthy volunteers receiving glucose loads in November 2018–February 2019 in Jakarta. This study aimed to assess the antioxidant effect of *Phaleria macrocarpa* (Scheff.) Boerl dry fruit extract in various dosage ranges. Subjects of this study aged 30–55 years. The data collection included anthropometric examination and malondialdehyde levels before and after administration of dry fruit extract doses of 62.5 mg, 125 mg, and 250 mg at 150 minutes after oral glucose induction. Data analysis using a paired t test with $p<0.05$. Decreased levels of malondialdehyde in the administration of *Phaleria macrocarpa* (Scheff.) Boerl with a dose of 62.5 mg, 125 mg, and 250 mg by 40.9%, 22.9%, and 18.3% compared to the baseline malondialdehyde level (1,608 nmol/mL). Statistical analysis using a paired t test showed $p=0.000$ for all three doses compared with baseline levels. Dry fruit extract of *Phaleria macrocarpa* (Scheff.) Boerl has an antioxidant effect; the antioxidant effect of the extract is not directly proportional to the dose.

Key words: Extract, malondialdehyde, *Phaleria macrocarpa*

Efek Antioksidan Ekstrak Kering *Phaleria macrocarpa* (Scheff.) Boerl terhadap Kadar Malondialdehid

Abstrak

Pertambahan usia menyebabkan peningkatan penyakit degeneratif. Antioksidan dalam tubuh tidak mampu menetralkan peningkatan konsentrasi radikal bebas. Daging buah *Phaleria macrocarpa* (Scheff.) Boerl mengandung flavonoid mempunyai efek antioksidan. Saat ini masih sangat terbatas uji klinis *Phaleria macrocarpa* (Scheff.) Boerl. Penelitian ini merupakan uji eksperimental sebelum dan sesudah perlakuan pada 30 sukarelawan sehat yang diinduksi dengan glukosa yang dilaksanakan pada bulan November 2018–Februari 2019 di Jakarta. Penelitian ini bertujuan menilai efek antioksidan ekstrak kering buah *Phaleria macrocarpa* (Scheff.) Boerl dalam beberapa kisaran dosis yang diberikan. Subjek penelitian berusia 30–55 tahun. Pengumpulan data meliputi pemeriksaan antropometri serta kadar malondialdehid sebelum dan sesudah pemberian ekstrak kering dosis 62,5 mg, 125 mg, dan 250 mg pada menit 150 setelah dilakukan induksi glukosa oral. Analisis data menggunakan uji t berpasangan dengan $p<0{,}05$. Penurunan kadar malondialdehid pada pemberian ekstrak *Phaleria macrocarpa* (Scheff.) Boerl dosis 62,5 mg, 125 mg, dan 250 mg sebesar 40,9%, 22,9%, dan 18,3% dibanding dengan kadar malondialdehid sebelum pemberian (1.608 nmol/mL). Analisis statistik menggunakan uji t berpasangan didapatkan $p=0{,}000$ untuk ketiga dosis dibanding dengan kadar awal. Ekstrak kering buah *Phaleria macrocarpa* (Scheff.) Boerl mempunyai efek antioksidan; efek antioksidan ekstrak tidak berbanding lurus dengan dosis.

Kata kunci: Ekstrak, malondialdehid, *Phaleria macrocarpa*

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Introduction

At present, the development of medical science is so rapid that it raises an increase in one's life expectancy. Life expectancy is the leading indicator of a person's health quality.[1] In 1999 life expectancy in Indonesia was 66.2 years. In 2007, it increased to 70 years, and in 2014, it became 71 years,[1,2] causing an increase in risk for various degenerative diseases. Degenerative diseases found in many communities are cancer, heart disease, diabetes, arthritis, liver disease, and others.

These degenerative diseases caused the inability of antioxidants in the body to neutralize the increase in free radical concentration. Free radicals are molecules that in their outer orbit have one or more unpaired electrons; they are very labile and very reactive so that they can cause damage to the cell components. An example is superoxide formed from hydroxyl radical, which initiates lipid peroxidation. The compound causes damage to the endothelial plasma membrane, lipoproteins, and deoxyribonucleic acid (DNA) genetic carrier. Hydrogen peroxide causes oxidative stress, one of which can be measured by using malondialdehyde (MDA). Lipid peroxidation can be detected indirectly by measuring plasma hydrolysis of lipoperoxidase to MDA form.[3,4]

One of the degenerative diseases, diabetes mellitus (DM), is currently a worldwide health problem. In 2011 around 366 million adults suffered from DM. It estimated that in 2030 there would a substantial increase of up to 551 millions patients with DM.[5] The condition of hyperglycemia results in an increase in oxidative stress, where it results from an imbalance between the formation of free radicals and antioxidants, which is an essential factor in the occurrence of blood vessel disorders. Previous clinical studies report that oxidative stress plays a significant role in the pathogenesis and development of complications of DM.[3,4,6]

One of the medicinal plants that are known to have antioxidant effects and widely used in the community is *Phaleria macrocarpa* (Scheff.) Boerl (PM). Some laboratory analysis studies show that PM showed an antioxidant effect, especially in young fruit and leaves.[7,8] Currently, scarce clinical trials are conducted to prove the antioxidant effects of PM. This study aims to assess the antioxidant effects of dried fruit pulp extract PM in a range of doses. It is necessary to determine the antioxidant effects of dried extract and the range of doses that provide the best antioxidant effect.

Methods

Respondents of this study were 30 healthy adult volunteers who fulfilled the following inclusion criteria. The criteria were men and women aged 30–55 years, having a healthy body weight (body mass index 18.5–25 kg/m^2). They are not having chronic diseases and no history of chronic diseases in the family, especially diabetes mellitus, hypertension, heart disease, supported by laboratory tests showing routine blood tests, liver function (SGPT, alkaline phosphatase), and normal kidney function (creatinine levels). They also have not consumed herbs or vitamin supplements a week before the study takes place/ during the study. Subjects in the previous 24 hours do not consume drinks containing caffeine, fruit juice, or smoking, and willing to take part in research and sign an informed consent. Exclusion criteria were pregnant or breastfeeding, consumed other drugs for the previous a week, or during the study that can affect blood glucose levels such as corticosteroid drugs, and participating in other studies within three months before this study.

The PM pericarp (without seed coat and seed) obtained from plant nurseries in the region of Semarang, Central Java. At each visit, subjects were given a glucose load of 400 calories (or 75 grams of glucose). The first visit only glucose load is given, whereas, in the second visit, 62.5 mg PME was given. They wash out for one week, and, at the next visit, subjects consumed 125 mg, and the following week consumed 250 mg PME. The parameters used to measure MDA levels.

Antioxidant effects were assessed by measuring MDA levels by determining MDA levels in serum after reacting with thiobarbituric acid (TBA) at hot temperatures in an acidic atmosphere. This reaction produces a red solution, which then measured using a spectrophotometer. The reagents used are the MDA standard, trichloroacetic acid (TCA), and TBA. Before the research took place, accuracy and precision test of the MDA examination carried out. This research has passed the ethical review of the Research Ethics Committee of Faculty of Medicine of Universitas Trisakti with letter number: 137/ KER/FK/I/2019.

Results

A total of 40 subjects examined for anthropometry (body weight and height) and body mass index examination. Besides, laboratory tests (hematology, blood sugar, SGPT, and creatinine) also carried out. Of the 40 subjects examined, only 30 people met the inclusion and exclusion criteria. Of the 30 volunteer subjects, 16 were women, and 14 were men. Personal data from 30 subjects are in Table 1.

In this study, the average age of subjects was 41.4 years, body weight in the range of 40–70 kilograms, height was 143–174 cm, and body mass index was 18.66–24.84 kg/m^2.

This study used auto control to monitor subjects. At the beginning of the study, all subjects tested for oral glucose tolerance with 75 grams of glucose and blood samples taken in 150 minutes after glucose induction as the baseline measure. After a week washout, subjects consumed glucose induction and PME at a dose of 62.5 mg, 125 mg, and 250 mg, respectively. The washout is performed one week before treatment with different doses. MDA was at 150 minutes after glucose induction. The results of the average examination of MDA levels in the 150th minute are in Table 2.

Table 3 shows the results of the statistical analysis of baseline MDA levels with PME doses of 62.5 mg, 125 mg, and 250 mg. From the results, there is a significant difference ($p<0.05$) between the two groups.

From Figure 1, it is seen that the MDA level decreases on a fairly large scale compared to the baseline at the PME dose of 62.5 mg, while the PME dose of 125 mg and 250 mg shows a decrease in MDA levels but not too large compared to the 62.5 mg dose.

Table 1 Characteristics of the Subject

Characteristics	Mean±SD n=30
Age (years)	41.40±6.41
Sex	
Female	16
Male	14
Weight (kg)	56.05±7.68
Height (m)	1.58±0.09
Body mass index (kg/m^2)	22.29±2.04

Table 2 Baseline MDA and PME Level

PME Doses	MDA Level (Average±SD)
Baseline	1.608±0.509
PME 62.5 mg	0.950±0.215
PME 125 mg	1.239±0.230
PME 250 mg	1.313±0.323

Table 3 Effect PME on Level MDA

Variables	p Value*
MDA baseline vs MDA PME 62.5 mg	0.000
MDA baseline vs MDA PME 125 mg	0.000
MDA baseline vs MDA PME 250 mg	0.000

Note: *Paired t test, p<0.05 significant difference

Discussion

In this study, 30 volunteered with an average age of 41.4 years to show the antioxidant effect of PME. Age or aging associated with free radicals. Aging is a biological process that cannot be avoided and is related to biochemical and physiological changes that are gradual and spontaneous and increase the body's susceptibility to disease. Scientific studies have shown that the aging process causes a decrease in the body's ability to use calories from food, decrease hormone function, suppress enzyme function, and decrease the body's

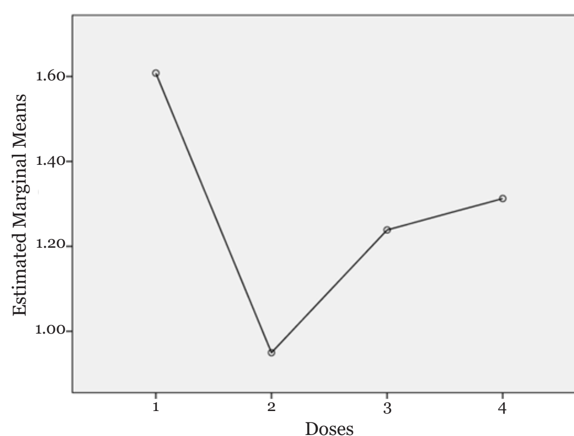

Figure The Effect of PME on MDA Level (nmol/mL) of Subject Baseline (1), and PME Dose 62.5 mg (2), 125 mg (3), and 250 mg (4)

resistance to fight disease. Aging results from an accumulation of changes caused by reactions in the body that are started by high reactive molecules known as 'free radicals.' These changes produce free radicals believed to be a significant cause of the aging process.[1,3]

Free radicals define as an atom, molecule, or component that contains unpaired electrons, so that it is generally unstable, has a short life, and is very reactive. The free radicals produced due to the use of oxygen in the metabolic process. These free radicals are produced by healthy body cells through metabolic processes, and also by external sources such as carcinogenic compounds and ionizing radiation.[3,9]

Free radicals produced from the results of the body's metabolism. They also caused by external factors such as cigarette smoke, the results of ultraviolet irradiation, organic trigger substances in foods, and other pollutants. Disease caused by free radicals is chronic. It will take years to become apparent or show any symptoms. Examples of diseases that are often associated with free radicals are heart attacks, cancer, cataracts, and decreased kidney function. To prevent or reduce chronic disease because free radicals are needed antioxidants. The human body can neutralize these free radicals; only if the amount is excessive, the ability to neutralize it will decrease.[10,11]

Research on the chemical content of eggshell seeds and fruit flesh PM showed that in hexane, ethyl acetate and methanol extract flavonoids, phenols, tannins, saponins, and sterols/terpenes with the highest content is saponins.[12–14]

The four main parts of MD plants that often used in society are the stems, leaves, seed shells, and fruit flesh.[8,15] Research on the chemical content of seeds and fruit flesh obtained alkaloid compounds, saponins, flavonoids, and polyphenols. Besides having the antioxidant effect of flavonoid content, the use of PME in DM cases can increase insulin expenditure by changing the metabolism of Ca^{2+} and can regenerate the island of Langerhans, especially β cells. Flavonoid contained in MD as an antioxidant that will protect pancreatic cell damage from free radicals.[16,17]

Flavanoids are a natural antioxidant and have biological activities, including antioxidants that can inhibit various oxidation reactions and can act as reducing hydroxyl radicals, superoxide, and peroxyl radicals. Extract the ethanol of young PM fruits has an inhibitory power of 78.48%, and the old fruit has an 83.08% inhibitory effect, meaning that the old fruit PM has a higher antioxidant effect.[11–14]

This study used an oral glucose tolerance test procedure. In a hyperglycemic state, it will produce free radicals. The highest MDA levels were seen in 150 minutes after 45-gram glucose loading, such as a glucose tolerance test. MDA levels in the 150th minute will be taken as a baseline (without the administration of PME), and MDA levels will be measured again at the same time (150 minutes) with extracts of 62.5 mg, 125 mg, and 250 mg.

This study is an advanced study of the utilization of PME as an anti-hypoglycemic and antioxidant drug in patients with DM. Diabetes characterized by a relative or absolute deficiency of insulin secretion and resistance. It causes chronic hyperglycemia and impaired carbohydrate, lipid, and protein metabolism. DM is known as an oxidative stress disorder that occurs due to an imbalance between the formation of free radicals and the natural antioxidant abilities of the body. Many studies have reported that oxidative stress plays a role in systemic inflammation, endothelial dysfunction, impaired pancreatic β cell secretion, and impaired glucose utilization in peripheral tissues.[3,4,6]

This oxidative stress also plays a vital role in complications that occur in diabetic patients. Sources of oxidative stress in diabetes include enzymatic, non-enzymatic, and mitochondrial pathways. Many factors influence the increased oxidative stress in DM. The dominant factor is the auto-oxidation of glucose, which causes an increase in free radicals. Increased extracellular glucose levels will induce the dysregulation of reactive oxygen and nitrogen pathways. This situation will cause disruption of the vascular endothelium and the production of nitric oxide (NO). Superoxide, when joining NO on endothelial cells, will produce peroxynitrite, which is a cytotoxic antioxidant.[18,19]

This research can be done in humans because PM is relatively safe and has been used for generations in Indonesian society. PM extracted with water and ethanol to obtain active ingredients that are antioxidants.[20,21] The volume of medicinal ingredients is less than that of PM meat powder, with a ratio of 1 gram of PM powder equal to 250 mg of dried extract of the god's crown (PME).

The MDA level decreases on a reasonably large

scale compared to the baseline at the PME dose of 62.5 mg, while the PME dose of 125 mg and 250 mg shows a decrease in MDA levels but not too large compared to the 62.5 mg dose. MDA levels assessed at 150 minutes after glucose induction. The mean MDA baseline level was 1,608, and with a dose of 62.5 mg PME, we found a decrease in MDA levels of 40.9% compared to the baseline. Giving a PME dose of 125 mg and 250 mg obtained a decrease in MDA levels of 22.9% and 18.3% compared to MDA baseline levels.

PME antioxidant activity from phenolic components and flavonoids contained in PM fruit.[22] Karimi et al.[23] reported that the content of the fruit consisted mainly of flavonoids and kaempferol, myricetin, naringin, quercetin. Correlation of flavonoid content in PM fruit with antioxidant activity caused by the presence of 3-hydroxyl groups in heterocyclic rings. In contrast, additional hydroxyl or methoxyl groups at position 3.5, and 7 rings A and C appear to be of less importance. Highly active flavonoids have ring B, which is occupied by 3'4'-dihydroxy and 3-OH groups.[24,25]

From the results of statistical analysis, using a paired t test between baseline and MDA administration level after PME was given a significant difference ($p<0.05$).

Complaints found in the subject are nausea and fullness on 250 mg PME; this is probably due to the high saponin content in the PM fruit, which can cause gastrointestinal irritation. Besides, the effect of reducing blood pressure in subjects with 125 mg or 250 mg PME doses were apparent. This effect caused by the presence of PM fruit action mechanism such as ACE receptor inhibitors.[25]

The main limitation of this study is the design as a pre-post test experimental study without controls—further studies needed with the standards of a good clinical trial.

Conclusion

Dry fruit extract of Phaleria macrocarpa (Scheff.) Boerl has an antioxidant effect; the extract dose of 62.5 mg has an antioxidant effect better than other doses. The antioxidant effect of the extract is not directly proportional to the dose.

Conflict of Interest

The authors do not have any conflict of interest to declare.

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References

1. Pangkahila W. Anti-aging: tetap muda dan sehat. Jakarta: Penerbit Buku Kompas; 2011.
2. Muziburrahman. Usia harapan hidup Indonesia [Internet]. 2014 August 23 [cited 2019 April 28]. Available from: http://zibur.blogspot.com/2014/08/usia-harapan-hidup-indonesia.html.
3. Zishan M, Ahmad Z, Idris S, Parveen Z, Hussain MW. Diabetes mellitus: role of free radicals and oxidative stress. World J Pharm Pharm Sci. 2017;6(5):448–70.
4. Sheikhpour R. Diabetes and oxidative stress: the mechanism and action. Iran J Diabetes Obes. 2013;5(1):40–5.
5. International Diabetes Federation. Global diabetes plan 2011–2021. Last update: 2017 August 1 [cited 2019 April 28]. Available from: https://www.idf.org/our-activities/advocacy-awareness/resources-and-tools/129-global-diabetes-plan-2011-2021.html.
6. Matough FA, Budin SB, Hamid ZA, Alwahaibi N, Mohamed J. The role of oxidative stress and antioxidants in diabetic complications. Sultan Qaboos Univ Med J. 2012;12(1):5–18.
7. Altaf R, Asmawi MZ, Dewa A, Sadikun A, Umar MI. Phytochemistry and medicinal properties of *Phaleria macrocarpa* (Scheff.) Boerl extracts. Pharmacogn Rev. 2013;7(13);73–80.
8. Alara OR, Olalera OA. A critical overview on the extraction of bioactive compounds from *Phaleria macrocarpa* (Thymelaceae). Nat Prod Chem Res. 2016;4(5);1000232.
9. Zatalia SR, Sanusi H. The role of antioxidants in the pathophysiology, complications, and management of diabetes mellitus. Acta Med Indones. 2013:45(2);141–7.
10. Kangralkar VA, Patil SD, Bandivadekar RM. Oxidative stress and diabetes: a review. Int J Pharm Appl. 2010;1(1):38–45.
11. Phaniendra A, Jestadi DB, Periyasamy L.

Free radicals: properties, sources, targets, and their implication in various diseases. Indian J Clin Biochem. 2015;30(1):11–26.
12. Othman SNAM, Sarker SD, Nahar L, Basar N. The ethnomedicinal, phytochemical and pharmacological properties of *Phaleria macrocarpa* (Scheff). Boerl. TANG. 2014;4(4):e22.
13. Alara OR, Alara JA, Olalere OA. Review on *Phaleria macrocarpa* pharmacological and phytochemical properties. Drug Des. 2016;5(3):1000134.
14. Ramdani ED, Marlupi UD, Sinambela J, Tjandrawinata RR. Isolation and identification of compounds from *Phaleria macrocarpa* (Scheff.) Boerl fruit extract. Asian Pac J Trop Biomed. 2017;7(4):300–5.
15. Susilawati, Matsjeh S, Pramono HD, Anwar C. Antioxidant activity of 2,6,4'- trihydroxy-4-methoxy benzophenone from ethyl acetate extract of leaves of mahkota dewa (*Phaleria macrocarpa* (Scheff.) Boerl.). Indo J Chem. 2011;11(2):180–5.
16. Yayah W, Hudaya T, Prasetyo S, Wangsa J. Pretreatment and optimization studies on the extraction of antioxidant components from *Phaleria macrocarpa* fruit. ASEAN Eng J Part B. 2016;5(1):46–60.
17. Chang CLT, Lin Y, Bartolome AP, Chen YC, Chiu SC, Yang WC. Herbal therapies for type 2 diabetes mellitus: chemistry, biology, and potential application of selected plants and compounds. Evid Based Complement Alternat Med. 2013;2013:378657.
18. Zatalia SR, Sanusi H. The role antioxidants in the pathophysiology, complications, and management of diabetes mellitus. Acta Med Indones. 2013;45(2):141–7.
19. Giacco F, Brownlee M. Oxidative stress and diabetic complications. Circ Res. 2010;107(9):1058–70.
20. Rahmi E, Wahyuni WT, Darusman LK, Suparto IH. Combination of ethanolic extract of α-glucosidase inhibitory activity of *Phaleria macrocarpa* (Scheff). Boerl. fruits and *Annona muricata* Linn. leaves. Trad Med J. 2016;21(1):63–8.
21. Hendra R, Haryani Y. *Phaleria macrocarpa* (Boerl.) Scheff fruit: a potential source of natural antioxidant. PCPR. 2018;3(1):1–4.
22. Yanti AR, Radji M, Mun'im A, Suyatna FD. Antioxidant effect of methanolic extract of *Phaleria macrocarpa* (Scheff.) Boerl in fructose 10%-induced rats. Int J PharmTech Res. 2015;8(9):41–7.
23. Karimi E, Oskoueian E, Hendra R, Jaafar HZE. Evaluation of *Crocus sativus* L. stigma phenolic and flavonoid compounds and its antioxidant activity. Molecules. 2010;15(9):6244–56.
24. Kefayati Z, Motamed SM, Shojaii A, Noori M, Ghods R. Antioxidant activity and phenolic and flavonoid contents of extract and subfractions of *Euphorbia splendida* Mobayen. Pharmacognosy Res. 2017;9(4):362–5.
25. Hendra R, Ahmas S, Sukari A, Shukor MY, Oskoueian E. Flavonoid analyses and antimicrobial activity of various parts of Phaleria macrocarpa (Scheff.) Boerl fruit. Int J Mol Sci. 2011;12(6):3422–31.

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RESEARCH ARTICLE

The Effect of Low Impact Aerobic Exercise on Elderly with Dementia Cognitive Function

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Abstract

In the elderly population, at least 10% of those over 65 years old and 50% of those over 80 years old experience a decline in cognitive function that varies from a cognitive decline due to normal aging (age-associated memory impairment/AAMI) to a mild cognitive decline (mild cognitive impairment/MCI) and dementia. Dementia is an intellectual disorder that affects the cognitive function, memory, language function, and visuospatial function that causes irreversible changes. Many studies have stated that lifestyle management in the form of increased physical activity has a protective effect on impaired cognitive functions, inhibits cognitive function decline, and even improves cognitive function in healthy elderly people and elderly with mild cognitive impairment to dementia. Low impact aerobic exercise is a physical activity that is useful and suitable for the elderly. This study aimed to determine the effect of low impact aerobic exercise on the cognitive function of elderly people with dementia. This was a quasi-experimental study with one group pretest-posttest method that involved elderly people from Tresna Werdha Teratai Palembang, South Sumatera, Indonesia who were selected based on the inclusion and exclusion criteria (n=38) from December 2018 to February 2019. Treatment provided was a low impact aerobic exercise 3 times a week for 5 weeks. Dementia was then measured before and after treatment using the Mini-mental State Examination (MMSE). The mean values of gymnastics before the treatment and after the treatment were 18.36±4.559 and 19.69±5.724, respectively. A p value of 0.000 was obtained using the Wilcoxon test. In summary, low impact aerobic exercise influences the cognitive function of the elderly with dementia.

Key words: Cognitive function, elderly, low impact aerobic exercise

Pengaruh Senam Aerobik *Low Impact* terhadap Fungsi Kognitif Usila dengan Demensia

Abstrak

Pada usia lanjut (usila), sedikitnya 10% dari yang berusia lebih dari 65 tahun dan 50% dari yang berusia lebih dari 80 tahun mengalami penurunan fungsi kognitif yang bervariasi mulai dari penurunan kognitif karena penuaan normal (*age-associate memory impairment*/AAMI) serta penurunan kognitif ringan (*mild cognitive impairment*/MCI) hingga demensia. Demensia adalah gangguan intelektual yang meliputi fungsi kognitif, daya ingat, bahasa, fungsi visuospasial, dan bersifat ireversibel. Banyak studi menyatakan bahwa manajemen gaya hidup berupa peningkatan aktivitas fisik mempunyai efek protektif terhadap gangguan fungsi kognitif, menghambat penurunan fungsi kognitif, serta bahkan meningkatkan fungsi kognitif pada usila yang sehat dan usila dengan penurunan fungsi kognitif ringan sampai demensia. Senam aerobik *low impact* merupakan aktifitas fisik yang bermanfaat dan cocok diberikan kepada usila. Penelitian ini bertujuan mengetahui pengaruh senam aerobik *low impact* terhadap fungsi kognitif usila dengan demensia. Penelitian ini merupakan studi *quasi-experimental* dengan metode *pretest-posttest one group* yang melibatkan usila dari Tresna Werdha Teratai Palembang, Sumatera Selatan, Indonesia yang dipilih berdasar atas kriteria inklusi dan eksklusi (n=38) dari bulan Desember 2018 hingga Februari 2019. Perlakuan yang diberikan berupa senam aerobik *low impact* 3 kali per minggu selama 5 minggu. Demensia kemudian diukur sebelum dan sesudah perlakuan menggunakan *Mini-mental State Examination* (MMSE). Nilai rerata senam sebelum perlakuan dan setelah perlakuan adalah 18,36±4,559 dan 19,69±5,724 masing-masing. Nilai p=0,000 didapatkan dengan menggunakan Uji Wilcoxon. Simpulan, senam aerobik *low impact* memengaruhi fungsi kognitif usila dengan demensia.

Kata kunci: Fungsi kognitif, senam aerobik *low impact*, usila

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Introduction

The elderly population size had increased from 14.4 million people (7.18%) in 2000 to 16.8 million people (7.78%) and 23.9 million people (9.77%) in 2010. However, a decrease is seen in 2017. There were 23.66 million elderly people in Indonesia (9.03%) and the estimated elderly population size in 2020 is 28.8 million people (11.34%). In 2010, South Sumatra province had 454.554 senior citizens, which then increased to 582.643 in 2016. This province has an estimated annual population increase of about 60 thousand people with around 7% are elderly people.[1]

The increasing number of elderly people brings the consequence of increasing age-related common disorders, such as age-related cognitive function decline. Among elderly people, at least 10% of those over 65 years old and 50% of those over 80 years old experience a decline in cognitive functions that varies from the cognitive decline due to normal aging (age-associated memory impairment/AAMI) to a mild cognitive decline (mild cognitive impairment/MCI) and dementia.[2]

Data regarding health problems experienced by the elderly show that the biggest health problem among elderly people is degenerative diseases, including dementia.[3] Dementia is a syndrome caused by a disease or brain disorder that is usually chronic and progressive in nature and affects multiple higher cognitive cortical functions, including memory, thinking ability, orientation, comprehension, arithmetic, learning ability, language, and value power (judgment).[4,5] Decreased cognitive functions in the form of dementia can be inhibited by taking preventive measures.

Various literature has revealed that physical exercise provides great health benefits. Exercise does not only prevent and reduce symptoms of various diseases but also clinically plays a role in healing and recovery from diseases.[6–8]

One of the preventive measures that can be implemented by the elderly is aerobic exercises to increase their physical activities.[9] Low impact aerobic exercise is the type of low-intensity aerobic exercise suitable for the elderly.

Previous research conducted by Cai et al.[10] shows that sports interventions for 4 weeks positively affect the cognitive function in Alzheimer's patients aged over 70 years which is evident from the increase in the Mini-mental State Examination (MMSE) value from 19 before the intervention to 20 after the intervention. This shows that sports interventions positively affect cognitive functions.[10] This study aimed to determine the effect of low impact aerobic exercise on the elderly with dementia.

Methods

This was a quasi-experimental pretest-posttest one group study performed from December 2018 to February 2019 on 38 elderly people in Tresna Werdha Teratai Palembang, which is a nursing home for the Elderly in South Sumatera, Indonesia. Participants were recruited using the total sampling method in which all elderly people who met the inclusion criteria were included. The inclusion criteria used were elderly with dementia (MMSE≤24), able to walk without any assistive device, minimum education of elementary school, willing to voluntarily participate in the study, as evident by signing the informed consent, to do routine gymnastic exercise 3 times a week for 5 weeks at Tresna Werdha Teratai Palembang.

The low impact aerobic gymnastic program assigned to the participants consisted of warming up (10 minutes), core exercise comprising various aerobic movements (30 minutes), and cooling down (10 minutes). Data were collected before and after the low impact aerobic exercise using the MMSE to assess the cognitive function. The MMSE is a widely used test for assessing elderly cognitive function. It includes tests of orientation, attention, memory, language, and visuospatial skills. The MMSE test includes simple questions and problems in some areas: time and place of test, repeating list of words, arithmetic including serial sevens, language use and comprehension, and basic motor skill.[11]

Data collected were processed by using a computer program system and then analyzed univariately to understand the average cognitive function of the elderly before and after gymnastics. Bivariate analyses using paired t test and Wilcoxon test as the alternative test were used to determine the effects of low impact aerobic exercise on the cognitive function of elderly people with dementia. Results were considered significant if p value$<$0.05.

This study has received ethical clearance from the Research Ethics Committee of the Bioethics, Humanities, and Islamic Medicine Unit (UBHKI) of the Faculty of Medicine, Universitas Muhammadiyah Palembang with letter number:

006/EC/UBHKI/FK-UMP/X/2018.

Results

Table 1 showed cognitive function mean values before and after low impact gymnastics. It is apparent that the 38 respondents presented different mini-mental status (MMSE) scores between before (18.36±4.559, p value=0.003) and after the low impact aerobic physical activity (19.69±5.724, p value=0.002). This proved that the data gained did not follow the normal distribution.

The Wilcoxon test on data from 38 respondents presented a p value of 0.000 (p<0.05), meaning that the low impact aerobic exercise in this study affected the cognitive function of the elderly with dementia (Table 2).

Discussion

This study found that the routine low impact aerobic exercises increased the cognitive functions of elderly people with dementia (p value=0.000). This is in line with the finding of a study conducted by Rohana[12] stating the influence of aerobic physical activities on cognitive function in the elderly with dementia. Besides, another study conducted by Yolanda and Fatmawati[13] suggested a significant difference in the cognitive function of the elderly before and after doing aerobic physical activities in the form of brain vitality exercises. Hence, it can be stated aerobic physical activities indeed influence the cognitive function of the elderly with dementia.

In contrast, several studies have suggested that there is no increase in the cognitive function of the elderly after doing exercises. One study on 141 women and 45 men who did exercises for 4 months obtained a p value of 0.11, which means that the exercise does not affect the cognitive functions of these elderly people. This may relate to the severity of dementia condition suffered by the participants, as well as the duration and frequency of the exercise. It is commonly understood that 85% of the lack of effect on cognitive function is caused by the type of dementia that is a post-stroke vascular dementia with lesions in several parts of the brain lobes.[14,15]

A study in Ngesrep village shows that routine physical exercises result in a significant influence on the cognitive performance of older people who visited the posyandu (integrated health post) routinely.[16] A meta-analysis involving 29 randomized controlled trials of healthy elderly people without dementia found that aerobic exercises improved cognitive functions including memory, attention, speed of information processing, and executive functions.[17]

A beneficial effect on the cognitive functions of the elderly with dementia has been linked to physical exercise activities.[18] Aerobic exercise influences the Papez circuit limbic system, especially at the relay station as neural impulses received at this station are influenced by several neurotransmitters, like norepinephrine, dopamine, and acetylcholine. The aerobic physical activities can activate the hypothalamus to synthesize corticotropin-releasing factors (CRFs), which will influence the release of neurotransmitters like acetylcholine, serotonin, dopamine, and norepinephrine. This, in turn, will affect the impulse of the Papez circuit. The impulse will travel through the arch of the fornix to the corpus of mamillare and then will be delivered to the anterior nucleus of the thalamus, which will project it into the cinguli girus thereby increasing nerve growth factor (NGF) and brain-derived neurotrophic factor (BDNF) in the cinguli gyrus, hippocampus, and dentate girus. Furthermore, the CRF synthesized by the hypothalamus will be sent to the pituitary to synthesize adrenocorticotropic hormone (ACTH) and this ACTH will later be sent to the adrenal gland to synthesize the cortisol hormone that increases the memory consolidation.[19–21] Aerobic physical activities change the blood flow; thereby

Table 1 Cognitive Function Mean Values before and after Low Impact Gymnastics

Gymnastics	Mean±SD (n=38)	p Value*
Before	18.36±4.559	0.003
After	19.69±5.724	0.002

Note: *Shapiro-Wilk test

Table 2 Effect of Low Impact Aerobic Gymnastics on Cognitive Function

Cognitive Function	p Value*
Before gymnastics	0.000
After gymnastics	0.000

Note: *Wilcoxon test

increasing the intake of oxygen and glucose, as well as lipid metabolism, to the brain that reduces the process of ischemia and damages to the microvascular (reperfusion injury). It also reduces the production of reactive oxygen species (ROS) which are destructive and tends to form free radicals. Hence, the NGF and BDNF of the nerve cells increase and they provide a protective effect for cell neurons as well as reducing the amyloid build-up on neurons that can cause an increase in cognitive abilities in elderly people.[22,23]

Physical activities also improve the physical capacity of patients with dementia. Multiple exercises that are combined into physical activity for patients with dementia have shown to have the largest effect. Therefore, a physical activity program that includes various activities is recommended to be included in the treatment for elderly patients with dementia.[24,25] It is expected that the findings of this study will be able to provide inputs when considering treatment for people with dementia, especially in taking the advantage of the low impact exercise as an alternative approach to improve memory among elderly people.

Conclusion

Low impact aerobic exercises improve the cognitive functions of elderly people with dementia in Tresna Werdha Teratai Palembang, South Sumatera, Indonesia.

Conflict of Interest

There is no conflict of interest at all authors.

References

1. Badan Pusat Statistik. Statistik penduduk lanjut usia 2017. Jakarta: Badan Pusat Statistik; 2018 [cited 2019 May 20]. Available from: https://www.bps.go.id/publication/2018/04/13/7a130a22aa29cc8219c5d153/statistik-penduduk-lanjut-usia-2017.html.
2. Masruroh. Efek aktivitas berjalan kaki terstruktur dalam memelihara fungsi kognitif pada usia lanjut: uji klinis acak tersamar tunggal [thesis]. Jakarta: Universitas Indonesia; 2014 [cited 2019 May 3]. Available from: http://lib.ui.ac.id/file?file=digital/2016-3/20405274-SP-Masruroh.pdf.
3. Pusat Data dan Informasi, Kementerian Kesehatan Republik Indonesia. Situasi lanjut usia (lansia) di Indonesia [Internet]. 2016 May [cited 2019 May 5]. Available from: https://pusdatin.kemkes.go.id/resources/download/pusdatin/infodatin/Infodatin-lansia-2016.pdf.
4. Mandolesi L, Polverino A, Montuori S, Foti F, Ferraioli G, Sorrentino P, et al. Effects of physical exercise on cognitive functioning and wellbeing: biological and psychological benefits. Front Psychol. 2018;9:509.
5. Maslim R. Buku saku diagnosis gangguan jiwa: rujukan ringkas dari PPDGJ-III dan DSM-5. Jakarta: Bagian Ilmu Kedokteran Jiwa FK-Unika Atmajaya; 2013.
6. Powers SK, Howley ET. Exercise physiology: theory and application to fitness and performance. 10th Edition. New York: McGraw-Hill Education; 2018.
7. Wahyuni NPDS. Sehat dan bahagia dengan senam bugar lansia. J Penjakora. 2015;3(1):66–77.
8. Sauliyusta M, Rekawati E. Aktivitas fisik memengaruhi fungsi kognitif lansia. JKI. 2016;19(2):71–7.
9. Tulak TG, Umar M. Pengaruh senam lansia terhadap penurunan tekanan darah lansia penderita hipertensi di Puskesmas Wara Palopo. Perspektif. 2017;2(1):169–72.
10. Cai H, Li G, Hua S, Liu Y, Chen L. Effect of exercise on cognitive function in chronic disease patients: a meta-analysis and systematic review of randomized controlled trials. Clin Interv Aging. 2017;12:773–83.
11. Schweizer TA, Al-Khindi T, Macdonald RL. Mini-Mental State Examination versus Montreal Cognitive Assessment: rapid assessment tools for cognitive and functional outcome after aneurysmal subarachnoid hemorrhage. J Neurol Sci. 2012;316(1–2):137–40.
12. Rohana S. Senam vitalisasi otak lebih meningkatkan fungsi kognitif kelompok lansia daripada senam lansia di Balai Perlindungan Sosial Propinsi Banten. Fisioterapi. 2011;11(1):15–35.
13. Yolanda J, Fatmawati V. Perbedaan pengaruh senam vitalisasi otak dan senam lansia terhadap peningkatan fungsi kognitif pada lansia [undergraduate thesis]. Yogyakarta: Universitas 'Aisyiyah; 2017 [cited 2019 April 30]. Available from: http://digilib.unisayogya.ac.id/2858/1/NASKAH%20PUBLIKASI%20PDF.pdf.

14. Wan M, Wong RY. Benefits of exercise in the elderly. CGS J CME, 2014;4(1):5–8.
15. Kenney WL, Wilmore JH, Costill DL. Physiology of sport and exercise. 5th Edition. Champaign: Human Kinetics; 2012.
16. Kusumowardani A, Wahyuni ES. Pengaruh latihan fisik terhadap kemampuan kognitif lansia di Desa Ngesrep Kecamatan Ngemplak Kabupaten Boyolali. Interest. 2017;6(2):168–78.
17. Teri L, Logsdon RG, McCurry SM. Exercise interventions for dementia and cognitive impairment: the Seattle Protocols. J Nutr Health Aging. 2008;12(6):391–4.
18. Setiawan RA. Pengaruh senam otak dengan fungsi kognitif lansia demensia di Panti Wredha Dharma Bakti Kasih Surakarta [undergraduate thesis]. Surakarta: STIKes Kusuma Husada Surakarta; 2014 [cited 2019 May 6]. Available from: http://digilib.ukh.ac.id/files/disk1/12/01-gdl-rochmadagu-566-1-skripsi_-n.pdf.
19. Hötting K, Schickert N, Kaiser J, Röder B, Schmidt-Kassow M. The effects of acute physical exercise on memory, peripheral BDNF, and cortisol in young adults. Neural Plast. 2016;2016:6860573.
20. Rodwell VW, Bender DA, Botham KM, Kennelly PJ, Weil PA. Biokimia Harper. 30th Edition. Jakarta: EGC; 2017.
21. Baehr M, Frotscher M. Diagnosis topik neurologi Duus: anatomi, fisiologi, tanda, gejala. 5th Edition. Jakarta: EGC; 2017.
22. Bherer L, Erickson KI, Liu-Ambrose T. A review of the effects of physical activity and exercise on cognitive and brain functions in older adults. J Aging Res. 2013;2013:657508.
23. Myers JS. Factors associated with changing cognitive function in older adults: implications for nursing rehabilitation. Rehabil Nurs. 2008;33(3):117–23.
24. Sherwood L. Fisiologi manusia: dari sel ke sistem. 9th Edition. Jakarta: EGC; 2018.
25. Lee HS, Park SW, Park YJ. Effects of physical activity programs on the improvement of dementia symptom: a meta-analysis. Biomed Res Int. 2016;2016:2920146.

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RESEARCH ARTICLE

A Comparative Evaluation of Community Periodontal Index (CPI) and the Presence of Nicotine Stomatitis among Smokers after Oral Hygiene Instruction

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Abstract

Smoking can cause periodontal disease as well as lesions in the oral mucosa. Nicotine stomatitis is inflammation caused by heat stimuli injury on the hard and soft palate of the oral cavity; smokers commonly suffer from this condition. Knowledge of how oral hygiene affects the health of dental and oral cavity. The purpose of this study was to describe the differences in community periodontal index (CPI) and nicotine stomatitis in smokers after oral hygiene instruction. The study subjects were 54 men who have a history of active smoking for more than five years. The experiment was carried out in the Biomedical Laboratory of Faculty of Medicine Universitas Islam Bandung in September 2018–January 2019. Dental examination initiated before and after dental health instructions. CPI and nicotine stomatitis tests performed on all subjects by dentists using dental instruments. After six weeks of information about oral hygiene, all subjects re-examined. The results show that there is a statistically significant difference in the average CPI value in smokers before and after dental instruction with a p value<0.001 ($p \leq 0.05$). In contrast, the condition of nicotine stomatitis remains the same. CPI value influenced by oral and dental hygiene showed that dental health instruction is very effective. However, stomatitis has not healed as long as the cause is not eliminated.

Key words: Community periodontal index, smokers, stomatitis nicotine

Evaluasi Komparatif *Community Periodontal Index* (CPI) dan Stomatitis Nikotin di Kalangan Perokok setelah Instruksi Kebersihan Mulut

Abstrak

Merokok dapat menyebabkan penyakit pada periodontal maupun lesi pada mukosa mulut. Stomatitis nikotin merupakan inflamasi yang disebabkan oleh panas yang terdapat pada palatum keras dan lunak; perokok umumnya menderita kondisi ini. Pengetahuan mengenai tata cara kebersihan mulut memengaruhi kesehatan gigi dan rongga mulut. Tujuan penelitian ini menilai perbedaan *community periodontal index* (CPI) dan stomatitis nikotin pada perokok setelah instruksi kebersihan mulut. Subjek penelitian adalah 54 pria yang memiliki riwayat merokok aktif selama lebih dari lima tahun. Penelitian dilakukan di Laboratorium Biomedik, Fakultas Kedokteran, Universitas Islam Bandung pada bulan September 2018–Januari 2019. Pemeriksaan dental dilakukan sebelum dan setelah instruksi kesehatan gigi. Pemeriksaan CPI dan stomatitis nikotin dilakukan kepada seluruh subjek oleh dokter gigi menggunakan instrumen gigi. Setelah enam minggu mendapatkan penyuluhan mengenai kebersihan mulut, seluruh subjek diperiksa kembali. Hasil penelitian menunjukkan bahwa terdapat perbedaan bermakna secara statistik nilai CPI rerata pada perokok sebelum dengan setelah dilakukan instruksi kesehatan gigi dengan p<0,001 ($p \leq 0{,}05$). Sebaliknya, kondisi stomatitis nikotin tetap sama. Nilai CPI dipengaruhi oleh kebersihan gigi dan mulut sehingga instruksi kesehatan gigi sangat efektif. Akan tetapi, stomatitis tidak dapat sembuh selama penyebabnya tidak dihentikan.

Kata kunci: *Community periodontal index*, perokok, stomatitis nikotin

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Introduction

Smoking with tobacco increases the possibilities of periodontal disease by affecting periodontal attachment, pocket formation, and bone loss. Besides, smoking will cause inflammation on the gingiva, and cause stains on the teeth interfere with the aesthetics and halitosis.[1–3] Smoking also causes damage to almost all organs and body systems. Oral health is an area that receives less attention, but it is a vital area. If the normal flora of the mouth changes, it will cause various diseases, both local and systemic. The smoke of the cigarette can cause the oral mucosal epithelium to be susceptible to the pathogen.[4] Periodontal disease often occurs, and there are some risk factors such as smoking, the knowledge of dental health, socioeconomic status, diabetes, senility, heredity, genetics, oral hygiene, lifestyle, and stress are related to periodontal disease.[5–7]

Cigarettes have a hazardous composition such as gas, nicotine, tar, and also contains more than 4,000 chemical constituents. Nicotine and tar able to stimulate injuries that will cause changes in the oral cavity such as changes in pH of the oral cavity, oral moisture, increasing intraoral temperature, changing immune response, and resistance to infections, especially fungal and virus infections.[2,8]

Nicotine stomatitis is a lesion that formed due to physical irritation from smoke.[9] The temperature at the tip of the tobacco cigarette combustion reaches 650°C (470°C–812°C), and the core temperature of the cigarette can reach 824°C–897°C. During inhalation of smoke, the mouth can reach 190°C. High-temperature fumes that come into direct contact with the mucous palate causing irritation and inflammation of the minor salivary glands in the hard palate.[2]

Periodontal screening is to prevent periodontal disease and improve oral health. Community periodontal index (CPI) or periodontal screening record should be performed for assessing the periodontal tissue.[10–12]

Instructions on oral hygiene such as tooth brushing techniques, frequency, and time of brushing are essential knowledge to improve dental and oral hygiene and health. The research aimed to see how the prevalence of nicotine stomatitis and the value of CPI in smokers after oral hygiene instruction that is needed to detect severe periodontal disease.

Methods

The study was at the Biomedical Laboratory, Faculty of Medicine, Universitas Islam Bandung (Unisba), from September 2018 to January 2019. Subjects were Unisba security officers with inclusion criteria, adults aged over 20 years, and a history of active smoking for more than five years. The research subjects were 54 men. The method is by examining the periodontal health status based on the criteria of the CPI and lesions on the palate that is nicotine stomatitis before and after instructions regarding dental and oral hygiene. CPI examination by evaluating the community periodontal index treatment needs (CPITN) as follows; Code 0 to Code 4 (Code 0: healthy periodontal conditions; Code 1: gingival bleeding on probing; Code 2: calculus and bleeding; Code 3: periodontal sac 4–5 mm; and Code 4: periodontal sac ≥6 mm). Nicotine stomatitis examination is done with anamnesis and examination using a mouth glass by the dentist.[10,13]

The data were processed using SPSS, and differences in CPI values analyzed with the Wilcoxon signed ranks test while for nicotine stomatitis analyzed with a chi-square test. The data presented in tabular form. The Health Research Ethics Committee of Faculty of Medicine Universitas Islam Bandung has approved this research, with the ethical clearance number: 379/Komite Etik.FK/X/2018.

Results

A total of 54 subjects were included in this study, had an average age of 34 years, with 74% had a history of having a toothache.

Table 1 shows that before oral hygiene instructions, most smokers in Code 1 as much as 37 people (68%), whereas after instruction, most in Code 0 as much as 45 people (83%). The results of the analysis using the Wilcoxon signed ranks test at 95%CI that there are statistically significant differences in the average CPI value in smokers before and after oral hygiene instruction at Unisba, with a p value<0.001 ($p \leq 0.05$).

Table 2 shows stomatitis in smokers before and after oral hygiene instruction. Before oral hygiene instructions, most smokers experience stomatitis as much as 37 people (69%), while after instructions, most smokers also experience stomatitis are 35 people (65%).

Table 1 Differences of Average in CPI Values of Smokers before and after Oral Hygiene Instruction

CPI Values	Groups (n=54)		p Value*
	Before	After	
CPI codes			
Code 0	15 (28%)	45 (83%)	
Code 1	37 (68%)	8 (15%)	
Code 2	2 (4%)	1 (2%)	
CPI value			<0.001
Average (SD)	0.76 (0.51)	0.19 (0.43)	
Median (min–max)	1 (0–2)	0 (0–2)	

Note: *Wilcoxon signed ranks test; Code 0: healthy periodontal conditions; Code 1: gingival bleeding on probing; Code 2: calculus and bleeding

Table 3 shows smokers with stomatitis before and after instruction. They were 35 people (95%), while smokers without stomatitis before counseling with stomatitis after instruction were none (0%). Stomatitis before and after the instruction found in two people (5%), while subjects without stomatitis before and after instruction were 17 people (100%).

Based on Table 3, the results of the chi-square test with the 95%CI indicate that there were no statistically significant differences in smokers who experience stomatitis before and after oral hygiene instruction with p value=0.500 (p value>0.05).

Table 2 Overview of Nicotine Stomatitis in Smokers before and after Oral Hygiene Instruction

Stomatitis	Groups (n=54)	
	Before	After
Yes	37 (69%)	35 (65%)
No	17 (31%)	19 (35%)

Discussion

Smoking is a significant risk factor associated with a lifestyle that causes periodontal disease. Oral hygiene instruction is the most effective way to change people's behavior regarding the importance of oral and dental hygiene, starting with proper technique, frequency, and time of brushing.[14]

This study shows that the periodontal disease that is assessed by CPI before the oral and dental health instruction is higher than after the instruction, and it is useful for explaining the pathogenesis of periodontal disease caused by smoking. Sajjad et al.[1] and Saribas et al.[7] stated there is a high correlation between the consumption of tobacco and gingival index, the plaque index, and the community periodontal index of treatment needs, there was a high correlation between intake of tobacco and the gingival score.

Table 3 Differences in Nicotine Stomatitis Conditions in Smokers before and after Oral Hygiene Instruction

Stomatitis before	Stomatitis after		Total (%)	p Value*
	Yes (%)	No (%)		
Yes (%)	35 (95)	2 (5)	37 (100)	0.500
No (%)	0 (0)	17 (100)	17 (100)	
Total (%)	35 (65)	19 (35)	54 (100)	

Note: McNemar test; *chi-square test

Nicotine can inhibit alveolar bone repair. Smokers have periodontitis four times more than nonsmokers. In general, calculus deposits are higher and also gingival inflammation.[15] The results showed that smoking is very susceptible to periodontal disease. Smoking affects the periodontitis process through an immunological mechanism and vascular damage. The periodontal status index and gingival melanin pigmentation were significantly worse in smokers than nonsmokers; it indicates that chronic smoking habits can affect dental health and can cause different periodontal disease. The level of gingival melanin pigmentation can correlate with worsening periodontal status and can be used as an early symptom of developing periodontal disease.[16–18]

History of stomatitis in the study showed no difference between before and after oral hygiene instruction. Mild nicotine stomatitis does not need therapy. However, if it worsens, it can be treated palliatively, giving the instructions for improving oral hygiene and stop smoking.[2] Nicotine stomatitis is a keratosis in the palate caused by tobacco. Palatal mucosa initially appeared reddish. Furthermore, in the vicinity of the minor salivary gland ducts shows inflammation and dilated holes, many micronodules from the red punctate region forming and making diffuse grayish-white wrinkles. The epithelial lining of the oral mucosa is the first immune system to invading microorganisms and carcinogenic agents.[19]

Etiology of nicotine stomatitis increased because of the temperature, rather than the tobacco chemicals. The temperature is responsible for this lesion. Among elderly Indian and Thailandian people, the general oral mucosal lesion type is smoker's palate with an incidence of 43%. Lesions mostly involve the maxillary hard palate region with a prevalence of 23.1%.[19,20]

During an intraoral examination, different oral lesions also recorded. The most common oral lesion was oral submucosal fibrosis, which affected 12.2% of subjects, followed by nicotine stomatitis (10.8%).[21] Other studies state that there are effects of smoking at different sites of the oral cavity and show the potential effects of smoking on buccal mucosal microbiota.[22] The heterogeneity of the oral microbe ecosystem found can contribute to the stability of the oral microbiota in most locations, when environmental disturbances occurred, such as those caused by smoking. Research that is conducted by Ain et al.[3] regarding various oral lesions where the subject has various bad habits; the most common is smoking (56.46 %).

Conclusions

Smoking is closely related to the onset of periodontal disease. Assessment and diagnosis of periodontal conditions of a smoker is a complex and challenging task to prevent serious diseases. Instructions regarding effective oral hygiene can reduce the risk of periodontal disease but cannot cure nicotine stomatitis.

Conflict of Interest

There is no conflict of interest in this study.

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References

1. Sajjad F, Mumtaz M, Ramsha Sajjad R. Effects of tobacco chewing and smoking and its relationship with periodontal health. Natl J Health Sci. 2017;2(3):106–8.
2. Prabowo DMS, Widodo HB. Nicotine stomatitis in smokers: a case report. J Dentomaxillofac Sci. 2018;3(1):58–60.
3. Ain TS, Gowhar O, Sultan S, Tangade P. Prevalence of oral mucosal lesions and associated habits in Kashmir, India. Int J Res Med Sci. 2016;4(8):3525–30.
4. Ozturk O, Fidanci İ, Unal M. Effects of smoking on oral cavity. J Exp Clin Med. 2017;34(1):3–7.
5. Robbihi AI, Sulaeman ES, Rahardjo SS. Path analysis: the effect of smoking on the risk of periodontal disease. IJM. 2018;3(2):99–109.
6. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. Int J Health Sci (Qassim). 2017;11(2):72–80.
7. Saribas E, Acun Kaya F, Dogru AG, Yildirim TT. Determination of periodontal status and smoking habits with CPITN index. Int Dent Res. 2017;7(2):26–31.
8. Horinouchi T, Higashi T, Mazaki Y, Miwa

S. Carbonyl compounds in the gas phase of cigarette mainstream smoke and their pharmacological properties. Biol Pharm Bull. 2016;39(6):909–14.
9. Visconti MJ, Ashack KA. Dermatologic manifestations associated with electronic cigarette use. J Am Acad Dermatol. 2019;81(4):1001–7.
10. Nomura Y, Okada A, Kakuta E, Gunji T, Kajiura S, Hanada N. A new screening method for periodontitis: an alternative to the community periodontal index. BMC Oral Health. 2016;16(1):64.
11. Kobayashi T, Suda T, Mizutani K, Aoyama N, Koyanagi T, Hayakumo S, et al. Clarification of quantitative intraoral circumstances with the community periodontal index of treatment needs data using covariance structure analysis. J Clin Diagn Res. 2019;13(6):ZC41–4.
12. Susanto A, Carolina DN, Amaliya A, Setia Pribadi IM, Miranda A. Periodontal health status and treatment needs of the community in Indonesia: a cross sectional study. J Int Oral Health. 2020;12(2):114–9.
13. Naz I, Butt AM, Bashir U, Memon H. Periodontal tissue; effect of fix orthodontic treatment. Prof Med J. 2017;24(6):930–4.
14. Amoo-Achampong F, Vitunac DE, Deeley K, Modesto A, Vieira AR. Complex patterns of response to oral hygiene instructions: longitudinal evaluation of periodontal patients. BMC Oral Health. 2018;18(1):72.
15. Handa S, Koui H, Khurana C. Insight into nicotine addiction. CHRISMED J Health Res. 2017;4(2):69–75.
16. Goyal V, Devaraj GC. Correlation of smoking, periodontal health status and gingival melanin pigmentation. Int J Health Sci Res. 2017;7(1):109–14.
17. Kubota M, Yanagita M, Mori K, Hasegawa S, Yamashita M, Yamada S, et al. The effects of cigarette smoke condensate and nicotine on periodontal tissue in a periodontitis model mouse. PLoS One. 20;11(5):e0155594.
18. Leite FRM, Nascimento GG, Scheutz F, López R. Effect of smoking on periodontitis: a systematic review and meta-regression. Am J Prev Med. 2018;54(6):831–41.
19. Koray M, Tosun T. Oral mucosal trauma and injuries. In: Gözler S, editor. Trauma in dentistry [e-book]. London: IntechOpen Limited; 2019 [cited 2020 January 30]. Available from: https://www.intechopen.com/books/trauma-in-dentistry/oral-mucosal-trauma-and-injuries.
20. Regezi JA, Sciubba J, Jordan RCK. Oral pathology: clinical pathologic correlations. 7th Edition. Elsevier Health Sciences. St. Louis: Elsevier; 2017.
21. Alshayeb M, Mathew A, Varma S, Elkaseh A, Kuduruthullah S, Ashekhi A, et al. Prevalence and distribution of oral mucosal lesions associated with tobacco use in patients visiting a dental school in Ajman. Oncol Radiother. 2019;13(2):29–33.
22. Mushatat SF, Khalaf AA, Al-Deen Taher JM. A clinical study about oral lesions and normal variants of the oral mucosa. J Pharm Sci Res. 2018;10(7):1755–7.

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