RELATIONSHIP BETWEEN SLEEP QUALITY AND COGNITIVEFUNCTION IN ELDERLY IN THE TRESNA WERDHA SOCIAL ASSISTANCE KHUSNUL KHOTIMAH PEKANBARU

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ABSTRACT

Based on data on population projections in Indonesia in 2015-2045, age groups of 60 and over will continue to increase. A large number of the elderly population can be a burden if the elderly have health problems. As we get older, there will be physical appearance, function and response in daily activity. The occurrence of sleep disorders will have an impact on cognition. To determine the correlation of sleep quality with cognitive function in the elderly in UPT PSTW Khusnul Khotimah Pekanbaru. This type of research is observational analytic with the cross-sectional approach. The study was conducted at UPT PSTW Khusnul Khotimah Pekanbaru. The sampling technique used was total sampling, with 46 respondents from a total population of 58 respondents in the UPT PSTW Khusnul Khotimah Pekanbaru. Research conducted on 46 respondents found 67% of respondents with poor sleep quality and as many as 65% of respondents experiencing cognitive impairment. Statistical test to determine the relationship of sleep quality with cognitive function in the elderly using the Spearman Correlation test showed that there was a significant relationship between sleep quality and cognitive function in the elderly in UPT PSTW Khusnul Khotimah Pekanbaru with a p-value of 0.003 (<0.05) and coefficient correlation (r) 0.427 shows the strength of the moderate relationship with the direction of the positive correlation. Sleep quality is related to and influences cognitive function in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru.

Keywords: Cognitive Function, Sleep Quality, Elderly

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INTRODUCTION

Indonesia is an archipelago state with the fourth largest population in the world, according to the World Population Prospects 2017 Revision by the United Nations. The world's population has now entered an era of the aging population aged 60 years old and over has exceeded 7% of the population. It is predicted that it will continue to increase. (Silviliyana et al. 2018).

The elderly is those who reached the age of 60 years old and over (Kementerian Kesehatan RI, 2015). In 2018, the number of elderly in Indonesia reached around 24,49 million people, Equivalent to 9,27% of the total population of Indonesia. This shows that Indonesia has become a country with an old population structure. Based on the projected data of Indonesia's Population, in 2015-2045, the age group 60 years and over will continue to increase. The percentage of the elderly population in Riau Province is around 5,48% of the total elderly population in Indonesia (Silviliyana et al., 2018).

A large number of elderly people in Indonesia can have both positive and negative impacts. It has positive impacts if the elderly population is independent, healthy, active, and productive. However, the large number of the elderly population can become a burden if the elderly have health problems which result in an increase in the cost of health services, a decrease in income, an increased disability, and a lack of social support and an environment that is not friendly to the elderly. (Kementerian Kesehatan RI, 2017).

As we get older, there will be a variety of physiological changes that will affect physical appearance and their function and response in daily activity. Most of the elderly are at high risk of experiencing disturbances in their sleep, which can be caused by several factors such as disease and age. (Setiati et al. 2015)

A cognitive disorder is when a person has difficulty remembering, learning new things, concentrating, or making decisions that can affect their daily lives. (Centers for Disease Control and Prevention. 2011). The occurrence of sleep disturbances will impact cognitive disorders, which will affect daily activities, reducing the quality of life of the elderly and cause the inability to live independently (Lestari et al., 2017).

This study aimed to determine the relationship between sleep quality and cognitive function in the elderly in Tresna Werdha Social Assistance Khusnul Khotimah Pekanbaru. Meanwhile, the benefits of this study are expected to provide an overview of the relationship between sleep quality and cognitive

function in the elderly.

Hanifa conducted the same research (2016), obtained a p-value of 1,000, which exceeds the limit of the 95% confidence degree (α = 0.05), which states that there is no relationship between sleep quality and cognitive function in the elderly. The research was conducted at the Margaguna Social Institution, South Jakarta, with 37 elderly respondents and used a bivariate analysis in a Fisher Exact Test. While the research that the researchers will do at Tresna Werdha Social Assistance Khusnul Khotimah Pekanbaru, with 46 elderly respondents and using bivariate analysis in the form of the Pearson / Spearman Correlation test. Based on the description of the introduction above, the researchers are interested in researching the relationship between sleep quality and cognitive function in the elderly in Tresna Werdha Social Assistance Khusnul Khotimah Pekanbaru.

METHOD

The type of research used is observational analytic with a cross-sectional approach, that is, data collection for the independent variable and the dependent variable is carried out at one time or one measurement at the same time to analyze the relationship between the independent variables, that is the quality of sleep in the elderly towards the dependent variable, that is a cognitive function in elderly people.

The research tool used to assess sleep quality in the elderly is the Pittsburgh Sleep Quality Index (PSQI) questionnaire, while to assess cognitive function in the elderly using the Mini-Mental State Examination (MMSE) questionnaire, both were used by using interview techniques by asking the researcher directly to the respondent.

The sampling technique uses total sampling, which is to reach the entire population. In this study, at first, sample was 58 people. Still, after adjusting for the inclusion and exclusion criteria, there were 46 respondents from the total population in Tresna Werdha Social Assistance Khusnul Khotimah Pekanbaru.

The data that has been collected is then processed and analyzed using the program SPSS®21. First, the univariate analysis aims to explain or describe the characteristics of each research variable. Furthermore, bivariate analysis was carried out on the two variables which were thought to be related. In conducting hypothesis testing, it is necessary to test the normality of the data. Normality testing uses the Shapiro-Wilk normality test to find out the probability value of the data. If the p-value is> 0.05, then the data is in a normal distribution, and if the p-value is

<0.05, the data is not normally distributed. If the data is normally distributed, use the Pearson Correlation test and if the data is not normally distributed, then use the Spearman Correlation test.

RESULTS

1. Univariate Analysis

Table 1. Respondent characterics

Characteristic	F	%
Age		
60-74	29	63
75-90	17	37
>90	0	0
Total	46	100
Gender		
Male	27	59
Female	19	41
Total	46	100
Eduactional Level		
Elementary	23	50
Junior High School	17	37
Senior High School	6	13
Total	46	100

Table 2. Respondent characteristics based on sleep quality

Criteria Sleep Quality	F	%
Very Good Fairly GoodFairly Bad	15	33
Very Bad	7	15
Total	18	39
	6	13
	46	100

Table 3. Respondent characteristics based on cognitive function

Criteria Cognitive Function	F	%
Without impaired cognitive function	16	35
Mild impaired cognitive function	17	37
Severe impaired cognitive function	13	28
Total	46	100

2. Bivariate Analysis

Table 4. Cross Tabulation of Sleep Quality with Cognitive Function

		Cognitive Function			Total
		Without Impaired Cognitive Function	Mild Impaired Cognitive Function	Severe Impaired Cognitive Function	
Good Quality Sleep	Count	8	5	2	15
	%	17.6%	11%	4.4%	33%
Fairly Good Quality Sleep	Count	2	5	0	7
	%	4.3%	10.7%	0.0%	15%
Fairly Bad Sleep Quality	Count	6	7	5	18
	%	13%	15.2%	10.8%	39%
Very Bad Sleep Quality	Count	0	0	6	6
	%	0.0%	0.0%	13%	13%
Total	Count	16	17	13	46
	%	35%	37%	28%	100%

Table 5. Data Normality Test Results

Variable	Value of *p-value* (*Shapiro–wilk*)	Description
Quality of sleep	0,001	Not normally distributed (*p-value*<0,05)
Cognitive Function	0,010	Not normally distributed (*p-value*<0,05)

Table 6. Results of the Spearman Correlation Analysis

		Quality of sleep	Cognitive function
Quality of Sleep	Correlation coefficient (r)	1,000	0,427**
	Sig. (2-tailed)	.	0,003
	N	46	46
Cognitive Function	Correlation coefficient (r)	0,427**	1,000
	Sig. (2-tailed)	0,003	.
	N	46	46

** .*Correlation is significant at the 0.05 level (2-tailed)*

DISCUSSION

1. Univariate Analysis

   a. Sleep Quality in the Elderly

   Research that has been conducted on the elderly in the Integrated Service Unit for Social Services Tresna Werdha (UPT PSTW) Khusnul Khotimah Pekanbaru with a total of 46 respondents (100%), and it was found that 31 (67%) respondents experienced poor sleep quality with varying levels. The high incidence rate of poor sleep quality in this study is based on the analysis of the answers to the Pittsburgh Sleep Quality Index (PSQI) sleep quality questionnaire. It was found that most respondents experienced many disturbances in their sleep, such as taking longer to fall asleep every night, waking up at night to go to the bathroom, and claimed to wake up early and then find it difficult to get back to sleep. During the day, daily activities become disturbed due to sleepiness and become less eager to complete an activity. This is in accordance with the statement that, in general, sleep disorders become more frequent and very disturbing alongside aging (Umami dan Priyanto, 2013).

   The poor quality of sleep in the elderly is because the elderly take longer to get to sleep (lie down longer in bed before falling asleep) and have a shorter time to sleep comfortably. The elderly also wake up more often in the middle of the night due to physical changes of age and illness, causing a significant decrease in sleep quality. (Rahayu,

2015).

The changes in sleep patterns in the elderly involve REM (rapid eye movement) sleep and Non-REM sleep. REM changes include a redistribution of REM sleep throughout the night. Also, more frequent and shorter REM episodes will result in less total REM sleep. Non-REM changes include a decrease in the amplitude of delta waves, causing a lower percentage of stage 3 and 4 sleep and a higher percentage of stage 1 and 2 sleep. Elderly individuals experience more wakefulness after sleep onset. The reduction of sleep quality in the elderly is mainly due to changes in timing and sleep consolidation. With increasing age, the elderly will have a lower amplitude of circadian rhythms and a shorter circadian cycle (Damping, 2017). The description of sleep quality in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru, apart from the questionnaire results, is in the form of complaints that arise in the elderly. Some of the elderly complained that they could not sleep well every night because the environment was not supportive. Four to six elderly people occupy each guesthouse in UPT PSTW Khusnul Khotimah Pekanbaru. With various forms of individual characteristics living together in one guesthouse, it can affect their sleeping environment. Some of the elderly also have a habit of sleeping late at night because they do fun activities such as watching TV.

This study found that 27 (59%) respondents were male, and 19 (41%) respondents were female. Of the 27 male respondents, 18 (66.6%) respondents experienced poor sleep quality, and of the 19 female respondents, 13 (68.4%) respondents experienced poor sleep quality. It was concluded that poor sleep quality was more common in women than men in UPT PSTW Khusnul Khotimah Pekanbaru. This might be caused by most of the elderly women complain more about the environment in one guesthouse, which affects their sleeping environment.

b. Cognitive Function in the Elderly

Based on the results of the study, it was found that the elderly at UPT PSTW Khusnul Khotimah Pekanbaru with a total of 46 respondents (100%), 30 (65%) of respondents experienced cognitive dysfunction with varying degrees. The description of cognitive dysfunction in this study

is based on analyzing the responses to the Mini-Mental State Examination (MMSE) cognitive function questionnaire. It was found that most of the respondents experienced many disorders in several aspects of cognitive function, namely orientation, attention, and calculations, as well as memory and language. This result is different from the research of Pinilih et al. in 2017, where it was found that cognitive function in the elderly was mostly in the normal category, namely as much as 75.5%, and showed that family support especially holds a position as a strong factor in preventing cognitive decline. This result is also not in line with Hanifa's research in 2016, which states that most cognitive function finding is good cognitive function, 80.6%, carried out at the Tresna Werdha Budi Mulia 4 Social Home, Margaguna, South Jakarta. This is because the house has routine activities or physical activity that every elderly must participate in, where physical activity can improve cognitive function in the elderly.

Poor cognitive function is often associated with various factors, such as neurological disease, vascular disease, depression, and diabetes mellitus (Kirk dan McGough, 2014). Another factor that is also significantly related to the aging process is education and old age itself (Blackwell et al., 2014).

As an individual age, there will be changes to the cognitive function of the elderly, such as reduced intellectual function improvement, the efficiency of nerve transmission in the brain (causing information processing to slow down and a lot of information is lost during transmission), reduced new information accumulation, information retrieval, and memory, as well as the ability to recall past events compared to the ability to recall recent events (Setiati et al., 2015).

This study found that 27 (59%) respondents were male, and 19 (41%) respondents were female. Of the 27 male respondents, 17 (63%) had cognitive dysfunction, and from the 19 female respondents, 13 (68.4%) had cognitive dysfunction. It was found that the percentage of cognitive dysfunction occurs more in women than men in UPT PSTW Khusnul Khotimah Pekanbaru. It is calculated based on 19 (41%) elderly female respondents, 11 (57.8%) respondents' last education was elementary school, 7 (36.8%) respondents' last education

was junior high school, and 1 (5.2%) the respondent' last education was senior high school. A statement supports this conclusion that one factor that can affect cognitive function is educational status (Setiati et al., 2015).

2. Bivariate Analysis

Based on the study results, it can be understood that of the 46 respondents, 15 respondents had good sleep quality. Of the 15 respondents, eight respondents did not experience cognitive dysfunction, five respondents experienced moderate cognitive function disorders, and two respondents experienced severe cognitive dysfunction. In addition, it was found that seven respondents experienced mild poor sleep quality. Of the seven respondents, two respondents did not experience cognitive dysfunction, five respondents experienced moderate cognitive dysfunction, and none experienced severe cognitive dysfunction. Then it was found that 18 respondents experienced moderate poor sleep quality. Of the 18 respondents, six respondents did not experience cognitive dysfunction, seven respondents experienced moderate cognitive dysfunction, and five respondents experienced severe cognitive dysfunction. Six respondents experienced severe poor sleep quality. Of the six respondents, all of them experienced severe cognitive dysfunction.

The results of statistical tests using the Spearman Correlation test regarding the relationship between sleep quality and cognitive function in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru, the obtained p-value was 0.003 (<0.05) with a correlation coefficient (r) of 0.427. The p-value <0.05 indicates a relationship between sleep quality and cognitive function in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru. Additionally, the obtained correlation coefficient value of 0.427, which is in the range 0.4 - <0.6, indicates the moderate strength of the relationship between sleep quality and cognitive function with a positive correlation direction, concludes that the elderly who have poor sleep quality can experience impaired cognitive function. This is in accordance with the research of Pinilih et al. in 2017, which stated that the more unhealthy a person's lifestyle (including poor sleep quality), the higher the risk of cognitive decline in the elderly. This study is also in line with research by Widyantara et al. in 2012, which showed that the elderly with poor sleep quality tends to experience impaired cognitive function (Widyantara et al., 2012). Hanifa conducted the same research in 2016, but different results were obtained, which there was no relationship

between sleep quality and cognitive function in the elderly. However, the study also shows that good sleep quality will result in 100% good cognitive function, while poor sleep quality results in 80% good cognitive function (Hanifa, 2016).

Sleep is useful for improving biological function regularly, storing energy during sleep, and restoring cognitive function. In the elderly, there is a decrease in sleep at stages 3 and 4 and a decrease in REM sleep. It is associated with changes in cerebral blood flow during REM sleep, increased cortical activity, increased oxygen consumption, and epinephrine release. These relationships can aid memory storage and learning. Lack of REM sleep can lead to feelings of confusion and suspicion. Various bodily functions such as motor appearance, memory, and balance can change when prolonged sleep loss occurs (Rahayu, 2015).

Poor quality sleep is linked to the functioning of specific brain areas and thus can impair cognitive function. Poor sleep quality can damage cognitive function that depends on the prefrontal cortex. This area has higher functions, such as language, executive function, divergent thinking, and creativity (Alhola dan Kantola, 2007). The prefrontal cortex is required for so many complex mental operations that are performed daily and may become very tired from overuse, causing the prefrontal cortex to become very susceptible to the effects of poor sleep quality (Killgore dan Weber, 2014).

This study also found that more elderly women experienced poor sleep quality (68.4%) and impaired cognitive function (68.4%) compared to men. In accordance with the statement of Jehan et al. in 2015, that this can be associated with the menopause phase, which can cause sleep disturbances. A community study conducted by Spira et al. in 2014 states that short sleep duration and low sleep efficiency are associated with cognitive impairment in elderly women.

CONCLUSION

Based on the results and discussion of research about the relationship between sleep quality and cognitive function in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru, the following conclusions can be drawn:

a. Sociodemographic characteristics of the elderly show that the age range is at most 60-74 years, which is 29 respondents (63%), where the dominant gender is male, namely 27 respondents (58.7%), and the current dominating level of education is Elementary School, as many as 23 respondents (50%).
b. The description of sleep quality in the

elderly was most elderly experienced a little more moderate poor sleep quality, namely 18 people (39%) compared to good sleep quality, namely 15 people (33%), the rest seven people had poor sleep quality (15%) and severe poor sleep quality with six people (13%).

c. The description of cognitive function in the elderly was most elderly are more likely to have moderate cognitive function disorders, namely 17 people (37%), compared to those who did not experience cognitive function disorders, namely 16 people (35%), and the rest had severe cognitive dysfunction, namely 13 people (28%).

d. The results of the analysis obtained p-value = 0.003 indicate there is a relationship between sleep quality and cognitive function in the elderly at UPT PSTW Khusnul Khotimah Pekanbaru, with a correlation coefficient value of 0.427, indicating the moderate strength of the relationship between sleep quality and cognitive function with a positive correlation.

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REFERENCES

1. Alhola, P. dan Kantola, P. 2007. Sleep deprivation : Impact on cognitive performance. *Neuropsychiatric Disease and Treatment*; 3(5), pp. 553–567.
2. Blackwell, T., Yaffe, K., Laffan, A., Ancoli-Israel, S., Redline, S., Ensrud, K., Song, Y. and Stone, K., 2014. Associations of Objectively and Subjectively Measured Sleep Quality with Subsequent Cognitive Decline in Older Community-Dwelling Men: The MrOS Sleep Study. Sleep, 37(4), pp.655- 663.
3. Centers for Disease Control and Prevention. 2011. Cognitive Impairment: A Call for Action, Now!. pp.
4. Damping, C.E. 2017. Psikiatri Geriatri. In: Elvira, S.D. and Hadisukanto, G. (eds)
5. *Buku Ajar Psikiatri*. 3rd edn. Jakarta: FKUI, pp. 534–572.
6. Hanifa, A. 2016. *Hubungan Kualitas Tidur dan Fungsi Kognitif pada Lanjut Usia di Panti Sosial Margaguna Jakarta Selatan*. Universitas Islam Negeri SyarifHidayatullah Jakarta.
7. Jehan, S., Isarilov, A., Salifu, I., Zizi, F., Jean, G., Pandi, S.R. 2015. Sleep Disordersin Post Menopausal Women. *J Sleep Disord Ther*, 4(5).
8. Kementerian Kesehatan RI. 2015. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 67 Tahun 2015*

Tentang Penyelenggaraan Pelayanan Kesehatan Lanjut Usia Di Pusat Kesehatan Masyarakat. Jakarta.

9. Kementerian Kesehatan RI. 2017. *Analisis Lansia Indonesia 2017*. Jakarta: Pusat Data dan Informasi Kementerian Kesehatan RI.
10. Killgore, W.D; Weber, M. 2014. Sleep Deprivation and Cognitive Performance. In: Bianchi, M.T. (eds.) *Sleep Deprivation and Disease*. Springer New York, pp. 209–229. doi: 10.1007/978-1-4614-9087-6.
11. Kirk, N; McGough, E. 2014. Physical Exercise and cognitive performance in the elderly. *Clinical Intervention in Aging*; 9, pp. 51–62.
12. Lestari Y.I., Indrasari D.K., Budiarsa I.G.N., Widyadharma I.P.E. 2017. *Korelasi Kualitas Tidur dengan Fungsi Kognitif pada Lansia di Desa Tonja Denpasar*. *Neurona*, 34(4), pp. 201–204.
13. Pinilih, S.S., Astuti, R.T., Rini, D.R. 2017. *Hubungan Antara Lifestyle Dengan Fungsi Kognitif pada Lansia*. Muhammadiyah Magelang.
14. Rahayu, R.A. 2015. Gangguan Tidur Pada Usia Lanjut. In: Setiati, S. et al. (eds) *Buku Ajar Ilmu Penyakit Dalam*. 6th edn. Jakarta: Pusat Penerbitan Ilmu Penyakit Dalam FK UI, pp. 3826–3836.
15. Setiati, S., Harimurti, K., Govinda, A. 2015. Proses Menua dan Implikasi Kliniknya. In: Setiati, S., Alwi, I., Sudoyo, A.W., Simadibrata, M., Setiyohadi, B., Syam, A.F (eds) *Buku Ajar Ilmu Penyakit Dalam*. 6th edn. Jakarta: Pusat Penerbitan Ilmu Penyakit Dalam FK UI, pp. 3671–3681.
16. Silviliyana, M., Maylasari, I., Agustina, R., Ramadani, K.D., Sulistyowati, R., Annisa, L., Dewi, F.W.R. 2018. *Statistik Penduduk Lanjut Usia 2018*. Jakarta: Badan Pusat Statistik, pp. 3-6.
17. Spira, A.P., Chen, L.P., Wu, M.N., Yaffe, K. 2014. *Impact of Sleep on The Risk ofCognitive Decline and Dementia*. Curr Opin Psychiatry; 27(6), pp. 478–483.
18. Umami, R; Priyanto, S. 2013. *Hubungan Kualitas Tidur Dengan Fungsi Kognitif dan Tekanan Darah pada Lansia di Desa Pasuruhan Kecamatan Mertoyudan Kabupaten Magelang*. JFIK UMM Magelang, 1(1), pp. 1–8.
19. Widyantara, I.W., Widyadharma, P.E., Budiarsa, I., Meidiary, A., 2012. *PerbedaanFungsi Kognitif pada Lansia yang Kualitas Tidurnya Baik dan Buruk di Banjar Peken Desa Sumerta Denpasar*. Neurona, 30(1), pp. 1–12.