SLEEP QUALITY BEFORE AND AFTER YOGA EXERCISES IN ELDERLY AT POSYANDU LANSIA YUSWO WIDODO SURABAYA

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ABSTRACT

Introduction: Population of the elderly in Indonesia continues to grow every year. Physiological setbacks that occur in the elderly contribute to the declining quality of sleep. Sleep disorder is one of the disorders in older people that are known to have a negative physical and psychological impact. One of the promotive actions to improve sleep quality in the elderly is physical activity, and one such activity that can be practiced by the elderly is yoga. Yoga has been shown to increase the quality of sleep in older people.
Aim: The purpose of this research was to understand the difference in sleep quality before and after yoga exercise in the elderly at Posyandu Lansia Yuswo Widodo Surabaya.
Method: This study was an analytical study with a pre-experimental design using one group pre-test post-test design, which was carried out for two months. The sampling method used was purposive sampling. The total samples obtained were 38 respondents, and all respondents were elderly in Posyandu Lansia Yuswo Widodo Surabaya. The research instrument used was the Pittsburgh Sleep Quality Index (PSQI). Statistical analysis used was the Wilcoxon Signed Rank Test.
Result: The majority of respondents before yoga exercises had poor sleep quality, and the majority of respondents after yoga exercises had good sleep quality. The results showed that there was a significant difference between the quality of sleep before and after yoga in the elderly at the Posyandu Lansia Yuswo Widodo Surabaya ($p = 0.000$).
Conclusion: The effective and routine application of yoga exercises could improve the quality of sleep in the elderly.

Keywords: elderly, yoga exercise, sleep quality

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INTRODUCTION

The population of the elderly in Indonesia continues to grow every year. In 2015, the proportion of elderly in Indonesia reached 5.4%, and it was expected to increase to 6.2% in 2020[1]. The increase in the elderly population impact the high dependency ratio in the elderly, which is caused by some physiological setbacks in the elderly. One of those setbacks as is the decline in sleep quality. The sleep quality is a concept that includes the quality of someone's sleep, the duration of sleep, the time needed to fall asleep (sleep latency), the percentage of time spent in bed, sleeping (sleep efficiency), sleep disturbance, and the use of sleeping pills.

A survey by the National Sleep Foundation in America in 2003 showed that 71% of the elderly experienced at least one sleep disorder symptom such as difficulty in going to sleep, often waking up at night, and waking up too early[2]. Inadequate sleep and poor sleep quality result in disruption of physiological and psychological balance that may lead to mortality[3]. One of the preventive actions to improve sleep quality is exercise. One such exercise that can be practiced by the elderly is yoga. Yoga is a type of exercise that involves different body movements and breathing exercises. Yoga exercises help integrate awareness between mind and body[4].

Yoga exercises can be regarded as mild physical exercise if the practitioners' pulse reaches the specific Target Heart Rate (THR) when practiced. Bankar *et al*. revealed that the elderly who practiced yoga showed a significant improvement in sleep quality[5]. So far, no research focused on yoga and its relation to sleep quality in Surabaya, therefore this research aimed to investigate differences in sleep quality before and after the application of yoga exercises in the elderly at the Posyandu Lansia Yuswo Widodo Surabaya. The contribution of this research includes education on the benefits of yoga exercises for the quality of sleep in the elderly and as a scientific reference on geriatric aspects.

METHODS

This study was an analytical study with a pre-experimental design using one group pre-test and post-test design. The study was conducted at the Posyandu Lansia Yuswo Widodo Surabaya, Jalan Bratang Gede VI D No. 4, Ngagelrejo, Wonokromo, Surabaya. Research started from July-September 2019. The total elderly population in the Posyandu Lansia Yuswo Widodo was 120 people, divided into 98 women and 22 men. The sample used was the elderly population in Posyandu Lansia Yuswo Widodo Surabaya who met the inclusion criteria: the elderly aged 60-85 years old, have the MMSE score higher than

16, able to communicate well (fluent speech and consciously answering questions), Timed Up and Go Test yielded result at more than 12 seconds attended yoga exercise for eight weeks, and have used the chair and mattress as a tool for yoga exercise.

The exclusion criteria were not willing to be the subject, have a history of uncontrolled chronic disease that could affect sleep (Obstructive Sleep Apnea/OSA, bronchitis, rhinitis), have consumed caffeine before going to sleep, and have consumed medication that caused sleep disturbance (b-blocker/diuretic), currently using walking aid (walkers, crutches, wheelchairs, canes, etc.), and no history of balance disorder (vertigo, Meniere's, stroke, vestibular neuritis, etc.).

The sampling method was purposive sampling, and the total sample obtained was 38 people.

Variables included were yoga exercises (independent variable), sleep quality (dependent variable), and age, history of illness, history of caffeine consumption, history of β-blocker/diuretic drugs consumption (control variables). Data were collected by interviewing each respondent about identity, history of diseases, medication, caffeine consumption. Assessment of cognitive function using MMSE and fall risk using the TUG test were also carried out. After that, subjects' sleep quality was assessed using the PSQI questionnaire.

Data were processed and analyzed using SPSS software version 25, and statistical analysis used the Wilcoxon Signed Rank Test.

RESULT

Subject's demographic is summarized in Table 1.

Table 1. Basic Characteristics of Respondents

	Freq. (n)	Percentage (%)
Gender		
Male	1	2,6
Female	37	97,4
Age (y/o)		
60-74	33	86,8
75-90	5	13,2
Level of Education		
Did not go to school	1	2,6
Junior High School	10	26,3
Senior High School	12	31,6
Bachelor's Degree	12	7,9
Occupation		
Housewife	35	92,1
Teacher	1	2,6
Enterpreneur	2	5,3
Total	**38**	**100**

Fig 1. Bar Diagram of Respondent Distribution based on Sleep Quality before and after Yoga

As shown in figure 1, before yoga exercises, most of the respondents had

poor sleep quality (55.3%) and after yoga exercises, the sleep quality was improved, where the majority of respondents had a good sleep quality (47.4%). Wilcoxon Signed Ranks Test showed that the difference was significant (Z = -4.812[b] and p=0.000).

Generally, all seven components of sleep quality assessed by PSQI have improved. However, some components improved but did not reach their normal limits, such as sleep duration and sleep disturbance.

Table 2. Improvement of Sleep Quality

Improvement of Sleep Quality	Freq. (n)	Percentage (%)
Increase	30	78,9
Decrease	1	2,6
Stable	7	18,4
Total	38	100

Table 3. Sleep Quality Status

Sleep Quality Status	Freq. (n)	Percentage (%)
Increasing to the Very Good Category	11	28,9
Increasing to the Good Category	17	44,7
Increasing to the Bad Category (from the Very Bad category)	2	5,3

After yoga exercises, the majority of respondents (78.9%) showed an improvement in their sleep quality, and most of them confessed to having good sleep quality (44.7%).

Distribution of Respondents based on Number of Meetings that the Post-Test Pulse Reached Target Heart Rate (THR)

The average number of meetings with respondents' post-test pulse that reached the THR in respondents whose sleep quality had improved was 12 out of 16 sessions.

One respondent, whose sleep quality is decreased, had six out of 16 sessions with a post-test pulse reached THR.

The average number of meetings with the post-test pulse that reached THR in respondents whose sleep quality did not change was nine out of 16 sessions.

DISCUSSION

Results of Respondents' Sleep Quality

The results of sleep quality measurement before yoga exercises (pre-test) in this research showed that most of the respondents had poor sleep quality. Endeshaw said that changes in the sleep patterns of the elderly made them more susceptible to sleep disturbances, so their subjective feelings about decreased sleep quality appeared [6]. However, in this study, the elderly felt that their sleep quality was improving.

Despite that, the elderly in this study were found to experience poor sleep latency, their total sleep time was less than five hours, and sleep efficiency is less than 85%. These conditions are

associated with some changes in circadian rhythm and melatonin production. Another component of sleep quality, sleep disturbance, was also found to increase. This condition might be influenced by psychosocial factors such as anxiety and physical factors such as pain. Miner et al. (2018) said that anxiety about illness, psychosocial factors such as social isolation, and joint pain, especially in more than one location, caused sleep disturbance and decreased sleep quality in the elderly. Most of the elderly who participated in this research did not take sleeping pills. The few that did take sleeping pills took them because they often felt difficulty to sleep or wake up at night. Beland et al. revealed that consumption of sleeping pills decreased sleep quality in the elderly [7].

The study also showed that the majority of the elderly did not experience daytime dysfunction, while those that experienced daytime (mild-severe) dysfunction felt drowsiness and napping during the daytime. Goldman et al. (2008) revealed that napping harmed the quality of sleep at night[8]. After the application of routine yoga [9] exercises for 16 meetings (post-test), it was found that the majority of respondents improved their sleep quality to a Good category. This improvement could be seen from the improvements in sleep quality's components such as the very good subjective feeling of sleep quality, total sleep time increased, latency and sleep efficiency improved, and use of sleeping pills reduced.

Bankar *et al.* said that there was a decrease in sleep latency, increased deep sleep, decreased sleep disturbance, increased sleep duration, increased sleep efficiency, and decreased sleeping pills used after the elderly attended routine yoga practice. The frequency of sleep disturbances, exceptionally moderate and severe, also decreased. Respondents revealed[5] that decreased stress and anxiety factors contributed to decreased sleep disturbances. Applying Hatha Yoga for four weeks had been found to reduce anxiety, stress, and depression in women [10]. Another component that was also found to decreased was daytime dysfunction, which was seen by decreasing sleepiness while traveling or increasing daytime productivity and an enthusiastic response when solving a problem. Improved sleep quality after routine yoga practice happened through several mechanisms like increased GABA, decreased norepinephrine (NE), cortisol, and relaxation of the mind, body, and mental [11].

Analysis of Measurement of Pulse Rate During Yoga Exercise and Sleep Quality Differences

The results of this research indicated that there were significant differences in the quality of sleep before and after yoga exercises in the elderly at the Posyandu Lansia Yuswo Widodo. Hariprasad et al. (2013) showed that the sleep quality of subjects who took yoga exercises was better than the control group who did not take yoga exercises [12].

Application of routine yoga exercises for two months or 16 times in this research, there was a variation in the change in sleep quality, such as increased, decreased, or remained the same. These changes were thought to be influenced by the effectiveness of yoga exercises conducted, which was interfered with the results of pulse measurements. Respondents who experienced an increase in sleep quality had more meetings with the post-test pulse reaching THR than respondents whose sleep quality decreased or remained the same. The results also showed that the attainment of a minimum seven yoga meetings that post-test pulse achieved THR, was able to maintain sleep quality status (seven people) or even improve sleep quality (30 people).

Yoga exercises, in general, have the same goal with other sports which is to improve physical and mental health, in this research is to enhance the quality of sleep. These targets can only be achieved if the exercise is carried out effectively. The more active the yoga exercises performed, the greater number of meetings where the post-test pulse successfully reached THR, which means that the yoga practice that was carried out has reached the appropriate mild intensity. The impact of effective yoga was improved quality of sleep; therefore, it can be interpreted that respondents with improved sleep quality did not only performed yoga exercises but also implemented effective yoga exercises.

CONCLUSION

Yoga significantly improves sleep quality in the elderly at the Posyandu Lansia Yuswo Widodo Surabaya. The improvement was observed in participants who their post-test pulse reached THR in 12 out of 16 meetings on average, or seven out of 16 meetings minimum.

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REFERENCES

1. Bappenas. Proyeksi Penduduk Indonesia 2010-2035. Badan Perenc Pembang Nas Badan Pus Stat [Internet]. 1980;90:1670–2(cited 2019 Maret 4). Available from: https://www.google.co.id/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=
2. National Sleep Foundation. Sleep inAmerica Poll 2003. 2003;2:38 (cited 2019Maret4).Availablefrom:https://www.sleepfoundation.org/sites/default/files/inlinefiles/2003SleepPollExecSumm.pdf
3. Morgan K. Factors Influencing Persistent Subjective Insomnia in Old Age: a Follow Up Study of Good and Poor Sleepers Aged 65 to 74. Age Ageing [Internet]. 1989;18:117–22(cited 2019 Maret 6).Availablefrom:http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L19206287
4. Luise Worle EP. Yoga As Therapeutic Exercise. Black S, editor. Yl. Toronto, Sydney: Elsevier; 2010. 250 p.
5. Bankar M, Chaudhari S, Chaudhari K. Impact of Long Term Yoga Practice on Sleep Quality and Quality of Life in The Elderly. J Ayurveda Integr Med [Internet]. 2013;4:28 (cited 2019 Maret 4).Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3667430/
6. Endeshaw Y. Aging , Subjective Sleep Quality, and Health Status : The Global Picture. Sleep Res Soc [Internet]. 2012;35:1035–6(cited 2019 September 27).Available from:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3397809/
7. Miner B, Fellow SM, Kryger MH, Miner B, Haven N, Disclaimer P. Sleep in the Aging Population. Sleep Med Clin [Internet]. 2018;12:31–8(cited 2019 September 18). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5300306/
8. Béland S, Préville M, Dubois M, Lorrain D, Grenier S, Voyer P, et al. Aging & Mental Health Benzodiazepine Use and Quality of Sleep in the CommunityDwelling Elderly Population. Aging Ment Heal [Internet]. 2010;:37–41(cited 2019 Oktober 1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/20658372
9. Goldman SE, Hall M, Boudreau R, Matthews KA. Association between Nighttime Sleep and Napping in Older Adults. Sleep Res Soc [Internet]. 2008;31:733–40(cited 2019 September 27). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/
10. Shohani M, Badfar G, Nasirkandy MP, Kaikhavani S, Rahmati S. The Effect of Yoga on Stress , Anxiety , and Depression in Women. Int J Prev Med [Internet]. 2018;21:10–4(cited 2019 September 22).Available from:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5843960/PMC2398743/
11. Mignot E, Taheri S, Nishino S. Sleeping with the Hypothalamus : Emerging Therapeutic Targets for Sleep Disorders. 2002;3:1071–5(cited 2019 April 15). Available from:https://www.ncbi.nlm.nih.gov/pubmed/12403989
12. Hariprasad VR, Sivakumar PT, KopardeV, Varambally S, Thirthalli J, Varghese M, et al. Effects of Yoga Intervention on Sleep and Quality-of-Life in Elderly : A Randomized Controlled Trial. Indian J Psychiatry [Internet]. 2013;55(cited 2019 September 22). Available from:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC37682