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Research article

SLEEP QUALITY IN MIDDLE-AGED WOMEN: FOCUS ON THE IMPACT OF DAYTIME DROWSINESS, PRESENCE OR ABSENCE OF DISEASE, AND SUNLIGHT EXPOSURE TIME

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ABSTRACT
Middle age is the stage between maturity and old age among the developmental stages of life. During this period, in addition to physical changes due to aging and endocrine imbalance, adaptation to various psychological and social changes occur including changing roles in the family, social support system, and loss of relationships between individuals. It is also a time to re-evaluate yourself and your life. Purpose of this study was to analyze the effects of daytime drowsiness, presence or absence of disease, and sunlight exposure time on the sleep quality of middle-aged women. The subjects of this study were 125 women middle-aged 40-60 years old, women who were not currently receiving any disease or hormone therapy. Subjects personally recorded on the mobile questionnaire using their mobile phone face to face, and data were collected in compliance with ethical guidelines. Data were collected using Pittsburgh Sleep Quality Index (PSQI) for sleep quality and Questionnaire on Daytime Drowsiness. According to research results, presence or absence of disease and daytime drowsiness were variables affecting sleep quality in middle-aged women. These two factors were able to explain the sleep quality of middle-aged women by 17.8% and it was statistically significant. However, the time of exposure to sunlight did not affect. In order to improve the quality of sleep in middle-aged women, non-drug interventions with fewer side effects that can improve sleep effects are needed. Therefore, when developing nursing intervention for improving sleep quality in middle-aged women, it is necessary to consider the conditions of disease and daytime drowsiness identified in this study.

KEYWORDS: Middle-aged women, Sleep quality, daytime drowsiness, Presence or absence of disease, Sunlight exposure time

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INTRODUCTION
With prolonged life expectancy of humans, women are living more than a third of their lives beyond middle age. Middle age is the stage between maturity and old age among the developmental stages of life. During this period, in addition to physical changes due to aging and endocrine imbalance, adaptation to various psychological and social changes occur including changing roles in the family, social support system, and loss of relationships between individuals. It is also a time to re-evaluate yourself and your life.[1]

Among Korean middle-aged women, 95% of women develop menopausal symptoms over a period of 2 to 8 years before and after menopause.[2] the incidence of sleep disturbances is high in middle-aged women and is one of the challenges associated with menopause.[3] Sleep disturbances have been reported in 53.6% of women aged between 45 and 69 years.[4] changes in sleep patterns are more frequent in women than in men,[5] and therefore, sleep disorders represent a serious health concern that cannot be overlooked, especially in women.

Yeom stated that sleep disorders are the key menopausal symptoms and health challenges in middle-aged women who resort to sleeping pills or alcohol as a remedy. In addition,[6] Cho stated that the more severe the menopausal symptoms, the lower is the quality of sleep and more severe the sleep disorder.[7] These sleep disorders in menopausal women reduce slow wave sleep and sleep efficiency. due to frequent arousal, leading to excessive daytime drowsiness, decreased memory, decreased concentration, and lower quality of life.[8]

Daytime drowsiness refers to inadequate sleepiness during working hours. Individuals with sleep disorders complain that daytime drowsiness is inevitable, such as falling asleep while sitting.[9] Hubin et al. surveyed the relationship between daytime drowsiness and depression in adults.[10] As a result, 11.0% of women and 6.7% of men were suffering from daytime drowsiness, and 25% of them had severe depression. And 11% were taking medications such as tranquilizers or sleeping pills. As such, daytime drowsiness was also associated with depression, which is associated with sleep disturbance, so it is necessary to study whether it is related to sleep quality in middle-aged women.

Elderly subjects with sleep disorders find it difficult to maintain arousal during the day and are particularly severe in women.[11] Therefore, daytime sleepiness is considered to be a variable that can affect sleep quality. Sleep disorder is a common challenge in cancer patients, and the prevalence rate is reported to be in the range of 30% to 76%.[12] Lee explained that health status is a variable parameter affecting the quality of sleep in the age group of 40 to 59 years.[13] In particular, compared to inpatients, outpatients require greater attention due to sleep disorders because of

neglected management of sleep-related symptoms.[14] Therefore, it is necessary to investigate whether individual health conditions such as high blood pressure and diabetes affect the quality of sleep. the relationship between sleep and light is also suggested. Light therapy was found to be an effective intervention in improving sleep quality, depression, and menopausal symptoms,[15] and was effective for sleep disorders and serotonin levels in menopausal women.[16] Even for the elderly with dementia, light therapy positively induces sleep and is effective in reducing depression, [17] suggesting that light therapy improves sleep quality.

In addition to menopausal symptoms, there are many factors that affect sleep in middle-aged women. Depression and anxiety are considered the most frequent negative emotions among middle-aged women. The average annual increase in the rate of depressed patients was 4.7% among women, which was almost twice as high as 2.6% for men. [18~20]. kim said that sleep disturbances in adult women are not only related to menopause, but also to stress and depression.[21] These said that sleep disorders and depression are reversible and interdependent.[22] In addition, various previous studies also suggested the relationship between menopausal symptoms and depression. In addition[,23,24.] it is necessary to investigate the relationship with the sleep patterns of middle-aged women.

Coffee and tea with caffeine have been suggested as drinks that should be avoided in the late afternoon as they degrade sleep quality. Although alcohol has a temporary hypnotic effect on depression, it has been reported to interfere with sleep. also, among middle-aged women, adverse changes in menopausal hormones, decline in physical function, changes in social support systems, changes in roles according to the independence of children, body changes, marital satisfaction, and spousal or parental bereavement are important factors that impair sleep quality.7 Identifying the various factors affecting the sleep quality of middle-aged women suffering from menopausal difficulties is a meaningful study. The results of this study could be used to develop a program to help middle-aged women overcome sleep problems. Accordingly, it is necessary to explore the factors that affect the sleep of middle-aged women.

Sleep is not only essential for humans to perform normal activities, but lack of sleep leads to fatigue and deterioration of physical activity, so it is an important health-related area. In particular, because sleep disorders are difficult to treat medically unless the subjects are in poor physical and mental condition, a strategy is needed to evaluate and manage sleep conditions. Effective intervention requires identification of the relevant factors that affect sleep quality, suggesting the need for in-depth analysis.
Therefore, this study analyzes the effects of factors such as daytime drowsiness, presence or absence of disease, and sunlight exposure time on the sleep quality of middle-aged women. Based on the findings, we intend to provide basic data for management and intervention to promote the desirable sleep pattern in middle-aged women, an important step determining the remainder of life. the specific research questions under investigation on middle-aged women are as follows. first, identify the Socio-demographic characteristics second, identify the differences in level of the sleep quality according to socio-demographic characteristics. third, identify the correlation among sleep quality, daytime drowsiness, presence or absence of disease, and sunlight exposure time fourth, identify the effects of daytime drowsiness, presence or absence of disease, and sunlight exposure time on sleep quality.

MATERIAL AND METHODS

This study is a cross-sectional descriptive study for identifying the effects of daytime drowsiness, presence or absence of disease, and sunlight exposure time on the sleep quality of middle-aged women. The subjects were 125 middle-aged women between the ages of 40 and 60 who are currently experiencing natural menopause rather than artificial menopause. The survey interviewees who had received pre-training were asked to personally enter the structured mobile questionnaire using a mobile phone by confronting the subjects. G*Power 3.1, a minimum of 148 students were required for a medium effect size of 0.15, a significance level of 0.01, and a statistical power of 0.99 when the number of predictive factors for a multiple regression was 114. Therefore, the number of subjects in this study seems appropriate. In the process of data collection, it was explained in advance that the collected data will be used only for research purposes and confidentiality is guaranteed, taking ethical considerations to the subject. In addition, after explaining the purpose of the study and the contents of the questionnaire, and notifying that the collected data will be processed anonymously, the survey was conducted on voluntary participants who wrote a written consent to participate in the study.

Sleep quality were developed by Buysse et al, 25 and the Pittsburgh Sleep Quality Index (PSQI) was adapted by Sohn et al., 26 Used. PSQI-K measures the quality of sleep over the past 1 month and consists of a total of 19 questions. The total score ranges from 0 points to 21 points, and the higher the score, the worse the sleep quality. The internal consistency Cronbach's α value in this study was 0.829.The daytime drowsiness scale was a measure that quantified the degree of subjective drowsiness, and a tool modified by Cho et al., 27 was used. It evaluates each individual's self-awareness of sleep and arousal. Eight situations that can cause drowsiness are set, and the degree of drowsiness according to each situation can be selected in four stages, enabling an overall evaluation of drowsiness. A score of 11 or higher was judged as abnormal excessive daytime drowsiness. The internal consistency Cronbach's α value in this study was 0.919. The questionnaire on the exposure time of sunlight surveyed the average number of minutes of outdoor sunlight per day for the past week. The questionnaire on the presence or absence of diseases is 'Do you have any diseases?'. Asked to answer 'yes' or 'no' to the question. If there was a disease, the name of the disease was described.

Data Collection and Analysis

The total of 125 middle-aged women were individually met by 5 trained research interviewers. The interviewers explained the mobile survey and asked participants to complete the questions using their own mobile devices. All participants provided informed written consent before participating and were assured that the information would never be used for any other purpose. the collected data were statistically processed using SPSS WIN 22.0. General characteristics were analyzed by frequency and %, and sleep quality according to general characteristics was analyzed by t-test and ANOVA. The correlation between the subject' sleep quality, daytime drowsiness, presence or absence of disease and sunlight time was analyzed by Pearson's Correlation Coefficient. Possible predictor variables of subject' sleep quality were analyzed using a stepwise multiple regression.

RESULTS

Socio-demographic characteristics of middle-aged women are described in Table 1. As for the age of the subjects, 49(39.2%) participants were 46-50 years old and 58(46.4%) participants were over 51 years old and 18(14.4%) participants were under 45 years old. 106 (84.8%) participants married and 9(7.2%) participants were single, 6(4.8%) participants' divorced. 79 (63.2%) participants had 2 children, 16(12.8%) participants had more than 3 children, and 11(8.8%) participants had no children. 37 (29.6%) participants had disease. As for the exposure time to sunlight, 52 people (41.6%) participants had 30 minutes to 1 hour per day, and 36 (28.8%) participants had more than 1 hour, 29(23.2%) participants less than 30 minutes and 8(6.4%) participants who were not exposed to sunlight.

Table1. Socio-demographic characteristics N=125

Characteristics	Categories	N (%)
age(year)	40-45 46-50 51-55 56-60	18(14.4) 49(39.2) 41(32.8) 17(13.6)
Marital status	Married Single Separation Bereavement Divorce	106(84.8) 9(7.2) 1(0.8) 3(2.4) 6(4.8)
Children(n)	0 1 2 ≥3	11(8.8) 19(15.2) 79(63.2) 16(12.8)
Disease	None Have	88(70.4) 37(29.6)
Sunlight exposure time(minute)	None 29< 30~59 ≥60	8(6.4) 29(23.2) 52(41.6) 36(28.8)

Mean differences on sleep quality by socio-demographic characteristics

Mean differences on sleep quality by socio-demographic characteristics are described in Table 2. As a result of this study, there was a significant difference in the quality of sleep according to the presence or absence of a disease (t=-3.563, p<0.001). Having more than one illness worsened the quality of sleep compared to those without the illness in middle-aged women. However, there was no significant difference in the level of sleep quality according to exposure time of sunlight, marital status, disease, age, and number of children. In particular, it has been confirmed that light therapy is an effective intervention to improve sleep quality, depression, and menopausal symptoms,[15] but in this study, the level of sleep quality of middle-aged women is not related to the time of sunlight. A more in-depth study is required Table 2.

Table 2. Mean differences on sleep quality by socio-demographic characteristics n=125

Characteristics	Categories	M n	t or F	p
Sunlight exposure time(minute)	None	18.0	0.513	0.674
	29<	20.4		
	30~59	19.2		
	≥60	20.4		
Marital status	Single	18.9	0.513	0.665
	Married	19.6		
	Separation, Bereavement, Divorce	21.4		
Disease	None	18.5	-3.563	<0.001
	Have	22.9		
age(year)	40-45	19.8	0.477	0.793
	46-50	20.2		
	51-55	21.1		
	56-60	19.2		
Children(n)	0	19.5	0.433	0.799
	1	20.7		
	2	19.8		
	≥3	19.9		

Correlation among the factors related to sleep quality in middle-aged women. Variables correlated with sleep quality in middle-aged women were described in Table 3.

The quality of sleep in middle-aged women was correlated with presence or absence of disease, daytime drowsiness. Presence or absence of disease (r= 0.320) had higher correlation than daytime drowsiness (r= 0.307). People with sleep disorders complain that daytime drowsiness, such as sleeping while sitting, is inevitable.[13] It can be said that the result of not getting enough sleep due to a sleep disorder causes daytime drowsiness. However, in this study, the sleep quality of middle-aged women was not correlated with sunlight exposure time Table 3.

Table 3. Correlation among the factors related to sleep quality in middle-aged women n=125

Characteristics	Sleep quality	Presence or absence of disease	Daytime drowsiness	Sunlight exposure time
Sleep quality	1			
Presence or absence of disease	0.320**	1		
Daytime drowsiness	0.307**	0.103	1	
Sunlight exposure time	0.051	0.076	0.099	1

* p<0.05, ** p<0.01

Factors influencing of sleep quality in middle-aged women

Factors influencing of sleep quality in middle-aged women are shown in Table 4. we conducted a stepwise multiple regression analysis to identify factors influencing peer communication about sex in male college students. Independent variables displayed correlation coefficients between independent variables (0.076 to 0.320), no autocorrelation (Durbin-Watson statistic: 1.555), and no variance inflation factor (VIF: 1.011 to 1.011). Results of this regression analysis were judged to be reliable. in sleep quality of middle-aged women, presence or absence of disease (t=3.36, p<0.001) was the most impact factor. And daytime drowsiness (t=3.19, p<0.01) was also influential factors. These two factors were able to explain the sleep quality of middle-aged women by 17.8% and it was statistically significant (F=11.95, p<0.001) [Table 4]

Table 4. Predictors on sleep quality in middle-aged women n=125

Variable	B	SE	β	t	*p*
Presence or absence of disease	4.083	1.215	0.292	3.36	<0.001
Daytime drowsiness	0.390	0.122	0.277	3.19	<0.01
R^2=0.178, F=11.95, *p*<0.001					

DISCUSSION

Sleep is not only essential for humans to lead a normal life, but is also an excellent way to restore physical and mental functions.[28] Women, in particular, are more associated with changes in their sleep patterns than men, and are more disturbed than men. In other words, it can be seen that women have many sleep-related problems, such as lower quality of sleep compared to men, and complaining of more sleep disorders.[5] sleep disturbance is a common problem that occurs depending on the person's health condition or having a disease.[12,29] Also, Kreitzer & Koithan reported that sleep disturbances can lead to cardiovascular disease, stroke, diabetes, depression, and metabolic syndrome.[30] It is not clear whether sleep disorders or disease outbreaks occurred first, so continuous research is required.

Sleep disorder is a common problem in serious patients such as cancer patients, and the prevalence rate is reported to be 30-76%. Despite the seriousness of sleep disorders, the need for management is underestimated, and interventions for sleep disorders based on theoretical basis are not properly implemented in practice.[12] Kim (2000) said that in their 50s, there are many health problems, such as high stress levels, high indigestion, long sleep induction time, and low sleep satisfaction.[31] In addition, the higher the age, the higher the correlation between stress, sleep satisfaction, and indigestion, suggesting the possibility of improving indigestion and sleep satisfaction through stress management. As such, it is suggested that not only the presence or absence of disease, but also stress may be related to sleep quality.

Based on this findings, the presence or absence of disease was one of the variables affecting the sleep quality of middle-aged women. Even with chronic diseases such as high blood pressure and diabetes that do not require hospital admission, the presence or absence of the disease itself affects the quality of sleep in middle-aged women. Therefore, in the case of middle-aged women with chronic diseases, there is a need to understand and manage their sleep status. In this study, daytime drowsiness was also a factor affecting the sleep quality of middle-aged women, which was consistent with the previous study results.[32~34] Daytime drowsiness has a wide range of symptoms, from mild sleepiness to short sleep or uncontrollable sleep seizures, and can cause excessive sleepiness during the day, which can affect minor to serious accidents during work, memory, judgment, and concentration. [35~36] Castro et al. (2009) described excessive daytime drowsiness as one of the symptoms of sleep disorder.[37] most common cause of daytime drowsiness is sleep deprivation,[35] but in addition, shift work that affects the circadian rhythm, irregular sleep, snoring, sleep-related breathing disorders such as sleep apnea, depression, and obesity.[38~39]

In the case of shift workers, sleep quality is lower and daytime drowsiness is more severe.[13,40~41] The subjective perception of sleep time rather than absolute sleep time is related to daytime sleepiness, and individual perceptions of the same sleep time may vary, so individual subjective evaluation is important.[36]

Daytime drowsiness may be a result of a sleep disorder as a cause, or daytime sleepiness may result in poor sleep quality. There is a need to develop interventions that can improve the quality of sleep through the management of daytime drowsiness. these middle-aged women's sleep disorders have been shown to reduce deep sleep and reduce sleep efficiency due to frequent arousal, leading to excessive sleepiness during the day, decreased memory, decreased concentration, and lower quality of life. On the other hand, if the quality of sleep is good, it has a positive effect on resilience, and it is said that overcoming adversities or crises in an individual's life, and the ability to recover or grow positively.[33]

People with sleep disorders complain that daytime drowsiness, such as sleeping while sitting, is inevitable.[9] It can be said that the result of not getting enough sleep due to a sleep disorder causes daytime sleepiness. In this study, daytime drowsiness was also correlated with sleep quality. In addition, apnea and snoring during sleep also decreased sleep quality. light increases serotonin synthesis during the day and has an important effect on sleep and wakefulness. According to the meta-analysis of light therapy, light therapy is effective in improving sleep disorders. The most appropriate time of day for optimal light therapy was different depending on the subject and purpose, but it was mainly applied early in the morning to improve sleep, and this was to induce improvement of sleep rhythm through progression of circadian rhythm.[41]

Kim and Seong reported that the intervention of light therapy for menopausal women aged 40-60 who participated in the menopausal classroom program was effective in

reducing sleep disorders.[42] Kang Joo-hee (2019) said that light therapy is safe and convenient for breast cancer patients, in particular, it has been confirmed that light therapy is an effective intervention to improve sleep quality, depression, and menopausal symptoms.[15]

However, in this study, sunlight exposure time was not a factor influencing the sleep quality of middle-aged women. This needs to be elucidated again through continuous further research. A more in-depth study is required In order to improve the quality of sleep in middle-aged women, non-drug interventions with fewer side effects that can improve sleep effects are needed. These interventions can be developed using variables that affect sleep quality. In this study, presence or absence of disease and daytime drowsiness were variables affecting sleep quality in middle-aged women. Therefore, in order to improve the sleep quality of menopausal women, the development of interventions taking into account the status of presence or absence of disease and daytime drowsiness is required.

CONCLUSION

Women, in particular, have more to do with changes in their sleep patterns than men, and have more sleep disturbances than men. In other words, it can be seen that women have many sleep-related problems, such as lower quality of sleep compared to men and complaining of more sleep disorders.9 In this study, we are trying to provide basic data to help establish a program to help in-crease the quality of sleep in middle-aged women with non-drug interventions with fewer side effects that can improve sleep effects. Based on these findings, the presence or absence of disease and daytime drowsiness were factors influencing the sleep quality of middle-aged women? The more severe the daytime drowsiness and the presence of the disease, the worse the sleep quality of middle-aged women. Therefore, when developing nursing intervention for improving sleep quality in middle-aged women, it is necessary to consider the conditions of disease and daytime drowsiness identified in this study. this research was supported by grants from Hanseo University Research Foundation in 2020.

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