

## The Effect of Sleep Health Education Based on Telephone Follow-up (Tele-Nursing) on Sleep Quality Improvement in Postmenopausal Elderly Women

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### Abstract

**Background and Objective:** Poor sleep is one of the most common problems in old age and menopause. The aim of this study was to investigate the effect of tele-nursing-based sleep health education on sleep quality in postmenopausal elderly women.

**Materials and Methods:** In this quasi-experimental study, 70 elderly people over 60 years of age who referred to urban community health centers of Gonabad City, Iran, and met the inclusion criteria were selected through a systematic sampling and were equally assigned into control and intervention groups. Participants completed a questionnaire that included the demographic questionnaire and Pittsburgh Sleep Quality Index (PSQI). After completing the pre-test in the intervention group, the sleep health education program was conducted as a face-to-face training session and a telephone follow-up during two months (12 follow-ups). The control group received routine health care. Post-test was performed in both groups after 2 months.

**Results:** We did not find any significant difference between two groups at baseline variables. Besides, there was no statistically significant difference in the mean score of sleep quality before intervention in the experimental and control groups ( $P = 0.127$ ), the mean score of sleep quality after the intervention showed a significant difference between the two groups ( $P < 0.001$ ).

**Conclusion:** The sleep health education program based on telephone follow-up can improve the sleep quality of postmenopausal elderly women. Therefore, teaching this non-pharmacological approach to health care workers, staff of community health centers, and caregivers is recommended to improve the sleep quality of postmenopausal elderly women.

**Keywords:** Menopause; Aging; Sleep hygiene

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### Introduction

Increasing the aging population and consequently increasing the population of postmenopausal elderly women has now made women's health one of the most important health issues (1).

Women experience different crises throughout their lives and stages of development (2). Menopause is one of the most important stages in a woman's life (3). Although menopause is a natural physiological phenomenon, it poses many problems for women. Problems with this period include hot flashes, night sweats, anxiety, headache, fatigue, irritability, and sleep disturbances. Sleep disorders are one of the most common menopausal problems (4).

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According to research, menopause plays an important role in structural changes in sleep in older women (5). During this period, one's sleep is delayed and this delayed sleep is associated with frequent awakening, resulting in a shorter sleep time (6). Studies show that more than 57% of older people over 60 years have poor sleep quality, and quality of sleep of older postmenopausal women is lower than older men (7). The results of a study by Hsu and Lin (8) on sleep quality in postmenopausal women indicated that 42.1% of postmenopausal women had poor sleep quality. Sleep and rest have a protective and restorative role and help restore physical and emotional strength (9).

In contrast, poor sleep leads to immune deficiency (10), increased risk of falls (11), depression, and dementia (12). There are many ways to deal with sleep disorders, but most people use hypnotic drugs to treat these disorders. These drugs alter the structure of sleep by affecting the sleeping stages, shortening them, and also reducing the length of deep sleep. Therefore, they do not lead to a restorative sleep and result in a decrease in individual efficiency (13). Although the efficacy of non-pharmacological drugs is slower than the efficacy of hypnotic medications, it is more durable and has fewer side effects (9). One of these methods is the sleep health program, which means expanding people's education on healthy lifestyle exercises that can improve sleep (14).

In other words, sleep health is defined as a set of behavioral and environmental conditions that directly or indirectly affect the quality of sleep of individuals (15). In addition to healthy people, sleep health rules will also be useful for people who have mild or moderate insomnia without significant organ failure (16).

Sleep health includes guidelines for modifying environmental factors (brightness, temperature, and noise) as well as individual sleep-related behaviors (having proper nutrition, regular sleep schedule, and having pre-bedtime activities) (17).

Given the benefits of using sleep health training, which include low cost, availability, no need for a specialist to implement it permanently, and the ability to implement it over a short period of time, it can be considered as an appropriate intervention to improve the sleep quality of the elderly (18).

Continuous follow-up is an essential part of health care services, and patients undergoing fol-

low-up are more likely to change their inappropriate health behaviors (19).

In the meantime, telephone follow-up is a very useful and inexpensive method of assessing the needs of out-of-hours patient care that reduces the number of frequent visits (20). As defined by the International Association of Nurses, tele-nursing is the use of telecommunication technology to improve patient care (21). The use of this technology leads to faster patient access to better services, lower costs, easier access to the most appropriate specialized skills, and a comprehensive increase in the quality of health care provided to patients (21). Providing health advice and education through telephone follow-up has been applied in studies such as those conducted on the feeling of loneliness in the elderly (22), patients with myocardial infarction (23), the increasing use of non-pharmacological methods in the prevention of diabetes (24), and the elderly with hypertension (HTN) (25).

Due to the high prevalence of sleep disorders in aging and its impact on physical and mental status of the elderly, a low-cost and uncomplicated intervention is needed in this regard. Telephone follow-up, on the other hand, is a very useful, inexpensive, and effective method of promoting self-care in patients. Since nurse-led telephone follow-up has not received much attention in our country and also, there is no similar study in this field in Iran, therefore, the present study aimed to investigate the effect of sleep health education based on telephone follow-up (tele-nursing) on sleep quality improvement in postmenopausal elderly women.

## Materials and Methods

The present study was conducted following a quasi-experimental study design. The study population included all postmenopausal elderly women over 60 years covered by urban community health centers of Gonabad City, Iran. Inclusion criteria included satisfaction with participation in the study, 60 years of age, cognitive health, and the possibility of making telephone calls with clients. Exclusion criteria included mental and physical disease, chronic pain, Alzheimer's disease (AD) based on the elderly health record as well as hospitalization during the intervention period, death of relatives and any similar unexpected events during the intervention, and telephone disconnection for 3 weeks during the intervention.

In this study, sample size was calculated to be 62 individuals based on the sample size determination formula by using the study of Hoch et al. (26) with 95% confidence interval (CI) level and 80% test power. A total of 70 individuals (35 in the intervention group and 35 in the control group) were considered with a likelihood of 10% sample attrition.

Participants completed a questionnaire that included the demographic questionnaire and Pittsburgh Sleep Quality Index (PSQI). The first part consisted of demographic information (age, sex, marital status, number of children, income adequacy, etc.) and the second part included a standard questionnaire called PSQI. The questionnaire was developed in 1989 by Buysse et al. (27) at the Psychiatric Institute of Pittsburgh in the United States, which assesses sleep disturbances over a 1-month time interval. The questionnaire consists of 19 questions with 7 components rated on a scale of 0 to 3. Total score ranges from 0 to 21. In this study, the scores of 5 and below and the scores of more than 5 were considered as good sleep quality and improper sleep quality, respectively. The creators obtained the internal reliability of the questionnaire using a Cronbach's alpha of 0.83. In the Iranian version, the validity and reliability of the questionnaire were 0.86 and 0.89, respectively (25).

Systematic random sampling was first performed according to the inclusion criteria (Gonabad City has 3 community health centers. Based on the list of the elderly names in these 3 centers, 14 eligible elderly women were randomly selected from each of the centers). Then, based on the elderly health records in the urban community health centers, contact information was drawn from a preliminary list of individuals randomly selected from 3 centers. A telephone call was then made to these subjects, and in addition to introducing the researcher and the purpose of the study, the subjects were given the necessary information about the study and their consent for participation in the study was obtained, and they were invited to visit the community health center on an agreed date. This continued until the sample size reached 70. After obtaining the written informed consent and completing the demographic questionnaire and the PSQI questionnaire, a code was assigned to each sample, and the codes were given to another person from the research team in the form of a complete list without the names of

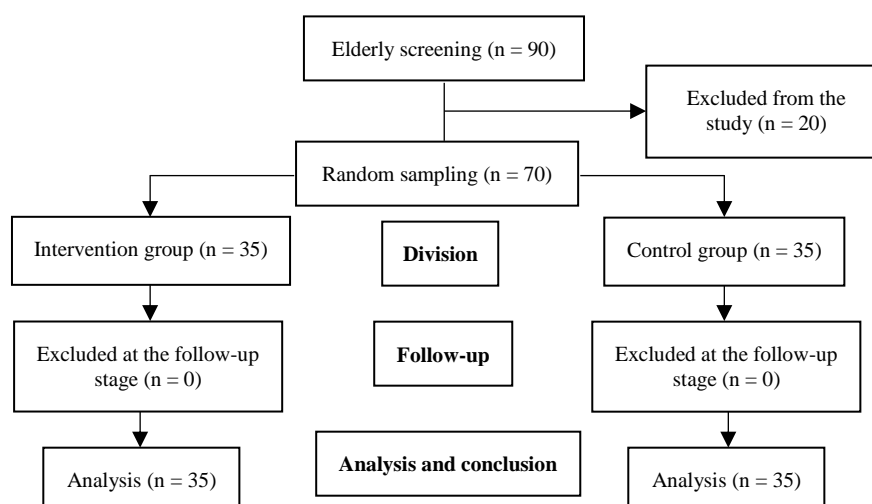
the subjects. The subjects were randomly assigned to the control and intervention groups by block randomized allocation of 4 blocks. The main questionnaire (pre-test) was given to the elderly by the main researcher and was completed before assigning individuals to the two groups. After the intervention, the post-test questionnaire was completed by a person other than the main researcher who was not aware of the group of people.

The sleep health education program was implemented based on a one-hour in-person training session held in the form of lectures, group discussions, and questions and answers. The importance of sleep in elderly life, changes in sleep in aging, and sleep health and factors affecting it as well as teaching the issues including the impact of habits and lifestyle such as sleep and wake-up time, sleep environment (light, sound, and temperature), and tobacco use on the quality of sleep, and how to adjust these conditions for a comfortable and high-quality sleep were provided to the elderly (28).

At this stage, an educational leaflet containing the above issues was provided to the elderly. In case of illiteracy, experts read the educational leaflet for the elderly. After attending the training session, in order to control, follow up, and ensure behavior change in the elderly, the telephone follow-up care counseling was given along the educational program twice a week in the first month of follow-up, and once a week in the second month (12 follow-ups in total) (28). The elderly were given a telephone number to consult. Each conversation was predicted to take between 10 and 15 minutes. The talk time was set from 8 AM to 1 PM by the researcher using a landline telephone at the community health center. Immediately after the second month, the sleep quality questionnaire was completed again by the elderly. Health center's routine care was performed for the control group, and after completion of the training plan, the educational leaflet was also given to the control group.

The steps for summarizing the study are described in figure 1.

The data were analyzed via SPSS software (version 16, SPSS Inc., Chicago, IL, USA). For data description, mean and standard deviation (SD), and frequency and percentage were used and, for inferential statistics, tests such as independent t-test, chi-square test, and Mann-Whitney test were run.



**Figure 1.** CONSORT flow diagram

The normality of the data was evaluated using the Kolmogorov-Smirnov test. Significance level was considered less than 0.05.

## Results

In this study, data of 70 elderly people (35 in the experimental group and 35 in the control group) were analyzed.

The results of the study showed that the mean age in the intervention and control group was  $64.34 \pm 3.91$  and  $65.62 \pm 4.41$  years, respectively. The mean number of successful years of education in the intervention group was  $4.19 \pm 4.47$  and that of the control group was  $3.80 \pm 5.02$ . There was no statistically significant difference in the mentioned variables between the two groups and thus, the two groups were statistically homogeneous (Table 1).

According to the results of the study, the mean

scores of sleep quality indicators before the intervention were not significantly different between the two groups of intervention and control ( $P > 0.05$ ). But after the intervention, there was a statistically significant difference in the mean scores of sleep quality indices in the two groups ( $P < 0.05$ ) (Table 2).

According to the independent t-test, there was no statistically significant difference in the mean score of sleep quality before intervention in the experimental and control groups ( $P > 0.05$ ), but the mean score of sleep quality after the intervention showed a significant difference between the two groups and the mean difference of sleep quality scores between the two groups before and after the intervention ( $P < 0.001$ ), indicating the positive effect of sleep health education based on telephone follow-up on the sleep quality of older women (Table 3).

**Table 1.** Comparison of studied demographic variables in two groups

Variables		Intervention	Control	P-value
Job	Housekeeper	33 (94.28)	35 (100)	0.359
	Retired	2 (5.71)	0 (0)	
Marital status	Married	30 (85.71)	22 (62.85)	0.091
	Non-married/divorced	5 (14.29)	13 (67.14)	
Accompanying life	With family	32 (91.42)	28 (80.00)	0.258
	Alone	3 (8.58)	7 (20.00)	
The economic situation*	Less than supplying the needs	2 (5.71)	6 (17.14)	0.251
	Supplying the needs	33 (94.28)	29 (82.80)	
Age**		$64.44 \pm 3.97$	$65.62 \pm 4.41$	0.337
Education (number of successful years of study**)		$4.19 \pm 4.47$	$3.80 \pm 5.02$	0.449

Data are presented as mean  $\pm$  standard deviation (SD) or number and percentage

\*Fisher's exact test; \*\*Mann-Whitney test

**Table 2.** Comparison of sleep quality components of study participants in the intervention and control groups before and after the implementation of sleep health education program

Variables		Intervention (mean ± SD)	Control (mean ± SD)	P-value
Sleep quality	Before intervention	1.19 ± 0.62	1.21 ± 0.48	0.583
	After intervention	0.97 ± 0.29	1.35 ± 0.64	< 0.001
Sleep latency	Before intervention	2.36 ± 0.83	2.02 ± 1.09	0.437
	After intervention	1.72 ± 0.84	2.55 ± 0.74	< 0.001
Sleep duration	Before intervention	1.08 ± 0.96	1.14 ± 0.95	0.189
	After intervention	0.75 ± 0.64	1.50 ± 1.05	< 0.001
Habitual sleep efficiency	Before intervention	0.47 ± 0.87	0.29 ± 0.67	0.731
	After intervention	0.13 ± 0.42	0.41 ± 0.70	< 0.001
Sleep disturbances	Before intervention	1.55 ± 0.55	1.44 ± 0.56	0.601
	After intervention	1.08 ± 0.28	1.50 ± 0.50	< 0.001
Use of sleeping medication	Before intervention	0.50 ± 0.97	0.35 ± 0.77	0.815
	After intervention	0.19 ± 0.46	0.29 ± 0.75	0.002
Daytime dysfunction	Before intervention	1.19 ± 0.66	0.85 ± 0.82	0.061
	After intervention	0.91 ± 0.50	0.82 ± 0.79	0.004

SD: Standard deviation

## Discussion

The aim of this study was to improve the sleep quality of postmenopausal women by following the sleep health education program via telephone follow-up. Findings of the present study indicated that the mean overall score of sleep quality in the intervention and control groups was low before the intervention. The results of Taheri Tanjani et al. (17), Montazeri Lemrasky et al. (14), Hedayat and Arefi (29), and Drake et al. (30) also indicated that the sleep quality of the elderly was low before the intervention, which is in line with the findings of the present study. Various factors affect the quality of sleep in postmenopausal women. For instance, their sleep becomes lighter as they age and besides, menopause causes hot flashes and night sweats that exacerbate these problems (31), and snoring, which is more common in postmenopausal women, also causes sleep disturbances in these individuals (32).

After the implementation of sleep health education program, the results of the study showed that the mean overall score of sleep quality improved in the experimental group. In other words, complying with the sleep health program rules improves overall sleep quality in postmenopausal elderly women. Numerous studies are in line with the results of the present study; the results of the study by Drake et al. (30) suggested the improvement of overall

sleep quality in postmenopausal women using sleep health education program. The results of other studies also showed that sleep health education program improved overall sleep quality of older women (14, 17).

Hedayat and Arefi also reported in their study that behavioral-cognitive therapies including treatment with sleep health program improved the overall sleep quality of older women (29). In a study by Edinger and Sampson (33), it was shown that cognitive-behavioral therapies with sleep health program improved the overall sleep quality in the elderly and the results remained consistent over a 6-month follow-up. But in a descriptive study by McCrae et al. (18), which aimed to study sleep health guidelines in two groups of elderly with and without sleep disorders, the results indicated that health was not significantly different between the two groups, which is inconsistent with the results of the present study. The likelihood of disagreement of the present study with the above-mentioned study may be related to the type of study and the target population. In the above-mentioned descriptive study, the researcher compared sleep health practices among the elderly with sleep disorders and the elderly without sleep disorders. However, the present study examined the role of sleep health in sleep quality of postmenopausal elderly women.

**Table 3.** Total sleep quality scores in the intervention and control groups before and after the intervention

Sleep quality	Group		P-value
	Intervention (mean ± SD)	Control (mean ± SD)	
Before intervention	8.36 ± 3.09	7.32 ± 2.39	0.127
After intervention	5.77 ± 2.05	8.44 ± 2.78	< 0.001
Mean difference before and after intervention	2.58 ± 2.25	-1.11 ± 2.33	< 0.001

SD: Standard deviation

There was a statistically significant difference in the mean overall score of sleep quality between the intervention and control groups after the intervention, indicating that the implementation of sleep health education based on telephone follow-up (tele-nursing) was effective in improving the overall sleep quality. The results of several studies are in line with the results of the present study. In the study of Yan et al. (34), it was also stated that telephone follow-up improved and modified lifestyle and also promoted self-care and self-management behaviors of chronic diseases.

The results of the study by Behzad et al. (25) showed that empowerment program based on telephone follow-up was effective in promoting self-efficacy of self-care behaviors of the elderly with HTN. Kamrani et al. (35) also showed in their study that patient education and subsequent telephone follow-ups could lead to more patients adhering to the treatment regimen and suggested telephone follow-up to serve patients.

Besides, in their study, Sol et al. (36) concluded that tele-nursing provided an opportunity to continue and improve the process of education and change in health behaviors that ultimately led to improved quality of health care. But in a study by Forouzesh et al. (23), which aimed to determine the effect of tele-nursing (telephone follow-up) after discharge on readmission due to complications after coronary artery bypass graft (CABG) surgery, the results showed that telephone follow-up had no effect on readmission, which is inconsistent with the results of the present study. The reason for this discrepancy may reside in the research community of the above-mentioned study - patients after CABG surgery - as well as the target community - the readmission group - which differed from our study.

The first limitation of this study is that sampling was performed on the elderly in the community and it seems that it cannot be generalized to the elderly hospitalized in the hospital and the nursing home. The second limitation is that sleep quality is a mental phenomenon and is reported by the individual, and each person's opinion about its severity varies.

## Conclusion

Given the high prevalence of insomnia and its complications in elderly postmenopausal women, as well as the high side effects of drug treatment, non-pharmacological methods should be used more

in the treatment and improvement of sleep quality, one of which is sleep hygiene training. On the other hand, because face-to-face access to all the elderly in the community is not possible, alternative methods such as telephone tracking can be used. This method, besides having no side effects and ease of use, improves the quality of sleep and ultimately the quality of life of postmenopausal elderly women which can provide the basis for more active participation of older people in society.

## Conflict of Interests

Authors have no conflict of interests.

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