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The Effect of Continuous Care Model on the Sleep Quality of the Elderly

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Abstract

Background: Aging is accompanied by the mitigation of sleep quality in the elderly, thereby affecting their physical and social dimensions and quality of life. However, studies have not addressed sleep problems in the elderly by means of a holistic approach, such as continuous care model (CCM).

Aim: The aim of this study was to determine the effects of CCM on sleep quality among the elderly.

Method: This quasi-experimental study was performed on 70 elderly individuals in a retirement center located in Zirab, Iran, in 2017, selected by convenience sampling method and randomly divided into two groups of control and intervention. Consequently, CCM was applied to the intervention group under four stages (i.e., orientation, sensitization, control, and evaluation) for 2 months averagely in 3-8 sessions in the retirement center under study. The data were collected in three stages using the Pittsburgh Sleep Quality Index (PSQI). Data analysis was performed in SPSS software (version 21), using generalized estimation equations (GEE).

Results: The participants of the control and intervention groups had the mean ages of 66.76±6.13 and 64.73±6.14 years, respectively. The GEE showed that the sleep quality of the intervention group differed significantly from that of the control group 1 and 2 months after the implementation of the CCM ($P<0.001$).

Implications for Practice: Provision of CCM-based care for the elderly could improve their sleep quality. Therefore, this model could be used to promote sleep quality in the elderly in various clinical settings.

Keywords: Aged, Continuous care model, Sleep quality

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Introduction

Increase in aging populations is an issue that affects all regions of the world, including Iran, where the elderly population was reported to increase from 8.65% in 2016 to 10.5% in 2025 (1). This growth points to the importance of fulfilling the needs of this vulnerable group. Sleep as one of the basic human needs (2) affects the concepts of health and quality of life (3). It is worth mentioning that the quality of sleep changes with aging (4). The reduction of sleep quality in the elderly prolongs the time before falling asleep and increases the frequency of awakenings at night (5), thereby reducing sleep quality in this population (4). Consequently, more than half of the elderly complain about sleep problems (6). Reduced quality of sleep in the elderly affects the physical and social dimensions, as well as the quality of life in the elderly (7).

In a study carried out by Huaqing Liu et al. (2016), sleep was closely associated with successful aging and good night sleep quality. These qualities can actively deal with the challenges of aging (8). In another study, 39.8% and 24.5% of the elderly had moderate and severe problems in terms of sleep quality, respectively (9). Researchers have also found that depression is inversely associated with sleep, and that the sleep quality of the elderly is significantly correlated with loneliness (10, 11).

Today, non-pharmacological interventions are recommended as an initial choice for the treatment of sleep disorders in the elderly population (12). Various studies have addressed particular interventions for solving sleep problems; however, the diverse needs of care that affect sleep have been neglected. For instance, a favorable strategy is the implementation of nursing interventions based on care model or framework which promotes the way nurses think about the provision of appropriate care (13).

Given that many factors cause sleep disorders among the elderly, care provision should be based on a holistic approach. An example of such an approach is the use of continuous care model (CCM), which was designed and evaluated by Ahmadi (2001) for the treatment of patients suffering from chronic coronary diseases. The mentioned author adopted a holistic orientation in deriving insights that properly affects the care and control of disease, drug complications, and quality of life in patients who are in need of dynamic and continuous care.

In the model, a patient is defined as an individual who is an effective care provider for his/her own health (14). Numerous studies have demonstrated the beneficial effects of this model on improving health problems. This model was beneficial in self-care management among patients with heart failure, enhancement of the sleep quality of patients with type II diabetes, and improvement of sleep quality in patients undergoing hemodialysis (15-17).

In order to ascertain the effects of CCM on outcomes related to acute and chronic disease, Moosavinasab et al. (2018) (18) conducted a systematic review. The mentioned research was conducted on 51 studies addressing quality and lifestyle, depression and anxiety, self-care, sleep quality, and sleepiness in different patients, such as renal, cardiac, and diabetic patients, as well as elderly individuals. The authors showed that this model, which corresponds with the characteristics of Iranian culture, could be implemented as a means of rectifying the various dimensions of a disease. However, the CCM has not been investigated in relation to the quality of sleep among the elderly population. To fill this void, the current research was carried out to determine the effects of CCM on sleep quality among aging individuals.

Methods

This quasi-experimental study was conducted in Iran (2017). The study population consisted of all the elderly participants who referred to a retirement center located in Zirab, Mazandaran, Iran, with a population of 16,000 people. This center was designed to offer insurance and retirement services for the elderly from 7:30 to 14:00 during office hours. The sample size was calculated using the Pocock's formula following the results obtained by Ahmarian et al. addressing elderly sleep quality considering a confidence interval of 95%, α of 0.05, and statistical power of 90% with the mean values of 0.69 ± 1.93 and 0.74 ± 1.83 in pretest and posttest, respectively (19).

In this study, 70 elderly people were selected via convenience sampling method. The study population was allocated into control (n=35) and intervention (n=35) groups on the basis of a random number table. The inclusion criteria were: 1) membership in the retirement center of Zirab, Iran, 2) age of 60-80 years, and 3) lack of simultaneous participation in other self-care programs intended to improve sleep quality. On the other hand, the exclusion criteria were: 1) presence of acute physical illness and 2) death. Subsequently, two subjects were excluded from the study due to death (control group) and

unwillingness to continue cooperation (intervention group).

The instruments used to collect data were a demographic characteristic form and Pittsburgh Sleep Quality Index (PSQI). The former comprises 10 open-ended and multiple-choice items covering such data as age, gender, educational level, marital status, activity level, income sufficiency, history of disease and smoking, number of children, and location of residence. The PSQI was designed by Büysse et.al. (1989) to assess the quality of sleep during the past month. This index consists of 19 items in seven domain, namely subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of medication for sleep, and daytime dysfunction.

The minimum and maximum scores of each domain are 0 and 3, respectively. In this regard, the scores of 0, 1, 2, and 3 are indicative of lack of, average, serious, and very serious sleep problems, respectively. The scores of these seven dimensions make the total score, which ranges from 0 to 21, with a score of above 5 indicating poor sleep quality. In this regard, a higher score is suggestive of weaker sleep quality (20).

In a study conducted by Rahmaninia in Iran, the validity of this tool was determined as 0.80. In addiiton, its reliability was reported as 0.93-0.98 using the test-retest method (21). In a study performed by Beirami et al., Cronbach alpha coefficient was reported as 0.83-0.86 (22). In a study carried out by Hossein Abadi et al., the reliability of this questionnaire was reported as 0.88 based on the test-retest technique (23). In this study, Rahmaninia's translated and validated version of PSQI was used. The reliability estimation rendered a Cronbach's alpha coefficient of 0.80-0.83.

Before applying the model, demographic and sleep quality questionnaires were completed by the participants or by the researcher for the illiterate. The CCM, which involved orientation, sensitization, control, and evaluation, was then implemented in the intervention group (Table 1). By contrast, the control group did not receive any special continual care.

Table 1. Contents of the continuous care model

Stages of continuous care model	Contents	Goal	Training method	Teacher	Each session assignments
Orientation	Expression of expectations and goals of study/ the nature of aging/ sleep changes in aging/ ways to improve sleep quality/explain the model/ gather information about the sleep problem	Orientation with sleep problems and ways to cope with it	*Lecture *group discussion *question and answer *educationa l video film	Researcher (the educational content was approved by the research team)	Review of the contents presented Record each problem they were face with
Sensitization	Use different sensitization methods; individual training/ consultation/ use of the experiences of other elderly people/ use of educational assistance methods/family role in sensitizing	Sensitizing the elderly to resolve sleep problems	*Lecture *group discussion *question and answer *educationa l video film	Researcher (the educational content was approved by the research team)	Review of the contents presented Record each problem they were faced with
Control	Physical sessions/ telephone control/ complete the checklist/ view activities/ an active member of the family ' report	Assess correct implementation of the model and if necessary, run the model from the first stage or change sensitization method	Completion of the checklist	Researcher	Completion of the checklist by the elderly
Evaluation	Assess the goals of continuous care model	Assess correct implementation of the model	Completion of the checklist	Researcher	Completion of the checklist by the elderly

At the orientation stage, individual sessions lasting 30-45 min were held to familiarize the elderly patients and their families (if needed) with the research objectives, identify one another's expectations, determine the sleep of the elderly and the complications they encounter, and encourage them to adopt CCM. The goal of the sensitization stage was to engage the elderly in the implementation of a consistent and continuous care approach to address their sleep conditions.

Because of the dispersion and lack of overlap in the needs identified in the previous stage and expectations of the participants, only one group of five males was formed, and the rest of the sessions were held individually. The individual sessions were run for 3-8 rounds, each lasting 30-45 min. This design was adopted by considering the needs of the subjects. For instance, since elderly individuals experience fatigue, the researcher shortened the sessions and increased frequency as a compensation. At this stage, different methods were used to sensitize the elderly to sleep problems. These techniques included individual training, counseling, using the experiences of other elderly people, and providing educational assistance for the families of the participants.

At the control stage, focus was directed toward institutionalizing appropriate health behaviors that affect the sleep quality of the participants. The manner by which the elderly individuals conducted themselves was regulated, using a checklist designed by the researcher for managing the intervention. The participants themselves and their family members filled in the checklist, which were then verified by the researcher. At this point, the role of the researcher as an educated nurse was transformed into an advisory function to enable the participants to call the attention of the researcher when they encountered problems and apply the CCM on their own, as needed.

Finally, the evaluation stage entailed the assessment of sleep quality, particularly the amount of progress achieved in the implementation of the CCM (20). Then, 1 and 2 months after the intervention, PSQI was completed by the elderly or the researcher. For the aged participants who had visual impairments or were illiterate, the researcher completed the questionnaire. The control group did not receive any special care or continuous care approach.

In line with research ethics principles, permission was obtained from the Ethics Committee of Tarbiat Modares University, Tehran, Iran. Moreover, the researcher referred to the retirement center after receiving the letter of introduction and obtaining permission from the authorities. In addition, the purpose of the study was explained to the eligible patients, and their informed written consent was obtained.

The data were analyzed in SPSS software (version 21). Before the intervention, two groups were matched in terms of confounding factors (e.g., demographic variables) using Chi-square and Fisher's exact tests. Furthermore, the effects of the intervention were determined using generalized estimation equations (GEEs). The Friedman test was performed to ascertain the validity of the results in each group. Additionally, Kolmogorov-Smirnov test was carried out to check the normality of the data. A p-value less than 0.05 was considered statistically significant.

Results

The results of the Mann-Whitney U test revealed no significant difference between the control and intervention groups in terms of the mean age (66.76±6.13 vs. 64.73±6.14, P=0.061). The demographic characteristics of the groups and the results of their comparison are presented in Table 2. Table 3 shows the mean sleep quality of the elderly in relation to the different dimensions and the total scores regarding such sleep quality index before the intervention, as well as 1 and 2 months after the intervention.

The mean total sleep quality scores of the intervention group were obtained as 8.76±2.83, 4.35±1.68, and 3.94±1.51 at the baseline, and 1 and 2 months after the intervention, respectively (P<0.001). However, regarding the control group, the total mean scores of sleep quality were respectively estimated as 9.1±2.8, 9.2±2.6, and 9.4±2.7 at the three mentioned stages (P=0.21). In the intervention group, the mean scores of subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication intake, and daytime dysfunction were estimated at 0.9±0.5, 1±0.6, 1±0.6, 0.05±0.6, 0.4±0.5, 0.08±0.2, and 0.2±0.4, respectively, one month after the implementation of CCM. These mean scores were indicative of an improvement in all dimensions.

The GEE findings revealed that the total sleep quality scores and the scores associated with its dimensions differed significantly after the implementation of the CCM (P<0.05). However, no significant difference was found between the interventional periods regarding the intake of hypnotic

Table 2. Comparison of the demographic characteristics of the elderly in control and intervention groups

Variable		Group		
		Control (%)	Intervention (%)	P-value
Gender	Male	29 (85.3)	29 (85.3)	P=1.0*
	Female	5 (14.7)	5 (14.7)	
Marital status	Married	32 (94.1)	31 (91.2)	P=0.64*
	Other	2(5.9)	3 (8.8)	
Educational level	Illiterate	4 (11.8)	3 (8.8)	P=0.77*
	Under diploma	13 (38.2)	11 (32.4)	
	Diploma	8 (23.5)	7 (20.6)	
	Academic	9 (26.5)	13 (38.2)	
Activity level	low	4 (11.8)	8 (23.5)	P=0.21**
	Moderate	30 (88.2)	25 (73.5)	
	Severe	0 (0)	1 (2.9)	
Income sufficiency	Sufficient	1 (2.9)	1 (2.9)	P=0.48*
	Relatively sufficient	28 (82.4)	31 (91.2)	
	Insufficient	5 (14.7)	2 (5.9)	
History of disease	Diabetes	1 (2.9)	2 (5.9)	P=0.19*
	Cardiovascular	5 (14.7)	6 (17.6)	
	Other	10 (29.4)	5 (14.7)	
	Multiple disease	14 (41.2)	10 (29.4)	
	No disease	4 (11.8)	11 (32.4)	
Smoking	Yes	6 (17.6)	7 (20.6)	P=0.75*
	No	28 (82.4)	27 (79.4)	
Location of living	City	26 (76.5)	21 (61.8)	P=0.18*
	village	8 (23.5)	13 (38.2)	
Age (year)	Mean±SD	66.7±6.1	64.7±6.1	P=0.06***
Number of children	Mean±SD	5.3±2.4	4.9±2.3	P=0.46***

*Chi-square **Fisher exact test ***Mann–Whitney U test

Table 3. Comparison of mean and standard deviation scores of sleep quality dimensions in control and intervention groups

Dimensions		Group		
		Control	Intervention	Inter-group comparison P-value
		Mean±SD	Mean±SD	
Subjective sleep quality	Before the intervention	1.3±0.5	1.3±0.5	P=0.003*
	1 month after intervention	1.4±0.5	0.9±0.5	
	2 months after intervention	1.4±0.5	0.8±0.5	
	Intra-group comparison P-value	P-value =0.39**	P<0.001**	
Sleep latency	Before the intervention	2.0±0.9	2.1±0.9	P<0.001*
	1 month after intervention	2.1±0.8	1.0±0.6	
	2 months after intervention	2.1±0.8	1.0±0.5	
	Intra-group comparison P -value	P-value =0.39**	P<0.001**	
Sleep duration	Before the intervention	2.3±0.7	2.15±0.8	P<0.001*
	1 month after intervention	2.3±0.7	1.0±0.6	
	2 months after intervention	2.32±0.7	0.9±0.6	
	Intra-group comparison P-value	P-value =0.39**	P<0.001**	
Sleep efficiency	Before the intervention	1.0±0.9	0.6±0.8	P =0.004*
	1 month after intervention	1.1±0.9	0.05±0.6	
	2 months after intervention	1.0±0.9	0.4±0.6	
	Intra-group comparison P -value	P-value =0.39**	P=0.02**	

Table 3 Continued.

Sleep disturbance	Before the intervention	1.0±0.6	1.2±0.5	P =0.01*
	1 month after intervention	1.0±0.6	0.4±0.5	
	2 months after intervention	1.0±0.6	0.3±0.4	
	Intra-group comparison P-value	P-value =0.39**	P<0.001**	
Use of medication for sleep	Before the intervention	0.5±1	0.4±1.7	P=0.13*
	1 month after intervention	0.4±1.0	0.08±0.2	
	2 months after intervention	0.6±1.1	0.1±0.4	
	Intra-group comparison P-value	P-value =0.39**	P=0.003**	
Daytime dysfunction	Before the intervention	0.7±0.9	0.7±0.7	P=0.03*
	1 month after intervention	0.7±0.9	0.2±0.4	
	2 months after intervention	0.7±0.9	0.2±0.4	
	Intra-group comparison P-value	P=0.11**	P<0.001**	
Total sleep quality score	Before the intervention	9.1±2.8	8.7±2.8	P<0.001*
	1 month after intervention	9.2±2.6	4.3±1.6	
	2 months after intervention	9.4±2.7	3.9±1.5	
	Intra-group comparison P-value	P=0.21**	P<0.001**	

*GEE ** Freidman

drugs (P> 0.05). The results of the Friedman test revealed a significant change in the scores of PSQI among the intervention participants.

Discussion

Results of this study showed a significant improvement in the mean score of sleep quality after the intervention in the CCM group in comparison with that in the control group. Before applying CCM, the two groups were assessed regarding confounding variables because evidence is indicative of better sleep quality in old men than in old women (24). Marital status, place of living, underlying diseases (25), educational level (26), and smoking (27) were significantly related to the quality of sleep. Therefore, the homogeneity of demographic variables was investigated before the intervention.

In some studies, contradictory results were reported regarding some dimensions of sleep quality. The results of the present study showed an improvement in "sleep disturbance" because during sensitization, individuals became sensitive to this need and the factors that interfered with their sleep. In addition, at the control stage, the suitability and impact of these health behaviors were assessed.

In the present study, the intervention group showed an improvement in "sleep latency", which is inconsistent with the results of a study carried out by Farrokhnejad Afshar et al. (2016) (28). This difference can be due to their type of intervention that was different from the present study. They used white noise to improve sleep quality in coronary patients. However, in our study, the factors that affected sleep onset latency in the orientation stages among the elderly were sensitized and assessed. Moreover, it changed the behavior of the elderly by reducing the time in bed.

In the present study, the mean score of sleep efficacy was decreased and improved. This finding is in line with those of a study performed by Wang et al. (2016) (29); however, it is inconsistent with those reported by Rasouli et al. (2013) (30). This difference may be due to the provision of one-dimensional care for the sleep problems of the elderly. However, in our study, interventions were conducted in the form of CCM that considered all aspects of care. This model is client-care, and implementation can change with client needs (14). This can be the reason for the difference between the present study and the one conducted by Rasouli et al.

There was an improvement in the "daytime dysfunction" dimension in the intervention group. It can be due to the implementation of CCM and the correction of health behaviors affecting daytime dysfunction, resulting in more effective sleep at night and reduced daytime sleepiness. Mendoza-Meléndez et al. (2016) confirmed this association by reporting that 6%, 48.2%, and 69.6% of the elderly expressed daytime sleepiness, expressed daytime snooze, felt tired during the day, respectively (31). Moreover, this problem affected daily dysfunction as a result of sleep duration.

As dimensions of sleep quality are associated with one another, enhancement in sleep onset latency and daily dysfunction have improved the subjective quality of sleep, sleep duration, and ultimately the

total score of sleep quality reduction. Accordingly, a better sleep quality has been reported in the elderly.

However, there was no significant difference between the two groups in terms of hypnotic consumption after the implementation of the model. This result can be due to the nature of the investigator's intervention as a geriatric nurse because it is not the responsibility of a geriatric nurse to prescribe or recommend not to take hypnotics. The researcher tried to correct the proper use of hypnotics in the elderly who took such agents in accordance with the doctor's prescriptions. This was observed to induce a positive effect on other aspects, such as sleep latency, daily dysfunction, and subjective sleep quality.

Hypnotic drugs in the elderly are used not only for sleep problems but also for stress and anxiety. Accordingly, the elderly may have taken hypnotics to cope with these problems. Bahrami Ein-al-Qassi et al. (2016) showed that physical activity improved all aspects of sleep quality (32); on the other hand, exercise and regular physical activity reduced anxiety (33). Rasoulli et al. also reported no significant difference in taking hypnotics before and after reflexology (30).

However, in a study performed by Khosrowan et al., there was a significant difference in the use of hypnotics after the implementation of CCM. Differences in the results of the studies suggest further research on the use of hypnotics in the elderly and their attitude towards the use of these drugs. More serious measures should be taken to reduce stress and anxiety in the elderly as factors affecting sleep. Moreover, the cooperation of other members of the healthcare team (i.e., doctors) should be also sought to change this approach.

The limitations of this research are the individual differences in responding to the questions of sleep quality, completion of the questionnaire for illiterate elderly by the researcher, and the researcher's lack of responsibility to change the type of their drugs.

Implications for Practice

This study showed that the implementation of a CCM could improve sleep quality in the elderly. Therefore, it is suggested to use this model in various hospital settings and elderly daycare centers. Moreover, it will be taught or used by geriatric nurses as a practical skill. Further studies are recommended to assess the level of anxiety before the intervention or use the consultation of other colleagues, such as doctors, to manage drug consumption among the elderly or exclude those having anxiety disorder and using medication for their sleep problems.

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Conflicts of Interest

The authors declare no conflicts of interest.

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