RESEARCH

THE EFFECT OF WALKING EXERCISE ON QUALITY OF LIFE AND SLEEP IN ELDERLY INDIVIDUALS: RANDOMIZED CONTROLLED STUDY

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Abstract

Introduction: This study was conducted for determining the effect of a walking exercise program on quality of life and sleep in elderly individuals.

Materials and Method: The study was designed as a randomized controlled trial that was stratified by gender, age, and physical activity levels. The study was conducted with 60 elderly individuals, 30 participants in the exercise walking group who participated in the walking program, and 30 participants in the control group without any intervention. The exercise walking group participated in the 40-minute walking program twice a week for 8 weeks. No intervention was made for the control group. In the study, data were collected using the introductory information form, World Health Organization Quality of Life Scale-Elderly Module, and Pittsburgh Sleep Quality Index. The same data collection forms were re-administered to the both groups after the walking program.

Results: A significant improvement was found in the daily walking time (mean±sd=32.16±13.43), quality of life (mean±sd=81.30±2.87) and sleep quality (mean±sd=4.33±2.39), of the exercise walking group participating in the walking program compared with the control group ($p<0.001$).

Conclusion: It was found that the walking program positively affected quality of life and sleep of elderly individuals. Consequently, this walking program is recommended to be applied in every environment where elderly individuals live.

Keywords: Aged; Walking; Quality of Life; Sleep.

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ARAŞTIRMA

YAŞLILARA UYGULANAN YÜRÜYÜŞ PROGRAMININ YAŞAM KALİTESİ VE UYKU ÜZERİNE ETKİSİ: RANDOMİZE KONTROLLÜ ÇALIŞMA

Öz

Giriş: Bu çalışma yürüyüş programının yaşlıların yaşam kalitesi ve uykusuna etkisini belirlemek amacıyla yapılmıştır.

Gereç ve Yöntem: Çalışma, cinsiyet, yaş ve fiziksel aktivite düzeylerine göre tabakalandırılmış randomize kontrollü bir araştırmadır. Çalışma yürüyüş programına katılan 30 deney grubu ve her hangi bir girişim uygulanmayan 30 kontrol grubu olmak üzere 60 yaşlının katılımı ile gerçekleşmiştir. Deney grubu sekiz hafta boyunca haftada iki kez, günde 40 dakikalık yürüyüş programına alınmıştır. Kontrol grubuna herhangi bir girişimde bulunulmamıştır. Çalışmada veriler her iki grupta, tanıtıcı bilgi formu, Dünya Sağlık Örgütü Yaşam Kalitesi Ölçeği-Yaşlı Modülü ve Pittsburgh Uyku Kalitesi İndeksi kullanılarak toplanmıştır. Yürüyüş programından sonra her iki gruba aynı veri toplama formları tekrar uygulanmıştır.

Bulgular: Yürüyüş programına katılan deney grubunun günlük yürüyüş süresi (ortalama±ss=32.16±13.43), yaşam kalitesi (ortalama±ss=81.30±2.87) ve uyku kalitesinde (ortalama±ss=4.33±2.39) kontrol grubuna göre önemli derecede ilerleme belirlenmiştir ($p<0.001$).

Sonuç: Yürüyüş programının yaşlı bireylerin yaşam ve uyku kalitesini olumlu etkilediği bulunmuştur. Sonuçta yürüyüş programının yaşlının yaşadığı her ortamda yapılabileceği önerisinde bulunulmuştur.

Anahtar Sözcükler: Yaşlı; Yürüme; Yaşam Kalitesi; Uyku.

INTRODUCTION

Increased life span and the decreased birth rates are aging the world's population. The World Health Organization (WHO) states that the elderly population is gradually increasing. By 2040, the proportion of the population aged 65 years and over in the entire population is expected to increase from 6.9% to 12% (1).

Turkey is one of the rapidly aging countries. The proportion of the elderly population (aged ≥65 years) in Turkey has risen from 7.7% in 2013 to 8.3% in 2016. This ratio is expected to increase to 10.2% in 2023, to 20.8% in 2050, and to 27.7% in 2075. On the basis of these figures, Turkey is estimated to be one of the "very old" countries in 2023 (2).

This rapid increase in the elderly population brings about physical, spiritual, social, economic and environmental problems. In addition, increasing age affects the quality of life of elderly individuals. Quality of life is a complex and broad concept influenced by the individual's physical and psychosocial health, culture and beliefs, and its relationship with the environment. It can, therefore, not be directly observed but can be measured through the factors affecting it. Studies have shown that age, gender, marital status, educational status, work life, income level, level of social support, relationship with family and environment, culture, health status, characteristics of housing, spare time activities, exercise habits, and sleep pattern are important variables affecting the quality of life of elderly individuals (3-5). Reportedly, different dimensions of quality of life are associated with sleep duration and sleep quality (4). In addition, studies have shown that elderly people living in nursing homes experience more sleep problems and have lower quality of life than elderly people living with their families (4, 5).

In recent studies, interventions such as Yoga, Pilates, Tai Chi, music, laughing therapy, humor, prayer, meditation, exercise therapy and training, Swiss ball and elastic band exercise, running, and walking activity have been shown to be appropriate interventions used for improving the quality of life and sleep quality in elderly individuals (7, 8).

Walking is an important activity as it is risk-free, easy and costless, can be performed without the need of special sports centers, is easily tolerated by every individual, is a type of exercise in daily life, and can be performed by elderly individuals on their own. Walking is also defined as a changeable behavioral factor associated with quality of life and health in elderly individuals. Walking decreases the injuries that occur by falls in elderly individuals, improves balance and coordination, increases muscle strength, regulates glycemic control, improves short-term memory, prolongs attention span, and improves spiritual well-being, sleep, and quality of life (9).

Walking is an important practice recommended by health professionals for reducing sleep problems and improving sleep and quality of life in elderly individuals. Studies have reported a positive correlation between exercise and sleep (10) and quality of life (9). Although studies have investigated the effect of walking on quality of life and sleep of elderly individuals, very few studies in Turkey have provided clear guidance on public health and clinical interventions positively influencing quality of life, and evidence supporting walking activity. Therefore, the present study is important as it is, to the best of our knowledge, the first study in Turkey where healthy elderly individuals are included in the walking program.

The main aim of this study was to identify the impacts of walking program, on quality of life in elderly individuals. The secondary target included assessment the impact of the walking program on sleep quality.

MATERIALS AND METHOD

Study design and sample selection

This is a randomized controlled experimental study. The study comprised 71 elderly individuals

living in a nursing home in Hatay province of Turkey. In determining sample size, the program G*Power 3.1 was used. Analysis showed that for a 0.05 margin of error, 90% statistical power, and 0.8 effect size the total number of participants should be 56 (28 per group), and in accordance with this, the study sample was formed with 64 participants (32 per group). A total of 64 elderly individuals who met the research criteria and agreed to participate in the study were randomly assigned to the exercise walking group and control group.

Randomization was performed by stratification according to gender, age and physical activity scores. After the gender variable was divided into 2 stratums (female and male), the age variable was divided into 3 stratums (65–74 years, 75–84 years and ≥85 years) and physical activity scores were divided into 3 stratums (<600 MET-min/week=inactive, 600–3000 MET-min/week =minimal active, >3000 MET-min/week=very active). In this case, a total of 2×3×3=18 combinations were made between the variables. In the study, the first female participant (age=65-74 years and physical activity=inactive) was included in the exercise walking group with heads or tails method. The second female (age=65-74 years, physical activity=inactive) was included in the control group. The same path was followed in each new combination. By combining the stratums, the groups were balanced.

Two participants in the exercise walking and control groups were unable to complete the study and were therefore excluded from the final analysis. All procedures were performed between October and December 2018.

Elderly individuals aged 65 years and over who had no visual, hearing, or mental disability; who were able to communicate verbally and answer questions independently; who did not have Alzheimer's and dementia, and any obstacle to walking (insulin-dependent diabetes, diabetic foot, heart failure, advanced hypertension, respiratory system disorders, presence of neuropathy, dialysis patients, etc.); and who agreed to participate in the study were included in the study.

Instruments

Introductory Information Form

This form evaluates the gender, age, smoking status, and daily walking duration of elderly individuals.

International Physical Activity Questionnaire-Short Form

It was developed by Booth (2000) for determining the physical activity level of an individual. The questionnaire evaluates physical activity performed for at least 10 minutes in the last seven days in terms of frequency, duration and intensity, and enables the calculation of the MET (metabolic equivalent) value; 1 MET refers to the amount of oxygen used by the individual at rest in sitting position. The questionnaire consists of intense physical activity, moderate physical activity and walking sections. According to the questionnaire, the individual consumes 8.0 MET in "intense physical activity," 4.0 MET in "moderate physical activity" and 3.3 MET in "walking activity." In the calculation, the MET coefficients from the related activity group are multiplied by minutes and frequency (days) to obtain the MET value. The multiplied values are collected and the total physical activity value is obtained. Accordingly, those with a weekly MET value below 600 have low physical activity levels, those with a weekly MET value between 600 and 3000 have moderate physical activity levels, and those with a weekly MET value above 3000 have high physical activity levels (10).

Turkish validity and reliability study of the questionnaire was conducted by Savcı et al. (2006) and test and retest reliability were reported as 0.30 and 0.69, respectively (10). In the present study, Cronbach's α was found to be 0.68.

World Health Organization Quality of Life Scale-Elderly Module

Developed by Power et al. (2005), this scale consists of 24 items. There are six subscales and each item is rated on a 5-point Likert-type scale. These subscales are; sensory functions, autonomy, past-present-future activities, death and dying, social participation and intimacy. Possible subscale scores range from 4 to 20. In addition, total score can be calculated by adding the score of each individual item. Higher scores indicate higher quality of life (12).

Turkish reliability and validity study of the scale was conducted by Eser et al. (2010) and Cronbach's α reliability coefficient was reported as 0.85 (12). In the present study, Cronbach's α value was found to be 0.83.

Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index (PSQI) is a self-report scale developed by Buysse (1989) for assessing sleep quality and sleep disturbance. It comprised 24 items. Each item is scored from 0 to 3 on a Likert-type scale of seven subscales. The subscales are subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction. The sum of the subscale scores gives the total PSQI score. The total PSQI score is between 0 and 21. Those with a PSQI score less than 5 are considered to have "good" sleep quality, whereas those with a PSQI score more than 5 are considered to have "poor" sleep quality (11).

Turkish validity and reliability study of the scale was conducted by Ağargün et al. (1996) and Cronbach's α reliability coefficient was reported as 0.80 (11). In the present study, Cronbach's α value was found to be 0.81.

Implementation

The participants in the exercise walking group completed the eight-week walking program. The program was conducted by a single researcher. The program was applied twice a week. A compensation session was held once a week for participants who could not attend the program for any reason. Two people who could not regularly attend the 8-week walk program were withdrawn from the exercise walking group and two people who did not take the post-test were withdrawn from the control group, and the study was completed with 60 participants.

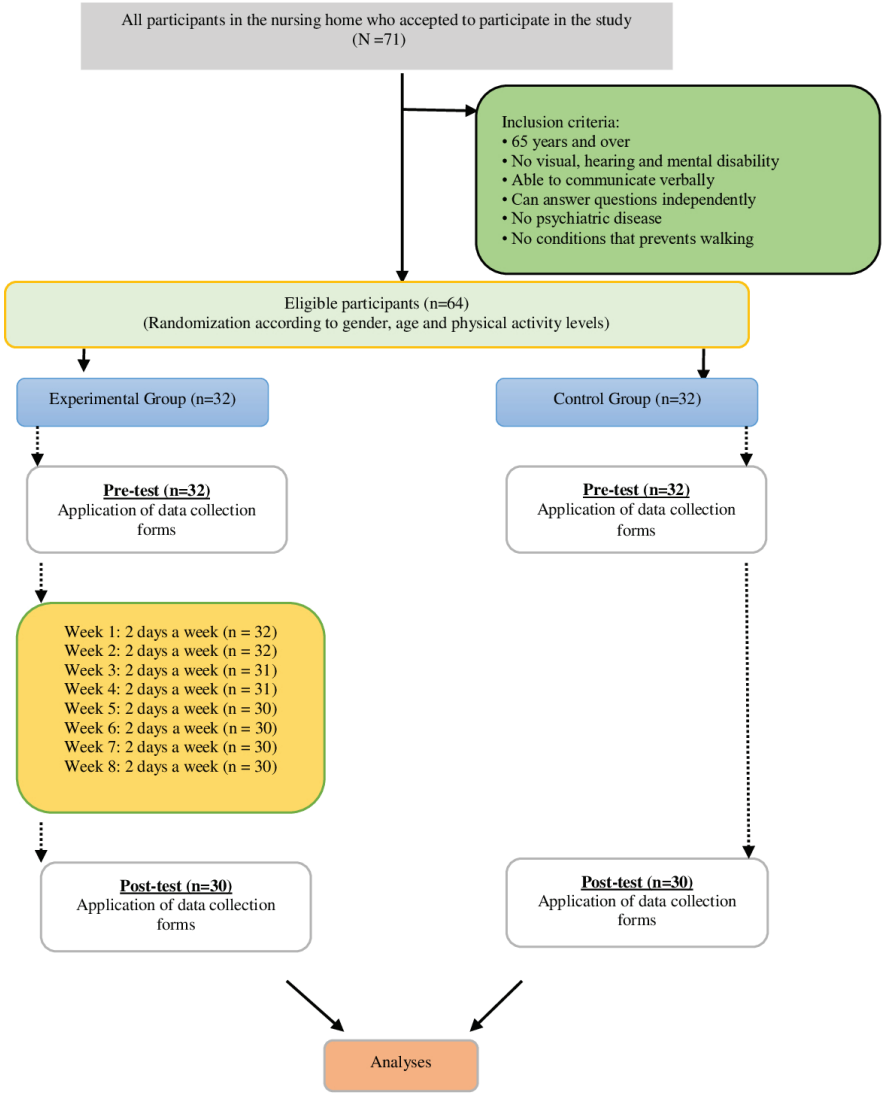
Walking program was conducted in the early morning hours in warm weather and at midday in cold weather. The garden of the nursing home where the study was conducted was chosen as the walking area. Walking tracks with flat floors around the garden were used. Elderly individuals were encouraged for fluid intake before, during and after exercise, and water was provided in the participants in small bottles.

Walking program was created as recommended by the American College of Sports Medicine. The "intensity" of the walk did not exceed 50% of the elderly individual's maximum heart rate. It was increased by 5% every two weeks, but never exceeded 70%. "Maximum heart rate" was calculated by the following formula: "220−age." The tolerance of elderly individuals to walking was evaluated by speech test. Moderate intensity walking activity was determined as the activity level where elderly individuals had no difficulty in talking to the person next to him/her without having breathlessness (13).

In each session, a 5-minute warm-up exercise, a 30-minute walking program, and a 5-minute cooling exercise were performed. The 30-minute walking exercise was divided into three sections of 10-minute periods and elderly individuals were rested for a short time after 10 minutes.

Elderly participants in the control group did not participate in the walking program during the study period. Once the walking program was completed, the same data collection forms were applied to the exercise walking and control groups by the researchers (Figure 1).

Figure 1. Flow chart of the participants during the study



Data analysis

The data obtained in this study were analyzed using Statistical Package for Social Sciences version 21.0 program. Descriptive statistics included frequency, percentage, and mean. Distribution of data was analyzed by Kolmogorov–Smirnov test. The independent samples t-test was used for comparing the mean values between the groups and the paired sample t-test was used for comparing the mean values within the groups. $P < 0.05$ was accepted as statistically significant in all analyses.

Ethical issues

Hatay Mustafa Kemal University Ethical Committee approved this study (Protocol No:2018/150). Before the study began, all participants were informed of objectives and procedures of the study. Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki. Participation in this study was voluntary.

RESULTS

Two participants in the exercise walking and control groups were unable to complete the study and were therefore excluded from the final analysis. The study was completed with 23 elderly women (mean age=73.56, sd=8.25) and 37 elderly men (mean age=71.91, sd=7.98). Most of the exercise walking group (63.3%) consisted of males. Of the participants in this group, 60% had graduated from either primary or secondary school. Most (80%) were widowed or divorced. It was found that 53.3% of the participants in the exercise walking group had chronic disease (colorectal cancer, hypertension, diabetes mellitus, cardiovascular diseases, etc.).

Most of the control group (60%) consisted of males. Of the participants in this group, 46.7% had graduated from either primary or secondary school. Most (70%) were widowed or divorced. It was found that 56.7% of the participants in the control group had chronic disease (hypertension, diabetes mellitus, cardiovascular diseases, chronic kidney diseases, etc.).

There was no significant difference in gender, education, marital status, smoking, chronic disease and regular check-up between the groups (p>0.05; Table 1).

Table 1. Participants' descriptive characteristics.

Variable	Exercise walking group		Control group		$\chi 2$ / P*
	n	%	n	%	
Gender					
Female	11	36.7	12	40.0	$\chi 2$=.071
Male	19	63.3	18	60.0	P=.791
Education					
Literate	8	14.6	10	33.3	
Primary or secondary school	18	60.0	14	46.7	$\chi 2$=1.122
High school or university	4	13.4	6	20.0	P=.571
Marital status					
Married	6	20.0	9	30.0	$\chi 2$=0.800
Widowed or divorced	24	80.0	21	70.0	P=0.371
Smoking					
Yes	11	36.7	8	26.7	$\chi 2$=0.693
No	19	63.3	22	73.3	P=0.405
Chronic disease					
Yes	16	53.3	17	56.7	$\chi 2$=0.067
No	14	46.7	13	43.3	P=0.795
Regular check-up					
Yes	22	73.3	25	83.3	$\chi 2$=0.884
No	8	26.7	5	16.7	P=0.347
Total	30	100.0	30	100.0	

*p=Pearson Chi-Square test.

After the exercise walking program, the daily walking duration of the experimental group increased and a statistically significant difference was found between the pre-treatment and post-treatment scores (t=-7.729, p<0.001). In addition, the quality of life scale score of the experimental group increased after the exercise walking program and a statistically significant difference was found between the pre-treatment and post-treatment scores (t=-4.182, p<0.001). Furthermore, the PSQI scores of the exercise walking group decreased after the walking program and a statistically significant difference was found between the pre-treatment and post-treatment scores (t=3.745, p=0.001) (Table 2).

There was no significant difference between the pre-treatment and post-treatment scores of the control group in terms of daily walking duration, quality of life and PSQI (p>0.05, Table 2).

When the change in scores after treatment of the exercise walking group and control groups were examined, a statistically significant difference was found between the two groups in terms of daily walking duration (t=8.450, p<0.001), quality of life (t=5.631, p<0.001), and PSQI (t=3.960, p<0.001) (Table 2). In addition, statistically significant differences were found in all other dimensions of quality of life except death and drying subscale after treatment (p<0.001, Table 2).

Table 2. Mean pre-treatment and post-treatment scores of the exercise walking group and control group.

Scales	Exercise Walking Group		Control Group		t-Test and p* value	t-Test and p** value	t-Test and p*** value
	Pre-treatment mean±sd	Post-treatment mean±sd	Pre-treatment mean±sd	Post-treatment mean±sd			
Walking duration	6.50±10.90	32.16±13.43	7.0±11.16	6.0±10.35	t=-7.729 p<0.001	t=1.000 p=0.326	t=8.450 p<0.001
Quality of Life Scale	71.26±11.83	81.30±2.87	67.36±11.43	66.66±10.95	t=-4.182 p< 0.001	t=1.481 p=0.149	t=5.631 p<0.001
Sensory functions	9.93±2.30	7.10±1.21	9.46±2.63	9.26±2.95	t=5.533 p<0.001	t=1.439 p=0.161	t=-3.711 p<0.001
Autonomy	14.56±2.43	17.90±1.34	13.0±3.26	13.03±3.20	t=-7.315 p<0.001	t=-1.000 p=0.326	t=7.677 p<0.001
Post-present-future activities	12.93±3.89	17.03±1.69	12.56±3.41	12.40±3.46	t=-5.659 p<0.001	t=0.724 p=0. 475	t=6.589 p<0.001
Social participation	11.93±3.76	17.16±1.17	11.83±3.44	11.66±3.08	t=-6.949 p<0.001	t=0.595 p=0.556	t=9.114 p<0.001
Death and drying	9.06±4.60	8.40±1.54	8.83±4.14	8.70±4.0	t=0.968 P=0.341	t=0.724 P=0.475	t=-0.382 p=0.704
Intimacy	12.83±3.49	17.46±1.30	11.66±3.37	11.60±3.60	t=-6.709 p< 0.001	t=0.338 p=0.738	t=8.377 p<0.001
PSQI	6.56±3.80	4.33±2.39	7.73±4.05	7.76±4.09	t=3.745 p=0.001	t=-0.273 p=0.787	t=3.960 p<0.001

* The comparison of pre-treatment and post-treatment scores of the scales in the exercise walking group

** The comparison of pre-treatment and post-treatment scores of the scales in the control group

***The comparison of scores post treatment in the exercise walking and control groups

DISCUSSION

Walking exercise programs have significant effects on elderly individuals (13, 14). These effects may improve quality of life and sleep quality in elderly individuals.

Walking activity is a changeable behavioral risk factor associated with quality of life and health. Walking programs increase the quality of life of individuals. In this study, the walking program was associated with an increase in the quality of life of elderly individuals. The increased quality of life score after walking showed that the individual felt better and developed positive emotions. In their meta-analysis, Chou et al. (2012) reported that exercise is beneficial in increasing gait speed, improving balance, and improving performance in older adults and it positively affects quality of life (15). Awick et al. (2015) reported that walking exercise in elderly individuals was more efficacious in improving quality of life compared with flexibility and stretching exercises (8). Another study showed a positive association between walking and quality of life; however, this relationship varied according to duration and intensity (16).

Recent studies have also focused on the relationship between quality of life and walking duration (17, 18). In this study, a 40 minute (twice a week) and medium intensity walking activity increased the quality of life of the participants. A randomized controlled longitudinal study reported that walking 30 minutes five days a week raised the quality of life of elderly patients and improved physical and cognitive function, as well as reduced anxiety. Other similar studies have shown that moderate walking (18) done for at least 150 minutes per week (19) enhanced the quality of life in the elderly. Another study demonstrated that a group that engaged in high intensity walking had a better quality of life than one that engaged in moderate walking (20). It is quite clear from the studies that frequency and intensity of exercise required to improve the quality of life vary in the context of elderly. Further targeted longitudinal intervention based studies are required to investigate the impact of intensity, frequency and duration of walking exercise that is required to improve quality of life.

Furthermore, in the study the walking program provided improvement in most of the parameters measuring quality of life (sensory functions, autonomy, post-present-future activities, social participation, and intimacy). Research evaluating the effect of walking exercise on the quality of life parameters using WHO-quality of life scale of nursing home residents has been limited. Moreover, there are no studies, experimental or semi-experimental, that examine the impact of walking on the parameters of quality of life. There have, however, been efforts at examining them through descriptive-cross-sectional studies.

Sensory function is an area having an impact on the quality of life. Efforts have been made to study the relationship between sensory function and changes in the senses of sight, hearing, taste, smell and touch in the elderly, and the impact of their loss on quality of life. In this study, the sensory function scores of the elderly declined after a walking exercise program. In a cross-sectional study done by Altay, Çavuşoğlu and Çal (2016) that examined the factors impacting health, the perception of health and the quality of life in the elderly, persons who perceived their health as being good had the lowest score on the sensory function parameter (21). This can be attributed to the elderly perceiving their health to be better after engaging in a walking exercise program.

Another parameter of quality of life is autonomy. Autonomy means the elderly being able to take care of themselves at advanced ages. In this study, the autonomy scores of the elderly rose following a walking exercise program. This finding can be attributed to the exercise of walking enabling the elderly to be more autonomous, be more in control of their lives, and be able to freely do what they want to do.

The study asked participants about their feelings and thoughts about how successful they were in past activities, as well as present and future ones. It wanted to find out whether a sense of achievement had any impact on how satisfied they felt with their lives and how they thought about their past and future. The study showed parameter

of past-current-future activities increased in the elderly who participated in the walking exercise program. It is believed that because of the walking program, elderly participants were able to recall happy memories, which had a positive current impact on their quality of life.

One major indicator of quality of life is social participation. It has a significant role in how the elderly views their use of time and in getting them to engage in important activities. This study demonstrated that the social participation score of the elderly included in it increased following a walking exercise program. A systemic study done by Meads and Exley (2018) showed that walking interventions aimed at buttressing social networks and encouraging changes in behavior significantly increased social participation (22). It is thought that quality of life will improve by the social participation achieved by walking in a group.

In this study, the parameters having the lowest score are those related to death and dying. It investigated the extent to which death was accepted as inevitable and the meaning it held for the participants. It found that following the walking exercise program, there was no statistically significant difference in the quality of life score on the parameters of death and dying. This means that prior to the walking exercise program, the elderly had already accepted the inevitability of death and were prepared for it. It is thought that religious belief played a major role in this outcome.

Another parameter of quality of life is "intimacy." Intimacy has to do with the relationships the elderly have with other people and the social support they derive from them. Having good health, sound relations with friends and family, financial security, professional achievement and intimacy all contribute to improved quality of life. This study showed that the intimacy score of the elderly who had participated in the walking exercise program increased. In a study done by Altay, Çavuşoğlu, and Çal (2016), the elderly received the highest quality of life score from intimacy (21). Therefore, walking programs are recommended as a way to improve the interaction of the elderly with other people.

In the present study, the sleep quality of elderly individuals in the exercise walking group was significantly improved following the walking program, in contrast to that in the control group. In a study conducted by Melancon et al. (2015), elderly men participated in a 60-minute moderate intensity walking program for 16 weeks (3 days a week). At the end of the study, it was reported that sleep time and sleep depth increased, and total wake time decreased (23). In a study by Karimi et al. (2016), 30-minute walking exercises were performed by elderly men 3 times a week for 8 weeks and the sleep quality of the participants was reportedly positively affected (24). In a meta-analysis, Yang et al. (2012) found that walking had a moderate positive effect on sleep quality of elderly individuals and recommended walking as an alternative or complementary approach to existing treatments for sleep problems (25). The findings of the present study are consistent with the findings of another study where a positive effect on sleep quality was detected in the exercise walking group participating in the walking program (14). Consistent with the literature, our results showed that walking program affects sleep quality.

There is a limitation of the study. The control group did not receive any placebo, so a placebo effect could not be tested. This may have reduced the motivation of the control group.

In conclusion; the results indicated that the walking program had a positive effect on the quality of life of nursing home residents. Moreover, the results of this study suggest that a walking program can improve sleep quality in elderly individuals. Nurses can use exercise walking as an intervention to improve the sleep and quality of life of elderly individuals living in nursing homes.

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No funding was received for this study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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