

# Effect of Aerobic Exercise on the General Health of Nurses; a Case Study of Shahrekord University of Medical Sciences' Hospitals

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## ABSTRACT

**Aims** The general health of nurses is always at risk due to difficult working conditions. Although exercise interventions, especially aerobic exercise, may improve the general health of nurses, no study has been found in this area so far. Therefore, the present study aimed to investigate the impact of aerobic exercise on the general health of nurses.

**Materials & Methods** This interventional study was carried out on 60 female nurses working in hospitals affiliated with Shahrekord University of Medical Sciences in 2017. Nurses were selected by the available sampling method and assigned to control and intervention groups by block randomization. Data were selected by General health and demographic questionnaires. The intervention group practiced three 1-hour sessions per week for eight weeks in the gym according to the exercise program, while the control group did not receive any intervention. The general health questionnaire was assessed in two groups before, immediately, and two months after the intervention. Data were analyzed using SPSS 19 software through T, chi-square tests, and repeated measures analysis of variance.

**Findings** The mean±SD age of participants was 33.0±2.7 years. The effect of the group was significant ( $p=0.001$ ) and showed an improvement in the general health of nurses participating in the intervention group after the intervention compared to the control group ( $p=0.02$ ). The effect of time was also significant because the mean general health of participants changed significantly over time in both control and intervention groups ( $p<0.001$ ). However, time-group interaction was not significant ( $p>0.05$ ).

**Conclusion** Aerobic exercise in nurses improves general health in the initial period after the intervention.

**Keywords** Nurses; Aerobic Exercise; Health Status

## CITATION LINKS

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## Introduction

Health workers are the largest workforce, of which 48% of them are nurses [1]. Nurses' health is important because they are the front-line force inpatient care, while different dimensions of their health are at risk for various reasons. Long-term communication with patients in critical condition, playing a supportive role for different patients, and workplace problems making back pain and other physical problems are effective factors affecting nurses' physical, mental, and even social health. Sleep, diet, and physical activity are three essential pillars for optimal health under the nursing profession's under-effect [2]. In studies conducted in Iran and the world, the general health status of nurses has been reported at a low level [3, 4].

It should be noted that poor health behaviors in nurses might lead to reduced physical and mental health and thus increase stress and absenteeism [5]. Nurses' poor health behaviors may lead to reduced physical-mental health and increased stress and absence from work [5]. Positive health behaviors such as physical activity in the nursing profession can help prevent stress, fatigue, and burnout [6].

A literature review suggests that one of the factors affecting physical activity is occupational factors. High-stress jobs that require recovery time have less physical activity [7]. However, some studies have shown that nurses do not perform the suggested times for physical activity, and the level of physical activity of nurses has been low in several studies [8]. It can happen for some reasons; for example, the stress in nurses' workplaces may limit nurses' ability to perform regular daily activities and exercise [9]. Therefore, it is necessary to consider strategies to increase physical activity [10] and provide educational and supportive interventions in this field [11].

Exercise is one of the interventions to promote employees' health, physical and mental well-being [12]. A review of the research background confirms that physical activity can improve individuals' physical and mental health and prevent long-term problems such as cardiovascular disease, obesity, type 2 diabetes, and depression [13]. Also, according to studies, different dimensions of quality of life improve by increasing physical activity [14]. Lack of physical activity is significantly associated with increased body mass index (BMI) and obesity [15]. One type of exercise and physical activity is aerobic exercise. By definition, aerobic exercise is an exercise in which the heart rate and respiratory volume increase to meet the increased oxygen demand of active muscles. The studies showed the effect of this type of exercise on blood lipid levels, the prevention of cardiovascular disease, and increased health [16].

Studies in the field of the general health of nurses have examined it cross-sectionally; in some studies, general health interventions have led to improving the health of nurses and improving their

cardiovascular status [17]. In one study, it was found that these exercises increase nursing students' self-confidence [18]. In another study, the exercises under the supervision of a physiotherapist were presented to a group of nurses in which the muscle strength, lipoprotein levels, and metabolic profile of the participants were significantly improved [19]. However, there wasn't a study on the effect of aerobic exercise on nurses' general health.

Determining appropriate interventions to promote the general health of nurses is essential due to the effectiveness of regular physical activity on the prevention and management of cardiovascular disease, other chronic diseases, and the existence of threats to nurses' health, including job stress and burnout due to hard work. However, whether aerobic exercise improves nurses' general health considering the above problems. Therefore, according to the previous studies and the lack of a study on the effect of aerobic exercise on the general health of nurses, the present study was conducted to determine the effect of aerobic exercise on the general health of nurses.

## Methods

This interventional study was carried out on female nurses working in hospitals affiliated with Shahrekord University of Medical Sciences in 2017. The sample size was calculated to be 30 people in each group based on the mean difference and power SSC software, 5% alpha and 80% test power, based on the results of the previous study [20] (mean difference 3.7 and standard deviation 6.65), and considering 20% loss, 30 people in each group were calculated. After sampling by the available sampling method, they were assigned to intervention and control groups (30 people in each group) using the block randomization method. Inclusion criteria were having at least one year of work experience, being in the age range of 25-40, the ability to do exercises, no medical problems according to the medical history questionnaire, lack of mental disorders based on self-report form, lack of facing severe stressful events such as the death of relatives during the last six months, and not participating in any organized physical activity for the past two months. The exclusion criteria were the absence of more than three consecutive training sessions and six sessions in total and severe stressful events during the training sessions.

Age, marital status, work experience, income, education, employment status and several children, medical history, history of physical and mental illness were collected by the demographic and clinical information questionnaires. The General Health Questionnaire was used to assess the general health status of nurses. This questionnaire has 28 questions and four subscales of physical symptoms, anxiety and insomnia, social dysfunction, and depression. The

questions were scored on a 4-point Likert scale. A test score was between zero and 84 and a cut-off point of 23 (this means that people who score 23 or less are healthy and more than 23 are suspected of having disorders) [21]. The reliability of this questionnaire is reported between 0.78-0.9, and Cronbach's alpha is between 0.9 and 0.95 [22,23]. The psychometrics of this questionnaire was also performed in Iran. Its convergence validity was assessed by correlation with the SCL-90-R questionnaire, and its correlation coefficient was 0.85 using the retest method [24].

Ethical permission was obtained from the Research Ethics Committee of Shiraz University of Medical Sciences. The researcher provided the necessary explanations about the objectives and method of the study to the subjects, and the subjects filled out the general health questionnaire after signing the informed consent form. The cardiovascular and respiratory status of the subjects in the intervention group were examined by an internal medicine specialist to prevent any possible problems. Three one-hour sessions on general health and aerobic exercise were provided for the intervention group one week before the start of the intervention, and the subjects participated in the discussion. The third session was held with the presence and supervision of a specialized sports consultant. The intervention group was then referred to the gym for three one-hour sessions per week for eight weeks. All intervention group members practiced together in a gym under the supervision of a researcher and physical education instructor, based on a designed exercise program.

Each training session included:

1- Warm up with stretching and flexibility exercises: 15 minutes;

2- Medium intensity aerobic exercise, which is equivalent to 70-60% of maximum heart rate (age-220) for example, the average exercise intensity heart rate for a 30-year-old is between 114 and 133:

$$30-220=190\%60\times190=114\%70\times190=133$$

The exercises lasted 35 minutes and included a set of walking, walking, quiet running, jumping, kicking, and hand-swimming exercises with music.

Cooling actions: 10 minutes, which included stretching movements of the lower body and upper body muscles and one minute of relaxation of the whole body. The exercise was performed outside the work shifts from 5 to 6 p.m. the control group did not receive the intervention. At the end of the study, the topics of the training sessions were presented to both groups in the form of brochures. The participants filled out the questionnaire before, at the initial, and two months after the intervention (follow-up).

Data acquired from the questionnaires and other

measurements were analyzed using SPSS 19 software. For this purpose, mean, standard deviation, number, and percentage were used to describe the variables; independent T and chi-square tests were used to compare demographic variables in the two groups. Kolmogorov-Smirnov test showed normal distribution of data on general health variables. Therefore, due to the assumptions of repeated measures analysis of variance, this test was used to compare the general health between study groups, study times and to evaluate the status of group-time interaction.

## Findings

Sixty people (30 people in each intervention and control group) participated in the study. Three nurses were excluded from the study in the intervention group due to absence in more than three training sessions (Figure 1).

The mean±standard deviation of participants' age was 33.0±2.7. Most of the subjects were married (70.2%) and had a bachelor's degree (93%). There was no statistically significant difference between the two groups regarding age, marital status, work experience, education level, and employment status ( $p > 0.05$ ; Table 1).

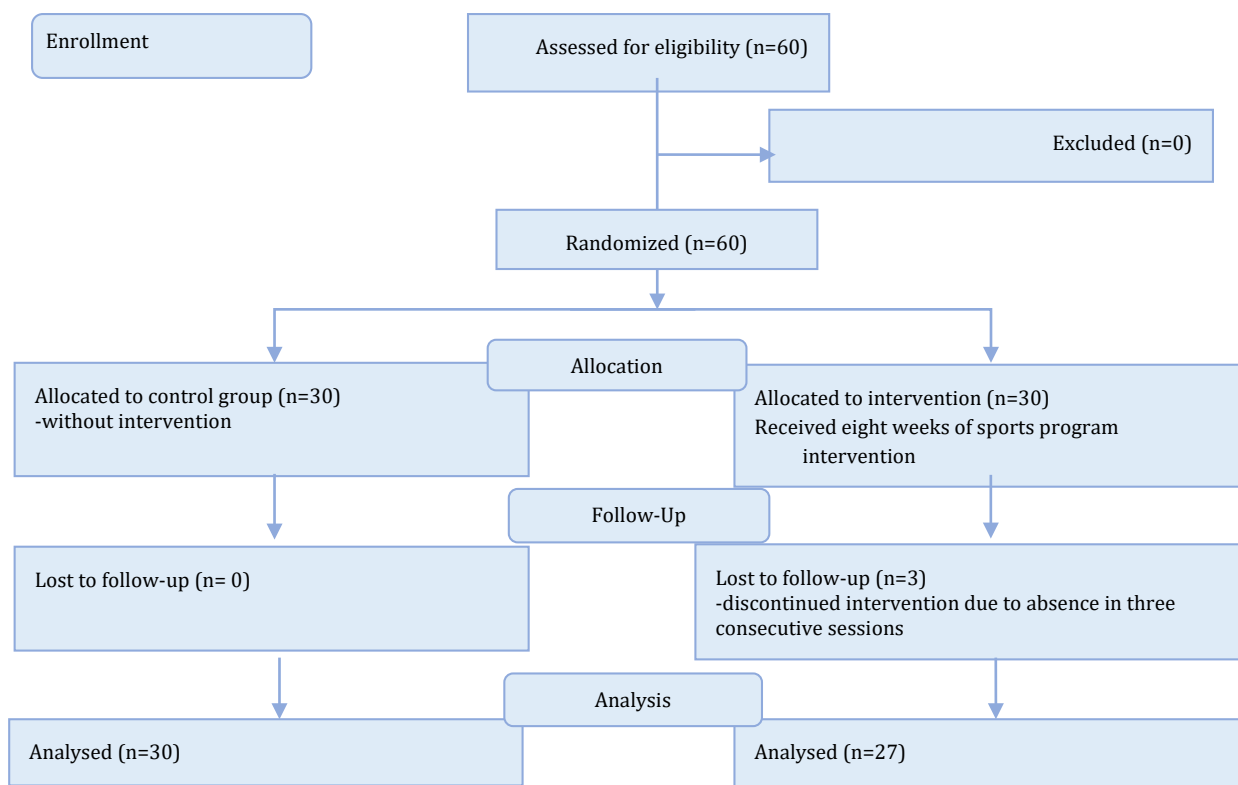
The results of the repeated measures test showed that the effect of the group regardless of time and the effect of time regardless of the group were significant. At the same time, time-group interaction was not significant (Table 2). The significance of the group effect indicated that regardless of the effect of time, the participants' general health was significantly different between the control and intervention groups.

There were no significant differences in general health between the intervention and control groups before the intervention. However, after the intervention, a significant improvement in general health was observed in the intervention group compared to the control group. However, at the time of follow-up (2 months after the intervention), the general health score did not significantly differ between the intervention and control groups (Table 3).

Since the time effect was also significant regardless of the group effect, the general health averages of the participants in the paired times were compared.

This pairwise comparison showed a significant improvement in the general health score of the intervention group before the intervention compared to after the intervention and a significant increase two months after the follow-up compared to the initial period after the intervention (Table 4).

No significant difference was observed between the study periods in the control group ( $p > 0.05$ ).

**Figure 1)** Flowchart of the number of participants**Table 1)** Demographic characteristics of participants (n=57)

Characteristics	Control N (%)	Intervention N (%)	p-value
<b>Age group (year)</b>			
24-30	12 (40)	10 (37)	0.65
31-40	18 (60)	17 (63)	
<b>Marital status</b>			
Single	10 (33.3)	7 (25.9)	0.24
Married	20 (66.7)	20 (74.1)	
<b>Occupation status</b>			
Official	10 (33.3)	8 (29.6)	0.21
Contractual	8 (26.7)	10 (37)	
Projective	7 (23.3)	5 (18.5)	
	5 (16.7)	4 (14.80)	
<b>Work experience (year)</b>			
1-5	9 (30)	10 (37)	0.32
6-10	11 (36.7)	10 (37)	
>10	10 (33.3)	7 (28)	
<b>Education level</b>			
Associate	1 (3.3)	1 (3.3)	0.19
Bachelor	28 (93.3)	25 (93.3)	
Master	1 (3.3)	1 (3.3)	

**Table 2)** Comparison of general health between control and intervention groups during study times

Group	Intervention			p-value		
	Before	Immediately after	After two months	Time	Group	Time-group
Control	24.50±6.25	25.36±5.83	24.63±6.22	0.001	0.001	0.05
Intervention	25.47±5.83	22.27±4.06	25.37±6.50			

**Table 3)** Comparison of mean general health scores between the two groups at the time of the study

Intervention stage	Group	Mean±SD	Mean difference	t	p-value
Before	Control	24.50±6.25	2.24	-1.04	0.16
	Intervention	25.47±5.83			
After	Control	25.36±5.83	3.09	2.35	0.02
	Intervention	22.27±4.06			
Two months later	Control	24.63±6.22	1.26	4.37	0.06
	Intervention	25.37±6.50			

**Table 4)** Comparison of mean changes of general health scores in the two groups before, in the initial period, and two months after the intervention (independent t-test results by calculating a mean difference between the steps)

Steps	Group	Mean difference	p-value
Before intervention-Immediately after intervention	Control	-0.33	0.001
	Intervention	3.44	
Immediately after intervention -2 months after intervention	Control	0.73	0.001
	Intervention	-3.14	

## Discussion

This study aimed to determine the effect of aerobic exercise on nurses' general health. The results confirmed the effect of these exercises in the intervention group, especially in the initial period after the intervention. These results are by the findings of the study by Mo *et al.* A relationship was found between physical activity and improving the physical condition of nurses [25]. Given that one of the indicators of general health is a physical condition and increased in the study, it can be said that aerobic exercise has improved the general health of nurses by improving their physical condition. The mean scores of the participants in the general health index were higher than the study of Abdi Masooleh *et al.* and lower than that of Barzideh *et al.*, who used the same questionnaire to assess the general health of nurses [26, 27]. Considering the mean scores after the intervention in the intervention group relative to the cut-off point of this questionnaire, it can be said that the implementation of the intervention has been able to change the general health level of the participants in the intervention group from a suspicious to a healthy state.

The present study results also showed that aerobic exercise could significantly improve the general health of nurses. In one study in which physiotherapist-supervised exercise was performed on nurses, nurses' physical fitness and aerobic capacity also improved compared to nurses who performed exercise without supervision [19].

In the present study, as the above study, aerobic exercise was performed under the supervision of an expert. In another study, aerobic exercise increased self-confidence among nursing students [18]. Increasing self-confidence is also one of the indicators of mental health that can effectively promote general health. Scientific evidence also shows that exercise can help maintain physical-mental health [28]. Aerobic exercise such as aerobic exercise reduces stress, increases vitality, and reduces depression due to increased oxygenation and secretion of endorphins [29].

Given that anxiety and depression are components of general health, in the present study, aerobic exercise could improve physical health by positively affecting anxiety and depression. However, in a study on the evaluation of the effect of aerobic exercise and yoga on the self-efficacy of university staff, it was found that yoga had a significant effect. In contrast, aerobic exercise did not affect [30]. To justify this difference, it can be said that the above study was performed on a

smaller number of samples than the present study and was the result of self-efficacy, not general health. Systematic reviews on nurses have shown that psychological interventions such as stress management and mindfulness reduce stress and increase nurses' general health and well-being [31, 32]. In another study, meditation and mindfulness therapies improved the general health of nurses in a retirement home [33]. It seems that psychological interventions have received more attention from researchers than physical interventions such as regular exercise; this may be due to the obstacles in performing these exercises for researchers and nurses. Indeed, aerobic exercise also has a considerable impact on mental health components and can help improve the mental health of nurses by increasing these components.

One of the significant points in the findings of this study was the decrease in general health two months after the intervention. On the other hand, the decline in general health for the third time in the intervention group may indicate the effect of several factors on the general health of nurses in addition to physical activity, and their general health has decreased after the end of aerobic exercise, and not following these programs. Other studies have shown that barriers such as lack of time, feeling tired, and lack of motivation make nurses less likely to engage in regular physical activity [34, 35]. The above study also indicates that nurses may have quit the exercise after the intervention and may need to continue the exercise for a longer period. Many studies have shown that nurses do not perform adequate physical activity [36]. In the proposed study, health managers should include employees' physical activity in their plans [25]. However, in Iran, the first hour of the morning shift is dedicated to the sports activities of office workers; however, it is not applicable for nurses due to the job sensitivity of nurses and the impossibility of absence in this shift. Web-based methods are the interventions that have been investigated in some studies [37]; web-based sports interventions can be offered to perform in the workplace due to accessibility at any time and place. In addition, other factors such as job stress and other unpredictable factors such as personal, interpersonal, and environmental problems may have contributed to the instability of nurses' general health after exercise intervention. But this improvement in general health has not been sustainable. Therefore, in addition to continuing aerobic exercise, nurses should investigate these



problems, and interventions should be made to reduce these problems.

The present study is one of the few studies that has investigated the effect of aerobic exercise on the general health of nurses. The limitation of this study was the small size of the statistical samples, the short time of intervention and follow-up, the restricting of the sample size to the female participant, and the lack of considering individual and interpersonal variables and factors as intervening variables. In addition, in the present study, the feasibility of this intervention has not been investigated.

Since the nurses' lifestyles and health behaviors affect the quality of care and ultimately the patients' clinical outcomes, nursing officials and health policymakers can provide physical equipment and sports facilities in hospitals and use exercise activities to promote nurses' health. Also, conducting studies with a larger sample size, a longer time intervention, and follow-up while paying attention to individual, interpersonal and environmental factors, and especially with the longitudinal studies approach, can further examine the results of this type of exercise. Also, we suggest conducting this research on male nurses due to different characteristics from women and comparing the effect of this research intervention on non-nursing professional participants. It is also suggested to study the feasibility of this type of exercise in the workplace.

## Conclusion

Although aerobic exercise can improve the general health of nurses in the initial period after the intervention, their general health has decreased after two months.

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**Ethical Permissions:** In this research, the code of ethics with the number IR.SUMS.REC.1392.S6904 was obtained from the research ethics committee of Shiraz University of Medical Sciences. It is also registered with IRCT2014051117653N1 in the clinical trial registration system.

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