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Effect of Jogging Program on Midwives' Physical Fitness: A Randomized, Controlled Trial

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ABSTRACT

Background & aim: Background & aim: Physical fitness is essential for maintaining optimal health and can be achieved and improved by doing physical activities. Maximal oxygen consumption (VO2 max) has been used as a measure of physical fitness. This study aimed to determine the effect of jogging program on midwives' physical fitness.

Methods: In this randomized controlled trial two large healthcare centers in Mashhad were randomly selected and each center assigned to either intervention or control group. 60 employed midwives, working at these centers, were selected via convenience sampling. The intervention group performed aerobic exercises at 30-60% VO2 max during 24 sessions. At the beginning and end of the study, participants' physical fitness was measured by calculating VO2 max, using Bruce test. Independent t-test, paired t-test, Mann-Whitney U, Wilcoxon, and Chi-square tests were carried out using SPSS version 19 to analyse data.

Results: The two groups showed no significant difference in terms of age, marital status, level of education, economic status and body mass index ($P>0.05$). Mean VO2 max in the intervention group (30.6±9.1) was significantly higher than that of the control group (24.3±7.3) ($P=0.023$). Participants' physical fitness was increased up to 30% by jogging.

Conclusion: As the results indicated, jogging could improve midwives' physical fitness. Therefore, it is essential that health system directors pay more attention to providing facilities at every workplace in order to improve employees' physical fitness.

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Introduction

Physical fitness is essential for maintaining optimal health and can be achieved and improved by doing physical activities (1). Physical fitness could help individuals perform more effectively and efficiently at work (2). In fact, a person with high resistance to fatigue and muscular pain can be productive at work and maintain his/her energy for social and family matters till the end of a busy day (3).

Physical fitness mainly depends on an individual's cardio-pulmonary endurance and is indicated by maximal oxygen consumption (VO_2 max) (4). VO_2 max is the maximum amount of oxygen an individual can utilize during an intense exercise (5, 6).

According to conducted research, today, people lead a sedentary lifestyle with little or no activities due to various reasons. Insufficient physical activity is a severe health problem in developed and developing countries (7). Lack of attention to reduced physical fitness and exercise

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due to overweight, cardiovascular diseases, movement restrictions, joint problems, fatigue, muscular atrophy, depression, and irritability leads to decreased quality of life (8). In fact, people with low physical activity may be reluctant to provide services for clients due to stress or lack of interest, caused by insufficient exercise (9).

Physical fitness may be improved by providing facilities for exercise programs and encouraging employees to participate in these programs; through these measures, morbidity rates associated with physical and mental diseases would decrease among employees (10). All performed studies support the fact that exercise can improve an individual's physical fitness (11-14). However, it is necessary to introduce exercise programs, which can effectively improve physical fitness with minimum costs.

As we noticed, jogging, as a cost-effective exercise with no facility requirements, has minimum risks for individuals and is feasible for all age groups. Therefore, we aimed to perform a study to evaluate the effect of jogging on midwives' physical fitness and compare the results with those of other exercise programs; we then introduced the most effective exercise program.

Materials and Methods

This two-group, randomized, controlled trial was conducted on employed midwives, working at Mashhad healthcare centers in 2013. For sampling, first, healthcare centers No. 1 and 3 were randomly selected among Mashhad healthcare centers and healthcare stations affiliated to centers No. 1, 2, 3, 5, and Samen. Then, each center was randomly assigned to either the intervention or control group.

Midwives employed at these centers were selected via purposeful sampling. Sample size was calculated, based on a previously conducted research (15). Overall, 30 participants were allocated to each group; thus, the total sample size was calculated to be 60 subjects; no participants dropped out of the study.

The inclusion criteria were as follows: 1) non-athletic midwives; 2) age range of 25-50 years; 3) working at Mashhad healthcare centers; 4) non-pregnancy or menopause; 5) lack of acute or chronic diseases such as major depression or cardiovascular, pulmonary, musculoskeletal, cognitive, and mental disorders; 6) history of hospitalization; and 7) use of psychiatric medications.

Participants' cardiovascular and pulmonary health was confirmed for performing Bruce test and acquiring VO_2 max ≥ 10.5 ml/kg/min (3 times more than VO_2 max during rest). If the subjects participated in the exercise program for only 1 session a week or 5 sessions throughout the study, they were excluded from the experiment; those who were not willing to continue the study were excluded, as well.

Demographic data including age, marital status, economic level, and education level were collected; also, the participants' height and weight were measured for calculating body mass index (BMI). At the beginning and end of the study, participants' body fitness was determined directly by calculating VO_2 max, using Bruce Treadmill Test Protocol with a reliability of 0.96 (15).

Bruce test is conducted on a treadmill (Technogym, made in Italy) and includes 7 steps. It starts by an individual walking and proceeds by increasing inclination and velocity in the 3rd and 4th steps; the test could continue further, based on the participant's ability to run. Each step of Bruce test takes 3 minutes and in each step, both inclination and velocity are increased. If participants are not able to continue the test or feel exhausted, the activity is stopped and VO_2 max is recorded on the monitor (16).

In the current study, the test was performed at 7:30-10 a.m. in order to eliminate the effect of tiredness associated with daily work. This time period was similar for both performed Bruce tests (at the beginning and end of the study). A general physician, with training in cardiopulmonary resuscitation, controlled the tests; participants' heart rate was controlled before and during the tests.

Participants in the intervention group had insurance coverage. The intervention group was divided into two sub-groups via simple randomization (drawing lots). Therefore, all names were written on pieces of paper and poured in a special container; then, two pieces were picked up. Groups 1 and 2 performed the

Table 1. Demographic characteristics of participants in the intervention and control groups

Variables	Intervention	Control	Test results	
Age (year) (mean±SD)	40.5±4.7	41.9±5.5	P= 0.290	T=1.1[b]
Marital status, number (Percentage)				
Single	4 (13.3)	4 (13.3)	P>0.99	X^2= 0.0001
Married	26 (86.7)	26 (86.7)		
Education level, number (Percentage)				
Associate's degree in midwifery	4 (13.3)	3 (10.0)	P=0.757	X^2= 0.6[c]
Bachelor of midwifery	24 (80.0)	26 (86.6)		
Master of midwifery	2 (6.7)	1 (3.3)		
Economic status, number (Percentage)				
Less than sufficient	1 (3.3)	0 (0.0)	P=0.355	Z= 0.95[a]
Sufficient	28 (93.3)	30 (100)		
More than sufficient	1 (3.3)	0 (0.0)		
BMI (kg/m²)	26.0±2.1	26.1±1.9	P=0.962	T=0.4[b]

a=Mann-Whitney Test
b=in depended T sample T-Test
c=chi-square test

Table 2. Mean and SD of VO_2 max at the beginning and end of the study in the intervention and control groups

VO_2 max (ml/kg/min)	Beginning of the study	End of the study	Wilcoxon test results	Percentage of recovery
Intervention	23.4±6.8	30.6±9.1	P=0.001 Z=4.7	30
Control	24.5±7.4	24.3±7.3	P=0.201 Z=1.3	-0.8
Mann-Whitney test results	Z=0.4 P=0.691	Z=2.27 P=0.023		

exercise program on even and odd days, respectively; the sessions were supervised by a trainer from 6-6:45 a.m. in an indoor gym at non-working hours. All conditions including time, training, exercise program, and environmental conditions were similar for both groups.

The exercise program continued for 24 sessions. Sessions were held 3 times a week for 45 minutes and composed of warm-up (all types of walking, slow running, stretching exercises, and dancing for 15-25 min) and aerobic exercises including jogging and slow walking during rest (jogging was performed for 5 minutes during the first session and increased to 20 minutes in the last session) and cool-down (stretching exercises and walking for 10 min).

Duration of exercises was fixed. However, the intensity of exercises gradually increased, based on the velocity and intensity of activities (more jogging), proportionate to the decreased amount of rest between repetitive movements and reduced duration of warm-ups; also, the intensity of the exercise program during 8 weeks increased from 30% VO_2 max to 60% VO_2 max.

The control group was asked not to perform any exercises during 8 weeks of the program. After 8 weeks, Bruce test was conducted for both groups and VO_2 max was calculated.

This study was approved by the ethics committee of Mashhad University of Medical Sciences. Written informed consents were obtained from participants and the subjects were assured about the confidentially of the data; they were also allowed to leave the study at any point they desired. The intervention posed no risks to the participants and the final results were presented to Mashhad University of Medical Sciences and the subjects.

Independent t-test, paired t-test, Mann-Whitney U, Wilcoxon, and Chi-square tests were performed, using SPSS version 19. In addition, the relationship between the confounding variables was analyzed by two-way ANOVA test. Confidence interval was considered at 95% and 0.05 was regarded as the significance level.

RCT code: IRCT2014040914910N5

Results

As the results indicated, the two groups showed no significant difference in terms of age (P=0.290), marital status (P=1.000), education level (P=0.757), economic status (P=0.355), or BMI (P=0.962) (Table 1).

Mann-Whitney U test showed no significant difference between the two groups regarding VO_2 max at the beginning of the study (P=0.691).

However, the groups showed a significant difference in VO_2 max at the end of the study, i.e., VO_2 max of the intervention group was significantly higher (P=0.023). Furthermore, Wilcoxon test indicated a significant difference within the intervention group (intra-group comparison) regarding VO_2 max (P<0.001). However, in the control group, no significant difference was found between the sub-groups (intra-group comparison) at the beginning and end of the study, according to Wilcoxon test (P=0.201) (Table 2).

There was no significant difference between the intervention and control groups in terms of mean BMI, based on Mann-Whitney test (P=0.326). However, paired t-test showed a significant difference between BMI at the beginning and end of the study in the intervention group (intra-group comparison) (P=0.028); this difference was not significant for the control group (P=0.201).

VO_2 max of groups at the beginning and end of the study was not significantly associated with age, marital status, education level, economic status, or BMI (P>0.05).

Discussion

According to the results, participants' physical fitness index (VO_2 max) in the intervention group increased from 23.4±6.8 before the test to 30.6±9.1 ml/kg/min after the test. This finding was supported by the intra-group comparison, which indicated that the physical activity of the intervention group increased by 30% after 8 weeks of aerobic exercises; this finding indicated the effectiveness of this exercise program.

The obtained results are in consistence with the findings of the study by Attarzadeh Hoseini et al. (2011). They performed a study on 30 healthy female students and found that 6 weeks of aerobic exercises could increase VO_2 max by 23% (15). The higher increase of VO_2 max in the present study, in comparison with the study by Attarzadeh Hoseini et al. (2011), could be related to the longer duration of aerobic exercises and the type of program in the present research.

Anbari Shapour et al. also reported that an exercise program could increase the physical fitness of male employees by 10% (10). Similarly, Simpson's study showed that performing long-term exercises could considerably increase VO_2 max (17). Aerobic exercises in the present study could increase VO_2 max more than other previously reported programs. Most scholars believe that VO_2 max could be increased by 15-20% by exercise (18); however, it was increased by 30% in the present study.

Shahram et al. (2008) suggested that intense exercise could more effectively increase VO_2 max (14.3%), in comparison with moderate exercise (10%) (19). In the current research, performing moderate exercises could effectively increase physical fitness (30%), which indicates the considerable effect of jogging on physical fitness.

As the findings of the present study indicated, jogging program could increase midwives' physical fitness. Increased physical fitness promotes physical and mental health, which plays an important role in one's personal and professional life. Therefore, community-based administrators and planners should pay more attention to developing exercise programs and providing facilities at every workplace in order to improve employees' physical fitness. It is recommended that further research be conducted on the effect of physical fitness on reducing physical and mental conditions.

Limitations

In the present research, participants' diet was not controlled, which is a limitation of this study. If participants in the control group had been informed about the intervention, they would have increased their physical activities; therefore, to eliminate this limitation, the subjects were asked not to change their daily physical programs for two months; in case of any changes, the participant was excluded from the study. Also, in order to prevent information exchange between the control and intervention participants, each healthcare center was allocated to either control or intervention group.

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Conflicts of Interest

The authors declare no conflicts of interest.

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