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

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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 (VO₂ max) (4). VO₂ 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...
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

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intervention</th>
<th>Control</th>
<th>Test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year) (mean±SD)</td>
<td>40.5±4.7</td>
<td>41.9±5.5</td>
<td>P= 0.290</td>
</tr>
<tr>
<td>Marital status, number (Percentage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>4 (13.3)</td>
<td>4 (13.3)</td>
<td>P&gt;0.99</td>
</tr>
<tr>
<td>Married</td>
<td>26 (86.7)</td>
<td>26 (86.7)</td>
<td>X²= 0.0001</td>
</tr>
<tr>
<td>Education level, number (Percentage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate’s degree in midwifery</td>
<td>4 (13.3)</td>
<td>3 (10.0)</td>
<td>P=0.757</td>
</tr>
<tr>
<td>Bachelor of midwifery</td>
<td>24 (80.0)</td>
<td>26 (86.6)</td>
<td>X²= 0.6c</td>
</tr>
<tr>
<td>Master of midwifery</td>
<td>2 (6.7)</td>
<td>1 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Economic status, number (Percentage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than sufficient</td>
<td>1 (3.3)</td>
<td>0 (0.0)</td>
<td>P=0.355</td>
</tr>
<tr>
<td>Sufficient</td>
<td>28 (93.3)</td>
<td>30 (100)</td>
<td>Z= 0.95a</td>
</tr>
<tr>
<td>More than sufficient</td>
<td>1 (3.3)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.0±2.1</td>
<td>26.1±1.9</td>
<td>P=0.962</td>
</tr>
</tbody>
</table>

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

Table 2. Mean and SD of VO₂ max at the beginning and end of the study in the intervention and control groups

<table>
<thead>
<tr>
<th>VO₂ max (ml/kg/min)</th>
<th>Beginning of the study</th>
<th>End of the study</th>
<th>Wilcoxon test results</th>
<th>Percentage of recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>23.4±6.8</td>
<td>30.6±9.1</td>
<td>Z=4.7</td>
<td>30</td>
</tr>
<tr>
<td>Control</td>
<td>24.5±7.4</td>
<td>24.3±7.3</td>
<td>Z=0.201</td>
<td>-0.8</td>
</tr>
</tbody>
</table>

Mann-Whitney test results
Z=0.4  P=0.691  Z=2.27  P=0.023

Results

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 confidentiality 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.

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However, the groups showed a significant difference in VO\textsubscript{2} max at the end of the study, i.e., VO\textsubscript{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\textsubscript{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\textsubscript{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\textsubscript{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\textsubscript{2} max by 23% (15). The higher increase of VO\textsubscript{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\textsubscript{2} max (17). Aerobic exercises in the present study could increase VO\textsubscript{2} max more than other previously reported programs. Most scholars believe that VO\textsubscript{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\textsubscript{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.

**Acknowledgement**

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Conflicts of Interest
The authors declare no conflicts of interest.

References