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The effect of Exercise Training on Disability due to Low Back Pain in Pregnant Women referred to the Health Centers of Karaj, Iran

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Background: Since back pain is the most common pregnancy-related symptom, this study aimed to determine the effect of exercise training on disability due to Low Back Pain (LBP) in pregnant women.
Materials and Methods: In this interventional study 120 pregnant women referring to the health centers in Karaj, were randomly assigned into two intervention (n = 60) and control (n = 60) groups, respectively. The demographic questions and standardized Quebec questionnaire were used to collect data. Data were analyzed using SPSS software ver. 21 and appropriate statistical tests.
Results: Totally 120 pregnant women (60 participants in each group) took part in this study. There was no significant difference between the two groups in terms of disability due to low back pain before the intervention ($P > 05$). However, after intervention, the disability score in intervention group was less than the control group significantly (1.4 ± 0.86 in intervention group compared to 2.23 ± 1.12 in control group with $P < 0.0001$).
Conclusion: This study showed that exercise training intervention could reduce disability due to low back pain in pregnant women in third trimester of their pregnancy.

Keywords: Low Back Pain (LBP), Pregnancy, Disability

Introduction

Low Back Pain (LBP) is one of the pregnancy-related symptoms, and about 30 to 70% of the pregnant women are suffering from low back pain (Ayanniyi et al 2006; Endresen 1995).

One of the purposes of a health care system is (LBP) prevention during pregnancy, and the best strategy to achieve this goal is performing appropriate exercises in order to maintain fitness and mobility of the body correctly and to minimize the pressure on the spine and back (Alicia 2013). Several studies showed that the prevalence rate of back pain in pregnant women is different and ranges from 24 to 90% in different populations (Ayanniyi et al 2006; Endresen 1995; Kelly-Jones & McDonald 1997; Sabino & Grauer 2008; Kristiansson, Svärdsudd & von Schoultz 1996; Gutke, Östgaard & Öberg 2008; Tiran & Mack 2000). It has been reported that on average 50% of the women suffer from back pain during their pregnancy period (Vleeming et al 2008), and one-third of them experience severe pain as well as reducing their quality of life, and about 10% of them experience debilitating pain (Kumle et al 2004). Most of the women experience back pain during their pregnancy period for the first time (Berg et al 1988). And one-third of the pregnant women believe that back pain is the most concrete problem during their pregnancy (Wergeland & Strand 1998) In some women, pregnancy back pain is as a starting point for a chronic pain process which can lead to severe disabilities and disorders (Ostgaard, Andersson & Karlsson 1991).In general, joint laxity along with the increase in the pregnant woman's body weight result in the anatomic changes and conveying the gravity center of the body to the front. Therefore, increased pressure on the back joints causes low back pain during pregnancy (Gutke, Östgaard & Öberg 2008; Saccomanni 2011; Ferreira & Alburquerque-Sendı´n 2013). Studies have reported that pregnant women attending in the exercise programs in order to improve muscular strength and flexibility, especially abdominal

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muscles, experience fewer disturbances in their body and less pain intensity in their lumbar compared with the women who do not perform exercise (Sabino & Grauer 2008; Saccomanni 2011).

Studies have shown that 90% of the LBP is due to muscle weakness, decrease in muscle flexibility, early fatigue of weak muscles, bad habits of daily life, not maintaining the correct posture of the body, and not performing exercises and regular physical activities. Almost, 41% of the women having back pain during their pregnancy period had also a history of LBP before the pregnancy, which often gets worse during this period. The pain in pregnant women may become more severe or last longer than before (Sabino & Grauer 2008; Saccomanni 2011).

LBP during pregnancy can lead to disability, reduced quality of life, or disable pregnant women. Sabino & Grauer (2008) reported that 11.4% of the pregnant women claimed that they had moderate to severe back pain, and 31% claimed that LBP has made them disable (Sabino & Grauer 2008).

Although the decline in physical activity can lead to back pain, LBP can also limit a person's physical activity and so aggravate back pain (Owe, Nystad & Bø 2009).

Performing daily exercises related to the back and lumbar can strengthen abdominal muscles elasticity while standing, bending, and quick jerking to right and left (James 2006).

One of the benefits of sports programs for women is in reducing or preventing back pain by improving body posture; thus, LBP prevention during pregnancy as well as the prevention of LBP to get worse is very important because a pregnant woman needs to adjust herself with the physiological changes taking place during pregnancy, and to prepare herself for her role as a mother (Pennick & Liddle, (2013). In a study conducted to investigate the effect of exercise on the back pain severity in pregnant women, it was shown that in the second half of the pregnancy period, exercise reduced back pain severity and the rate of disability (Garshasbi & Zadeh 2005). But in another study conducted on the impact of exercise on lumbar and pelvic pain and disability, it was raised that there was no strong evidence about the effects of exercise on lumbar and pelvic pain and disability. Regarding the type of designed exercises which are different in different studies, it cannot be judged about their effect (Stuge, Hilde & Vøllestad 2003). It seems that further studies are needed to be carried out in order to assess the impact of exercise on disability.

The number of childbirths in Iran is increasing due to population policies so that the National Organization for Civil Registration (NOCR) reported that a number of 1,570,219 babies were born in 2013 (https://www.sabteahval.ir). Therefore, regarding the importance of women's and pregnant mother's health and its priority in health programs of the ministry of health and community health centers, such researches would help improve the lifestyle of mothers during pregnancy with the aim of reducing disability due to back pain. In this regard, this study aimed to investigate the effect of exercise training on disability due to LBP in pregnant women during pregnancy.

Materials and Methods

This interventional study was conducted in order to determine the effect of a backache preventive behavioral program on reducing disability dur to LBP among pregnant women referring to the health centers in the city of Karaj, Iran during years 2015-2016. After the approval of the study by the medical ethics committee of Tarbiat Modarres University and allocating an ID IR.TMU.REC1394. 199 code and also obtaining permission from the Health Department of Alborz University of Medical Sciences, the study was begun.

The study population was consisted of all pregnant women who were in the second trimester of their pregnancy (from Week 20), referring to health centers located in Karaj, Iran.

In this study, in order to calculate the sample size in two groups, the Pukak formula was used to determine the number of samples. The sample size was determined based on a similar study by Yan et al. (2014) conducted on 90 pregnant women. Therefore, by taking into account the parameter of this study and likelihood of loss, 60 samples were selected in each group (Yan et al 2014).

Therefore, multi-stage random sampling method was used so that of all community health centers in Karaj, a total of 8 centers were randomly selected as follow: from the north of the city 2 centers, south 2 centers, east 2 centers, and west 2 centers. Then the pregnant women who referred to these centers and were in the 20th week of their pregnancy period and were eligible and willing to participate in the study were enrolled and coded. From each center, 16 pregnant women who wished to participate in the study were randomly selected. Due to ethical considerations, the method of intervention was described for the participants. At the end using randomly table, a total of 120 patients were

selected, 60 cases for the control group and 60 cases for the intervention group, respectively. Possible loss was considered as 10-15%.

Inclusion criteria for the participants were as follows: being in the second trimester of the pregnancy period, medically not having any limitation in performing exercise movements, having a health certification from their doctor or midwife. Exclusion criteria for the participants to be excluded from the study were as follows: having high risk pregnancy (bleeding, spotting, runny nose, headache, and blurred vision) identified by asking the pregnant women or observing their medical records, having any problem in performing the exercise, lake of regular attendance, and lake of consent to participate in the study.

After getting informed consent form, the following steps were taken:

-Taking history: the history of the pregnant women was taken again by a trained midwife at prenatal care centers. The subjects in the study were revisited in order to ensure about having the inclusion criteria. Demographic and Quebec questionnaires were completed in the first session by all the participants of both groups.

-Research implementation: The classes were begun from the second half of the pregnant women's pregnancy period (twentieth week) just for the intervention group in "Pregnancy Exercise center", and the theoretical materials were taught by the a health educator (researcher), and training exercises practically were taught simply and smoothly in 8 sessions by a trained midwife having a coach certification approved by the Karaj health center.

The sessions from first to eighth were held in the pregnancy weeks of 20 -23th, 24-27th, 28-29th, 30-31est, 32-33rd, 34-35th, 36th, and 37th week of the pregnancy. Each session lasted for 90 minutes consisting of 15 minutes for each other familiarity, 30 minutes for theoretical training about the importance of the exercise and preparation for a healthy pregnancy and childbirth, 45 minutes for training in breathing techniques and practical training in body posture reform, relaxation, and massage along with watching educational films about the sports and relaxation during pregnancy. It was also reminded that these exercises be repeated at least 2 times per week by the pregnant women at home.

Training sessions were consisted of educational materials suitable for pregnancy age, which were focused on the cause of back pain in pregnancy and preventive behaviors, including how to sleep, sit, and walk properly in pregnancy, as well as how to lift objects correctly. In these sessions the questions were answered. Then practical movements including several sections of stretch-resistance movements, breathing exercises, relaxation, and massage were taught in training sessions by trained midwives. The materials were selected from the book "antenatal education and preparation for childbirth" of the ministry of health, according to the American College of Obstetricians and Gynecology (ACOG) (Emamiafshar et al). Also, the materials were included in a brochure available for the intervention group. Personal abilities were taken into account in repetition and intensity of each exercise.

Educational films were shown in training classes in order to better understand how to correctly perform exercise movements, sleeping, siting, standing, and relaxing.

-Evaluation: After 8 weeks past intervention and prior to the childbirth, the Quebec questionnaire was completed again in both groups in order to measure the effects of exercise training in the intervention group and then compared with the control group.

Data collection method was consisted of a two-part questionnaire including demographic questions about the pregnant and also Quebec questionnaire containing 25 questions with a 5-point rating scale measures the degree of disability on each question rating from 0 to 4. Overall, the questionnaire ranks the participants from 0 to 100. Therefore, 0-25 means less disability, 26-50 indicates moderate disability, 75-51 represents a significant disability, and 76 and above indicates high and acute disability. The validity of the questionnaire was confirmed in another study by Schoppink (Schoppink et al 1996). Also, Reneman et al. (2002) confirmed the validity of the questionnaire in order to determine the extent of LBP (Reneman et al 2002).

Results

Totally 120 pregnant women (60 participants in each group) took part in this study. Table 1 shows the demographic characteristics of the participants, As this table shows there no significant difference between two groups in terms of these characteristics $P > .05$ except for the number of pregnancy and the level of participants' education, $P < .05$ (Table 1). Table 2 shows the compairtions the average amount of disability before and after the educational intervention in intervention and control groups. According this table**,** the disability in intervention group was improved after intervention ($P < 0.0001$). However, in control group who did not received any

education, disability was worse significantly at the follow up time ($P < 0.0001$).

Discussion

According to the obtained results, it can be concluded that interventional programs in terms of performing exercise activities and training-regarding how correctly perform daily activities-could reduce disability rate in pregnant women who were in the second half of their pregnancy period. It means that after holding training courses for pregnant women, they were able to reduce the degree of disability due to back pain in the second half of their pregnancy by performing preventive behaviors such as correct standing, sitting, and sleeping during pregnancy. The women not participating in the training courses but increasing their awareness about the problem by experience or asking questions from the other people were not able to reduce the disability rate. Comparing the average scores on disability in daily activities indicated that there was a significant difference between the two groups in terms of disability rate during daily activities due to low back pain in the third trimester of the pregnancy.

The results of this study showed that participation in the training courses resulted in reducing disability due to low back pain in pregnant women. Before holding the training courses, pregnant women did not have sufficient information about how to sit, stand, and walk correctly. Participation in training courses modified and reformed the behavior of these women, leading to a decrease in pain severity and disability rate. This finding is in line with the finding of other study conducted by Bandpei et al. (2010). They showed that training and performing exercise and considering ergonomic recommendations had a significant effect on reducing pain and disability due to back pain during pregnancy.

Finally, it was concluded that by participating in training courses and performing sports activities and preventive behaviors, the degree of disability due to low back pain was reduced, which can be attributed to the appropriate exercise activities and the rise of patients' awareness about the correct performance of daily activities. This finding is also consistent with the finding of other study conducted by yan et al. (2014). They indicated that balance exercises with the ball were effective in reducing back pain and improving physical functions during pregnancy (yan et al 2014). The results of the current study are also consistent with the other studies' findings indicating the effect of exercise on improving body postural function (Sabino &Grauer 2008; Ozdemir et al 2015). Stafne et al. (2012) showed that exercise during pregnancy did not reduce low back pain but significantly reduced the level of disability in pregnant women. These results in the second part are consistent with the present study's findings (Stafne et al 2012). Liddle & Pennick (2015) showed with strong evidence that exercise improved functional disability and reduced sick leaves, which is in line with the present study's results (Liddle & Pennick 2015).

In Ruhi's study, it was shown that improving the mental and physical fitness reduced pain and disability and increased the patient's quality of life (Ruhi 2013). In Unsgaard et al.'s study, it was shown that the exercises performed with the aim of back pain prevention, strengthening the abdominal muscles did not have any effect on reducing low back pain and disability (Unsgaard et al 2016). This finding is not consistent with the results of the present study. Also, in Dumas study, there was no significant difference between the intervention and control groups in term of activity limitation (Dumas et al 1995), which is not consistent with the results of the present study.

The results of this study showed that educational interventions could reduce disability due to low back pain in the third trimester of the pregnancy in the intervention group. Regarding the diversity of designed educational packages in disability prevention studies during pregnancy as well as considering the results of this study, it seems that educational package designed as pictorial, showing film, holding face to face classes, telephone follow-up, the use of cyberspace to answer the questions of the participants, providing exercise training pamphlets for repeating exercises at home, following the pregnant women by community health providers in order to complete training courses and create confidence in the intervention group under study to repeat exercises were effective approach in reducing disability due to back pain during pregnancy.

Despite the relatively adequate samples size in each group and providing training courses, the present study had some limitations. Due to ethical considerations, the pregnant women were informed about the participation in the classes in the third stage of sampling. The women who could attend the classes were registered in the intervention group, and the others were placed in the control group. This blindness trend in the process of research was considered as a limitation. The use of self-reporting questionnaires, subjective evaluation, relying on the pregnant' own statements, the lack of objective

criteria for assessing the effect of exercise training and preventive behaviors, the use the diagram to determine the extent of disability due to low back pain, and the lack of physical examination of each participant can be considered as weak points of this study. Therefore, the results of this study cannot be generalized to all pregnant women.. Thus, it is recommended that further studies be carried out with more sample size and specialized examinations for determining the degree of disability and examining the extent of disability in longer time even after the childbirth.

Table 1. Frequency distribution of demographic characteristics of the studied participants in intervention and control groups.

Variables Age	Frequency	Frequency Percent	Frequency	Frequency Percent	$P_{V\ U\ Mann\ Whitney\ test}$
	Intervention groups N	%	Control group N	%	
Between 25 and 15 years	20	33.3	22	36.7	**808**
Between 26 and 35 years	39	65	36	60.0	
Between 36 and 45 years	1	1.7	2	3.3	
Weight					
Between 40 and 60 kg	5	8.3	4	7.6	**276**
Between 61 and 80 kg	34	7.56	29	3.48	
Between 81 and 100 kg	21	35	27	45	
Height					
Between 145 to 160	33	55	39	65	**304**
Between 161 to 175	27	45	20	33.3	
176 to the top	0	0	1	1.7	
BMI					
Less than 18.5	2	3.33	5	8.3	**413**
18.9-24.9	23	33.38	24	40	
25-29.9	13	7.21	12	20	
More than 30	22	36.7	19	31.7	
Number of pregnancy					
First	41	368	26	43.3	**002**
Second	16	726	20	33.3	
Third	2	3.3	8	13.3	
Fourth	1	1.7	5	38	
Sixth	0	0	1	1.7	
Level of Education					
Illiterate	5	8.3	1	71	**003**
High school diploma	15	25	35	58.3	
Diploma	21	35	19	31.7	
Associate Degree	2	3.3	1	1.7	
Masters	15	25	4	3.3	
Senior and higher	2	3.3	0	0	
Job					
housewife	55	91.7	58	96.7	**253**
Employee	5	7.4	2	3.4	

Table 2. Comparing the average amount of disability intervention in studied participants of intervention and control groups before and after the educational.

Variable		Intervention group (n = 60)		Control group (n = 60)		P value
		Mean	Standared deviation	Mean	Standared deviation	
The disability due to low back pain	Before intervention	1.86١	1.009	1.90	1.900.71	.743
	After intervention	1.40	1.400.86	2.23	1.122.23	0001
	The significance level	0001		0001		

Conclusion

This study showed that exercise training intervention could reduce disability due to low back pain in pregnant women in third trimester of their pregnancy.

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Conflict of Interest

There is no conflict of interest for this article.

Author contribution

M K H; Study implementation, data collection and analysis, writing the first draft of paper.

SST: Study design and data analysis, editing and confirming the final draft of the paper.

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