The Effect of Pilates on Pain in Pregnant Women

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Research article

Keywords: Pilates, low back pain, pelvic pain, pregnant women

Posted Date: October 11th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-900418/v1

Abstract

Background and Objectives

Although pregnancy is a joyful period for most women, the physiological, anatomical, and biochemical changes can cause stress among mothers. low back pain (LBP), and pelvic pain (PP) are common in pregnancy. Also, considering that Pilates also has an effect on reducing LBP during non-pregnancy, in order to promote women's health during pregnancy and reduce economic costs, we decided to measure the effect of Pilates on reducing pain in pregnant women.

Materials and Methods

In the present double-blind randomized clinical trial, the effect of Pilates on reducing pain in pregnancy is investigated. The participants include 60 pregnant women who referred to the health care centers in Shahrekord City. The participants are randomly assigned into the intervention and control groups. The intervention group women, who are at 20 weeks of gestation, are required to attend two Pilates sessions per week for 12 weeks. Each session lasted 30 minutes with moderate intensity. Followed by the intervention, pain assessment was carried out using a visual analog scale (VAS). Data are analyzed using independent t-test in SPSS software version 23. The P-values of <0.05 are statistically significant.

Results

Two groups are matched in terms of their demographic characteristics prior to the intervention. After the intervention, low back pain (0.001) and pelvic pain (P<0.001) are significantly lower in the intervention than the control group.

Conclusion

Pilates can decrease low back pain and pelvic pain in pregnancy.

Introduction

Pregnancy, as one of the most important stages in women's life (1), is considered as a unique physiological window through which maternal-fetal adaptation can have major consequences for the long-term health of mother and fetus (2). Although pregnancy is a joyful period for most women, the physiological, anatomical, and biochemical changes can cause stress among mothers **(3, 4).**

These changes include postural changes, weakened ligaments, apper back pain, sacro iliac joint pain, muscle cramp, low back pain (LBP), and pelvic pain (PP) (5, 6). The reason for most of these changes is unknown and multifactorial and is associated with biomechanical, vascular, and hormonal changes during pregnancy (7).

Low back pain is defined as pain or discomfort in the area between the costal marginal and fierier gluteal fold with or without pain referred to the lower limb and without serious damage to the spine or nerve roots (8, 9). More than two-thirds of women experience LBP during pregnancy and one in five women also suffer from pelvic pain during pregnancy. About half of women also suffer from a combination of PP and LBP (10). Many studies refer to PP and LBP as a common and debilitating pain and refer to it as Lumbo pelvic pain (LPP) (9, 11). In different studies, different prevalence (due to pain measurement in different weeks of pregnancy and different measurement scales) has been reported between 3.9 to 91% (9, 11, 12). Back pain is an important health problem and has huge social and economic costs (8, 13, 14). In the United States, $ 14.5 billion is the direct cost of this problem (15). LPP can lead to problems in daily life, frustration, and sadness by creating a high level of disability due to disruption in daily activities, such as standing, walking, lifting objects, going up and down stairs and sleeping, reduce life quality, act as a catalyst for depression, and have a negative impact on a person's life (5, 7, 12, 14, & 16). LPP is also a common cause of absence from work and sick leave (12). Although most women consider such pain to be a normal physiological phenomenon, which improves after pregnancy (9), up to 7% of women report back pain for 3 to 12 months after delivery, and in many women, the onset of chronic low back pain is first experienced during pregnancy (7, 14). To reduce pain during pregnancy, different approaches such as supervised educational interventions, heat and cold therapy, massage, relaxation and exercise are used (8, 12). One of the exercises recommended by ACOG during pregnancy is modified Pilates (17). By increasing strength, stability, and flexibility, Pilates causes the storage and d increase of energy and is useful in reducing musculoskeletal pain, relaxation, improving sleep quality, reducing stress and fatigue. Pilates is a focused technique for building and stabilizing the center (abdominal, back, and hip muscles) and improving posture, breathing, flexibility, strength, and muscle control. The Pilates approach focuses on the active use of the trunk muscles to stabilize the pelvis and lower back. There is evidence suggesting that lumbar stabilization exercises can improve internal muscle strength (18-20). Recent studies have shown the positive effects of Pilates on zinc, improving pelvic floor muscle function, reducing back pain, menopausal osteoporosis, reducing body mass index, reducing subcutaneous fat, improving postpartum sleep quality and increasing quality of life in women (2, 21, & 22). In a study, Pilates improved pelvic floor strength during pregnancy (23). A systematic review of physical exercise during pregnancy has also shown that light strength exercises such as Pilates during the second and third trimesters of pregnancy can be done once or twice a week with 8 to 10 muscle strength exercises per session. But the effects of such exercises have rarely been studied (3). Another systematic review study entitled “The Impact of Pilates on Women's Health: A systematic review of clinical trials” has shown that there is no strong evidence for the effect of Pilates during pregnancy and that studies are needed in this regard (21). Despite the myriad benefits of Pilates and the ACOG recommendation to do this exercise during pregnancy, the benefits of this exercise in pregnancy are still debated and studies in this area are limited. Also, considering that Pilates also has an effect on reducing LBP during non-pregnancy (24), in order to promote women's health during pregnancy and reduce economic costs, we decided to measure the effect of Pilates on reducing pain in pregnant women.

Materials And Methods

The present double-blind randomized clinical trial was carried out among 60 pregnant women, who referred to the health care centers of Shahrekord City (capital city of Charmahal o Bakhtiyari province) from April 2018 to November 2018. Available sampling method was administered to select the participants. In this regard, six health centers were randomly selected from high (n=2), medium (n=2), and low (n=2) socio-economical areas in Shahrekord. The centers were far apart, so that members of the study groups could not communicate with each other. Followed by applying random sampling, one health center, selected from each socio-economical area, was assigned into the intervention and control groups and participants were randomly selected from these centers.

The following inclusion criteria were considered for selecting the participants: healthy pregnant women with no background diseases, no partial or absolute exercise contradictions during pregnancy (such as vaginal bleeding, preterm labor, twin pregnancies, BMI<12, etc.), no pain during pregnancy, and no previous history of back and pelvic pain, no medicine intake, willingness to participate in the research, and literacy education. The exclusion criteria included maternal complications, such as kidney disease (low back pain due to kidney disorder), pre-eclampsia, bone disorders, and etc. after starting the study, lack of participation in Pilates exercises for more than one session, lack of willingness to stay in the study, and lack of completing the questionnaire.

Of 135 women who met the inclusion criteria, 75 individuals quitted the study because they were concerned about the safety issues and were not ensure about the research efficiency. Upon obtaining approval from the Ethics Committee of Shahrekord University of Medical Sciences, Iran, the researcher referred to the research contexts, introduced herself to the health center's authorities, explained the research procedure and purpose, and made the required coordination to implement the study. Later, written informed consent forms were obtained from all participants, they were provided with the required information on the study goals and features, and were asked to complete the demographic questionnaire and the exercise checklist. The researcher's cellphone number was also available to the participants, so that they could contact her in case of facing any problem while performing the exercises.

Pilates exercises started at 20^{th} week of gestation for the intervention group (1). Exercises were performed in the gym under supervision of an instructor with a Pilates exercise coaching certificate and based on safe Pilates exercises during pregnancy (2). The intervention was conducted two sessions per week for 12 weeks and each session lasted 30 minutes with moderate intensity and 8 to 10 strength exercises were performed in each session (3). Gestational age was diagnosed at the beginning of study using ultrasound. The trainer was asked to date and sign an attendance list after each session to ensure that the participants performed the exercises regularly. During the intervention, the participants were followed up by making phone calls and reviewing the exercise checklist weekly. The control group received routine care during pregnancy. In the case that members of the control group attended Pilates exercises during pregnancy, they were excluded from the study and replaced.

To meet the participants after their delivery, researcher assistant attended the health centers, where sampling was performed near the probable dates of delivery of the intervention and control groups. Until

the pregnant woman (both control and intervention groups) visits the health center for the latest pregnancy care, they should complete a checklist of pain during pregnancy.

Assessment of pain

Pain assessment was carried out using a visual analog scale (VAS) according to Bourbanis, and completed by making a checklist (√) or circling (O) numbers on a pain scale corresponding to the level of pain felt. We included a brief interview guide equipped with images corresponding to specific pain scale ratings. A pain assessment was performed after

completion of the entire period of exercise(6).

The two study groups were matched in terms of their demographic information, such as the participants' age, period after the last pregnancy (month), having previous pregnancies, intake of supplements during pregnancy, BMI before intervention, exercising before pregnancy, nutritional status in pregnancy, job, and income.

Finally, data obtained from the control and intervention groups were analyzed using descriptive and analytical statistics in SPSS software version 23. Independent t-test was run to compare the baseline variables between the two groups. The level of significance in all tests was considered to be 0.05.

Results

Of 60 individuals who met the inclusion criteria to participate in the study, five were excluded due to their lack of willingness, concern about the safety issues, and lack of assurance about the research efficiency. Consequently, 55 women completed the study in the intervention (n =28) and control (n =27) groups.

The participants' age ranged from 20 to 28 years with a mean of 24± 5.64 years. The average period from the participants' last menstruation was 18-45 months with a mean of 31±12 months. According to Table 1, no significant difference was observed between the intervention and control groups in terms of their demographic information.

Table 1: Demographic information of the participants in the two intervention and control groups

Characteristic		Control	Intervention	
		Mean±SD	Mean±SD	P
Age		24.36±5.5	42.82±5.85	**0.28**
Mean time after the last pregnancy(month)		33.25±14.06	03.87±13.85	**0.47**
		N(%)	N(%)	
Having a previous pregnancy	Yes	13(48.1)	12(42.9)	**0.69**
	No	14(51.9)	16(5.1)	
Use of supplements during pregnancy	Yes	17(63)	14(50)	**0.33**
	No	10(37)	14(50)	
Maternal BMI before intervention	BMI<18.5	4(14.8)	5(17.9)	**0.99**
	18.5<BMI<24.9	5(18.5)	6(21.7)	
	25<BMI<29.9	6(22.2)	5(17.9)	
	30<BMI<34.9	6(22.2)	6(21.4)	
	BMI>35	6(22.2)	6(21.4)	
Do exercise before pregnancy	Yes	13(48.1)	13(46.4)	**0.9**
	No	14(51.9)	15(53.6)	
Nutritional status in pregnancy	Poor	6(22.2)	8(28.6)	**0.95**
	Medium	7(25.9)	7(25)	
	Good	7(25.9)	7(25)	
	Excellent	7(25.9)	6(21.4)	
Job	unemployment	4(14.8)	5(17.9)	**0.97**
	Employment	6(22.2)	5(17.9)	
	Housewife	8(29.6)	9(32.1)	
	Student	9(33.3)	9(32.1)	
income	Insufficient	6(22.2)	10(35.7)	**0.59**
	Sufficient	12(44.4)	10(35.7)	
	Relatively sufficient	9(33.3)	8(28.6)	

Table 2 presents the results of comparison of different pain level in the intervention and control groups after the study. Based on these results, after the intervention, low back pain (0.001) and pelvic pain (P <0.001) were significantly lower in the intervention group in comparison to the control group.

Table 2: Comparison of pain in the intervention and control groups after the study

P	intervention	Control	T	
	Mean±SD	Mean±SD		**Complication**
0.001	3.52±2.04	5.7±2.98	3.58	
				Low back pain
P<0.001	2.28±1.78	5.15±2.87	4.2	
				Pelvic pain

Discussion

This study investigated the influence of Pilates on reducing pain in preeclampsia. According to the results achieved in this study, **Low back pain** and **Pelvic pain** were decreased compared to the control group. Although there are many studies on the influence of exercise on pain in pregnancy, there are limited reports in the literature on the influence of Pilates on pain in pregnancy. For example, Yueh-Chu Peng investigated different exercise intensities for relieving Lumbopelvic pain in pregnant women and concluded that moderate-intensity exercise can reduce lumbopelvic pain during pregnancy (9). The findings of Linda Kahr Andersen's study suggested a possible protective effect of physical exercise on pelvic girdle pain during pregnancy (14). The result of these studies were in line with the present study. Liddle SD investigated interventions for preventing and treating low-back and pelvic pain during pregnancy (Review). Results of this meta-analysis indicated that exercise significantly reduces low back pain in pregnancy but doesn't have significant effect on pelvic pain in pregnancy (25). In this study, like the present study, low back pain was reduced, but unlike our study, exercise had no effect on reducing pelvic pain. Of course, all of the above studies looked at the effect of exercise on pain in pregnancy, not Pilates. The results of Ika Oktaviani's study showed that Pilates is an effective method of reducing pain in pregnancy (6). The result of this study was in line with the present study.

Based on the findings, Pilates decreased low back pain and pelvic pain followed by performing Pilates exercises in the intervention group. Theories of pain go back to ancient times. According to those theories, pain is a phenomenon related to the brain, but in recent studies, psychological and emotional factors have been emphasized more (26, 27). In the past, it was thought that the cause of back and pelvic pain in pregnancy was an increase in the amount of estradiol, progesterone or relaxin in the mother's serum, which causes pain in pregnant women in the back and pelvis area due to loosening of ligaments due to increased hormones (6, 28 However, studies have shown that increased joint relaxation and related discomfort during pregnancy is not associated with increased levels of these hormones, and most of the relaxation occurs in the first half of pregnancy. It seems that this loosening can lead to changes in the mother's posture and ultimately lead to pain in the mother's back (28). Due to its strong nature, Pilates can focus on stabilizing the muscles of the lower back and pelvis and improve the internal strength of the muscles (6) and thus, reduce pain in the lower back and pelvis during pregnancy.

Conclusion

Findings of the present study revealed the positive impact of Pilates on low back pain and pelvic pain. Furthermore, no specific complications were observed during the intervention period, which corroborates the safety of Pilates in pregnancy. However, a greater number of interventions with larger sample size are needed to confirm the results.

Declarations

Conflicts of interest: None of the authors has any conflict of interest to declare.

Acknowledgements The authors thank all the participants and study sites that took part in this study. Authors' contributions B.M and F .A contributed the conception and design of the study. B.M and Z.R contributed to MR data acquisition, and B.M and F.A contributed the clinical data acquisition. Z.R contributed the image analysis and statistical analysis. All authors read and approved the final manuscript.

Funding This study was supported by shahrekord university of medical science and Community-oriented Nursing Midwifery research center, Nursing and Midwifery school, Shahrekord Uiversity of medical science,Shahrekord, Iran

Availability of data and materials

All data generated and analyzed during the current study will be available from the corresponding author on reasonable request.

Declarations Ethics approval and consent to participate

Ethics committee of Shahrekord University of Medical Sciences approved the research protocol with IR.SKUMS.REC.1395.332 , and the procedures conformed to the tenets of the Declaration of Helsinki.

IP: https://en.irct.ir/trial/37938

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Figures

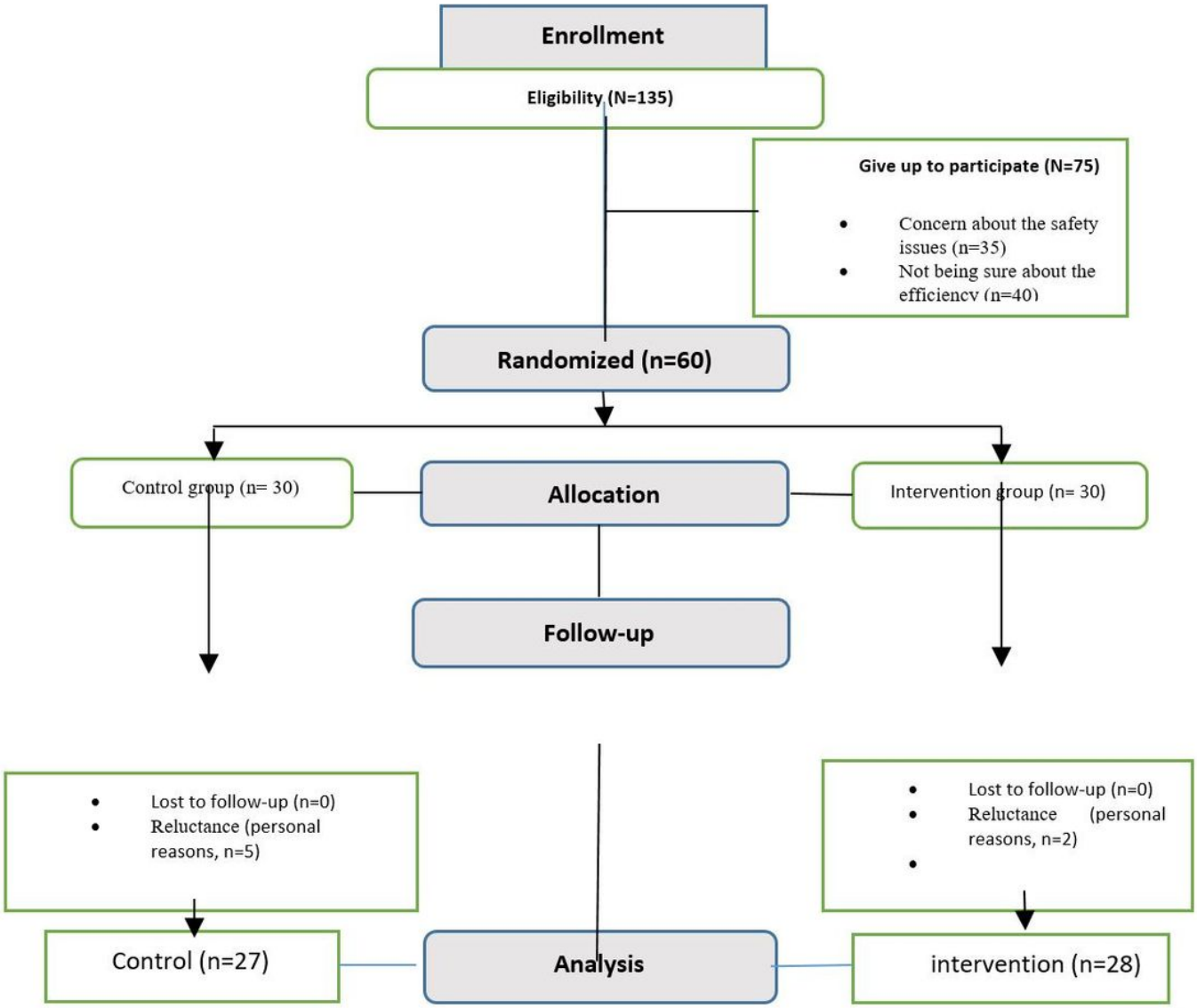

Figure 1

CONSORT flowchart of the study population

Supplementary Files

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