

The Impact of Pilates Training on Mental Health and Happiness among Untrained Menopausal Women

Maryam Abdoshahi^{1*}, PhD 

¹Department of Motor Behavior, Faculty of Sport Sciences, Alzahra University, Tehran, Iran

*Corresponding author: Maryam Abdoshahi, PhD; Department of Motor Behavior, Faculty of Sport Sciences, Alzahra University, Tehran, Iran. Email: m.abdoshahi@alzahra.ac.ir

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Abstract

Background: The effects of participation in sports and physical activities on mental health in menopausal women have been less examined. Therefore, the goal of the current research was to further investigate the effects of participation in sports and physical activities using a Pilates training intervention on mental health and happiness among menopausal women.

Methods: The current research used an experimental method with pre-test and post-test using a control group. Thirty-two menopausal women from Tehran (district 5), Iran, in 2022, who were chosen using a convenience sampling method, participated in the study. The intervention group (n=16) was exposed to three months of Pilates exercises, while those in the control group (n=16) performed their regular daily activities. Mental health and happiness were measured using The Depression Anxiety Stress Scale-21 and The Oxford-Happiness Inventory, respectively, prior to and following the intervention. Independent t-test and analysis of covariance using SPSS version 26 were utilized to analyze the data.

Results: The results showed similar mental health and happiness within both groups at baseline. Moreover, the results revealed that our sample had medium to high symptoms of depression, anxiety, and stress at pretest. Furthermore, the participants in the intervention group reported lower depression ($P<0.001$), anxiety ($P<0.001$), and stress ($P<0.001$) as well as higher happiness ($P<0.001$) following the intervention than the control group.

Conclusions: Based on our findings, it is recommended that menopausal women participate in various sports training courses such as Pilates to improve their mental health status.

Keywords: Menopause, Mental health, Happiness, Pilates, Women

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1. Introduction

Menopause refers to a significant period of hormonal changes in women, which is a sign of the final stage of life's abundance (1). The World Health Organization (WHO) characterizes menopause as the true cessation of menstruation for at least 12 months due to the loss of activity of ovarian follicles (2). According to various sources, the average age of menopause is 50-51 years old (3), with menopause age changes typically falling within the age range of 45-55 years (4). Due to the increase in life expectancy in many countries, previous study showed that women spend more than one-third of their lives in menopause (5). Among the physical problems associated with menopause are hot flashes, osteoporosis, cardiovascular diseases, atrophy of the reproductive system, and neuropsychological problems such as anxiety, stress, fatigue, anger, and depression (3-5). Approximately 75% of women experience these acute symptoms after menopause, which can cause severe discomfort and disruption

in their lives (2). These symptoms, which occur physiologically in old age, can have a significant impact on reducing the quality of life (1). According to previous literature, it is estimated that 26-33% of women experience their first episode of depression during menopause (4). It has also been shown that the risk of depression increases during the transition to menopause. In fact, menopause has been associated with reduced well-being and increased depression. For example, Smith-DiJulio and colleagues (6) found that women's well-being shifts during the menopausal transition and the beginning of postmenopause. Additionally, Bromberger and colleagues (7) discovered that menopausal women experience higher levels of depression compared to before menopause. Finally, Cohen and co-workers (8) demonstrated that premenopausal women who had no depression before menopause were twice as likely to become depressed when entering premenopause.

Some studies have shown a lower prevalence or

lower severity of menopausal symptoms among women who regularly participate in sports, and have described the prospective effects of sports and physical activities in reducing menopausal symptoms (9-12). There are various sports that can have positive effects on a woman's menopause, including walking, yoga, pelvic floor exercises such as Pilates, and aerobic exercises. Several trials have investigated the effectiveness of participating in sports and physical activities on the physical and psychological health of menopausal women, and consistently demonstrated that sports and physical participation have numerous benefits on the cardiovascular system, osteoporosis, obesity, and depression (13-20). However, it is important to further explore whether participating in regular sports and physical activities can have other health-related benefits among menopausal women. One of the most important health-related components that are affected by menopause is mental health. However, the impact of participation in sports and physical activities on mental health in menopausal women has been less investigated.

According to WHO, mental health is the ability to maintain harmonious relationships with other people, adapt and modify the individual and community environment, and resolve conflicts and personal desires in a coherent, rational, and appropriate manner (21). The concept of mental wellbeing is a facet of the general concept of wellbeing and refers to all strategies and measures used to prevent mental illnesses. Mental wellbeing is based on how individuals think, feel, and act. People who enjoy mental wellbeing and have a positive outlook on life are better equipped to deal with life's challenges, feel good about themselves and others, and are responsible in their workplace and relationships (22, 23).

Experts and researchers in various health sciences believe that participation in sport and physical activities is a way to improve physical and mental health. In fact, numerous studies have confirmed the health-related benefits of participating in regular sport and physical activities. For example, it has been shown that physical activity has positive effects on self-efficacy (24, 25), resilience (24), social skills (26), wellbeing (27), physical fitness (28, 29), body composition (30), body mass index (31), and mental health (31-35).

Recent studies have found that with increasing age and decreasing desire to do sports, depression, anxiety, and stress increase (33-35). Participating in regular exercise activity can reduce depression. However, as mentioned earlier, the effects of participation in sport and physical activities on mental health in menopausal women have been less investigated. Hence, we aimed to examine further the effects of participation in sport and physical activities using a Pilates training intervention on mental health and happiness among menopausal women.

2. Methods

The present study utilized an experimental design with pre-test and post-test assessments and a control group.

2.1. Participants

The statistical population consisted of all menopausal women residing in Tehran (district 5), Iran, in 2022. Convenience sampling was used to select 32 participants based on the inclusion and exclusion criteria. The inclusion criteria were: not engaging in regular sports or physical activities in the last six months, not suffering from cardiovascular, digestive, metabolic, renal, and bone-joint diseases, not using tobacco, medication, or special nutritional supplements, and having passed at least one year since their last menstrual period. The exclusion criteria were non-cooperation in the research and non-participation in two consecutive training sessions. All participants provided written informed consent. The sample size was determined using G-Power software ($\alpha=0.01$ and power test=0.95), indicating a total sample size of 32 participants. The mean and standard deviation of the experimental and control groups were 48.39 ± 7.15 and 38.60 ± 7.51 , respectively. Participants were randomly allocated to either the intervention or control group using a block randomization method, with each group consisting of 16 participants.

2.2. Measures

Mental health: The Depression Anxiety Stress Scale-21 (DASS-21) (36) was used to assess depression, anxiety, and stress as mental health-related variables. The DASS-21 is designed to measure negative emotional states associated with

depression, anxiety, and stress. The scale consists of 21 items, with three subscales (depression, anxiety, and stress), each containing seven items scored on a 4-point Likert scale from 0 (not at all) to 3 (most of the time). Higher scores indicate higher levels of symptoms. The items refer to the previous week. The validity of the DASS-21 has been previously confirmed, and in this study, the Persian version of DASS-21 was confirmed valid by ten experts (CVI=0.90, CVR=0.86). Additionally, Cronbach's alpha was 0.88.

Happiness: The Oxford-Happiness Inventory (OHI) (37) was used to assess happiness in the current study. The OHI is a self-report scale consisting of 29 items scored on a 4-point Likert scale from 0 (never) to 3 (always). Higher scores indicate higher levels of happiness, with a total score ranging from 0-87. In the original study, Hills and Argyle (37) reported an internal consistency reliability alpha coefficient of 0.90 and a 7-week test-retest reliability coefficient of 0.78. In this study, the Persian version of OHI was confirmed valid by ten experts (CVI=0.88, CVR=0.82), and Cronbach's alpha was 0.91.

2.3. Procedure

A professional Pilates coach was used to perform Pilates exercises for this research. The protocol of the study included a pre-test and a post-test. The pre-test was conducted first, and the post-test was administered immediately after the intervention. The intervention was conducted at the gym and under the supervision of the trainer. The intervention group participated in Pilates exercises for three months, with two sessions per week. In accordance with the exercise program used in previous studies, the Pilates exercises were done in two sections (38-41). The first section of exercises was done on the mat for the first six weeks, and the second section was done using the band for the second six weeks. The trainer supervised the participants and provided them with the necessary instructions. All movements were taught to the participants in a slow and controlled manner to increase coordination and facilitate the learning process. Initially, simple Pilates movements were selected to familiarize the participants with the principles of Pilates. As participants progressed in basic exercises and improved their movements, the intensity and complexity of the exercises increased. The progression of exercises was from lying down

to sitting and standing. A period of 30 seconds of rest was given between each exercise and the next exercise. The control group participants only engaged in their daily activities during the training period. After the training, a post-test was conducted for both groups to evaluate the effects of the training.

2.4. Data Analysis

Descriptive statistics consisting of means and standard deviations were used to mark variables using SPSS version 26. An independent t-test was used to compare the means of the groups in the pre-test. To compare the pre-test and post-test scores, we used analysis of covariance (ANCOVA). In addition, we used a Chi-square test to compare the demographic data across the groups. The P value was set at $P < 0.05$.

3. Results

3.1. Demographic Data

Table 1 presents the demographic data of the study participants. The majority of the participants (62.5%) were in the age group of 50-55 years, 92% were married, 61.5% had a high school education, and 5.5% were housewives. Additionally, 49.5% were classified as overweight. In terms of the duration of menopause, 63.5% of the participants had passed 1-5 years since their menopause. The results of the Chi-square test revealed no significant differences between groups regarding age, marital status, job, and the duration of menopause (all $P > 0.05$). However, the intervention group had a significantly higher level of education and lower BMI (both $P < 0.05$).

3.2. Pre-test

The descriptive results of the pre-test showed that 47% vs. 49% of the participants in the intervention and control groups, respectively, were at a moderate-to-severe level of depression. Furthermore, the study found that 46% vs. 44% of the participants in the intervention and control groups, respectively, had a moderate-to-severe level of anxiety. Moreover, the results indicated that 49% vs. 53% of the participants in the intervention and control groups, respectively, had a moderate-to-severe level of stress. Finally, the mean happiness score was 41.39 vs. 40.55 for the participants in

Table 1: Comparison of demographic data across groups

Variables	Categories	Groups		Comparison
		Intervention	Control	
		Number	Number	
Age	50-55	9	10	$X^2=1.71$ $P=0.397$
	56-60	6	4	
	61-65	1	2	
Marital status	Married	15	14	$X^2=2.68$ $P=0.241$
	Widow	3	4	
Education	Illiterate	-	1	$X^2=7.29$ $P<0.001$
	High school	10	8	
	Higher education	6	7	
Job	Housewife	8	7	$X^2=2.89$ $P=0.142$
	Employed	2	4	
	Rented	6	7	
BMI	Overweight (>25)	7	10	$X^2=9.67$ $P<0.001$
	Underweight (<18.5)	1	-	
	Healthy (18.5-25)	8	6	
The duration of menopause	1-5 years	11	10	$X^2=0.93$ $P=0.796$
	6-10 years	4	4	
	Above 11 years	1	2	

Table 2: Comparing the mean scores of groups in the pre-test and post-test

Variables	Groups	Pre-test (M±SD)	Post-test (M±SD)	Within-group comparison (Paired t test)	Between-group comparison (ANCOVA)
Depression	Intervention	5.74±2.02	4.78±2.49	$t=-3.348, P<0.001$	$F=60.39, P<0.001$
	Control	5.80±1.93	5.71±2.32	$t=0.493, P=0.498$	
Anxiety	Intervention	4.80±2.15	4.05±1.47	$t=5.935, P<0.001$	$F=39.67, P<0.001$
	Control	4.76±2.28	4.81±2.28	$t=0.471, P=0.502$	
Stress	Intervention	7.17±2.39	5.70±2.31	$t=4.257, P<0.001$	$F=65.37, P<0.001$
	Control	7.39±2.81	7.44±2.63	$t=0.589, P=0.401$	
Happiness	Intervention	41.39±9.64	51.47±12.13	$t=3.967, P<0.001$	$F=85.44, P<0.001$
	Control	40.55±8.48	41.49±9.89	$t=0.196, P=0.834$	

the intervention and control groups, respectively, indicating a lower-than-medium level of happiness among our participants.

Results of the t-test indicated no significant difference between groups regarding depression ($t=-0.849, P=0.493$), anxiety ($t=-0.937, P=0.345$), stress ($t=-1.048, P=0.124$), and happiness ($t=0.973, P=0.401$).

3.2. Comparison of Pre-test with Post-test

In the post-test, the results revealed that 53% of participants in the control group had a moderate-to-severe level of depression compared to 37% in the intervention group. Regarding anxiety, 45% of the control group had a moderate-to-severe level of anxiety compared to 33% in the intervention group. Moreover, 56% of the control group had a moderate-to-severe level of stress compared to

35% in the intervention group. Finally, the mean happiness score was 41.49 for the control group and 51.47 for the intervention group, indicating a higher level of happiness among the participants in the intervention group.

The results of the paired t-test showed a significant improvement in mental health and happiness in the intervention group following the intervention [depression ($t=-3.348, P<0.001$), anxiety ($t=5.935, P<0.001$), stress ($t=4.257, P<0.001$), and happiness ($t=3.967, P<0.001$)]. However, there were no significant changes in the control group [depression ($t=0.493, P=0.498$), anxiety ($t=0.471, P=0.502$), stress ($t=0.589, P=0.401$), and happiness ($t=0.196, P=0.834$)].

Furthermore, the results of ANCOVA (as shown in Table 2) indicated significant differences between the groups in terms of depression

($F=60.39$, $P<0.001$), anxiety ($F=39.67$, $P<0.001$), stress ($F=65.37$, $P<0.001$), and happiness ($F=85.44$, $P<0.001$). As shown in Table 2, Pilates training significantly and positively influenced mental health and happiness among menopausal women.

4. Discussion

The aim of this study was to examine the effects of participation in sport and physical activities, specifically a Pilates training intervention, on mental health and happiness among menopausal women. In terms of mental health, we found that the prevalence of symptoms of depression, anxiety, and stress among menopausal women was higher than usual. Most of the women had moderate to severe symptoms of depression. However, exposure to a Pilates training intervention significantly reduced the symptoms of depression, anxiety, and stress. This finding is consistent with previous studies such as Elavsky and McAuley (10), Moilanen and colleagues (17), and Sternfeld and Dugan (18) who demonstrated that sport-based interventions decrease symptoms of depression, anxiety, and stress among different age groups, including adults.

Pilates is known to be an appropriate wellness and restoration approach for adults. It has been suggested that the impact of Pilates exercise in reducing sadness in young and older adults can be attributed to the role of serotonin, as an imbalance in serotonin levels may affect mood in a way that leads to depression (38, 39). This is consistent with research showing associations between increased serotonin levels and improved depressive symptoms in a female sample following Pilates (38).

Exercise is one of the strategies that increase serotonin (38), which naturally raises the level of alertness and improves the general mood of the person. It gives individuals more energy and enthusiasm to perform everyday tasks. When feelings of worry and anxiety occur, engaging in work or an activity can be helpful since a person usually cannot focus on multiple issues at the same time (25-29). At this time, the more enjoyable the work and activity is, the more effective it will be. Additionally, if that work helps a person focus more on a task, its effectiveness will increase. This action will make it easier to deal with anxious thoughts and distract one's mind from negative thoughts. Participating in sport and physical activities can make a person feel more relaxed in the face of

anxiety-provoking situations (26-31, 33). This effect occurs due to physiological changes such as hormonal changes in the body. Regarding Pilates exercise, it can be stated that this type of exercise increases the fun and happiness of the person and also enhances the person's concentration. Both of these changes reduce negative and anxiety-provoking thoughts in a person, and over time, improve a person's mental health (34-35).

In menopausal women, negative and anxiety-provoking thoughts may increase due to hormonal and physical changes. As shown by this and previous studies, engaging in sports, particularly Pilates exercises, can increase a person's ability to manage negative thoughts and improve their mental health (36, 38, 41). Thus, it is strongly recommended that menopausal women participate in enjoyable exercises such as Pilates to enhance their mental health. In this regard, the positive impact of social contacts, which emerge during training, should not be ignored. Social interaction was highlighted as a possible mechanism for significant decreases in depressive symptoms after a workout accompanied by intervention involving mildly depressed elderly individuals (40-41).

4.1. Limitations

One of the limitations of the present study is that individual differences such as hormonal differences, physical and psychological conditions, sleeping quality, cardiovascular fitness, and other psychological symptoms of menopause, which may affect the mental health status of the participants, were not measured before the intervention. Therefore, it is recommended that future studies consider these variables when examining the effects of Pilates on the mental health of menopausal women. Additionally, another limitation of this study was the use of a purposive sampling method, which means that the results should be interpreted with caution.

5. Conclusions

In conclusion, current research suggests that menopausal women often experience moderate to severe symptoms of depression, anxiety, and stress. However, participating in a Pilates training intervention can significantly reduce these symptoms and increase happiness among menopausal women. These findings have practical

implications for menopausal women seeking to improve their mental health.

Therefore, we recommend that menopausal women consider participating in various sports training courses, such as Pilates, to improve their mental health status.

Ethical Approval

The Ethics Committee of Sport Sciences Research Center approved the research method with the code of IR.SSRC.REC.1401.079. Also, written informed consent was obtained from the participants.

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Conflicts of Interest: None declared.

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