

Research Article

# The Effect of Mat Pilates Exercise Program on Body Mass Index and Body Composition in Non-Physically Active Working Iraqi Women

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## Abstract

The current study aimed to investigate the effect of using a pilates exercise program on improving body mass index and body composition of non-physically active working women. The participants of the study were (16) working women at the University of Basrah, Iraq. A pre-posttest was utilized to collect the data, (after a 12-week cycle of exercises) in Pilates groups, the results of the study showed that there were statistically significant differences at ( $\alpha \leq 0.05$ ) in the women's mean scores on body mass index and body composition. The study concluded that the pilates exercise program is effective in the improvement of body mass index and body composition of non-physically active working women.

## Introduction

Pilates is a system of exercise that allows controlling the mind and body. It uses smooth, flowing movements that tone and stretch the body and increase strength and flexibility in muscles and joints. It also utilizes the power of the mind to help with the exercises and to increase the harmony between body and mind [1] Pilates system offers a complete workout for the body that exercises not just the main muscle groups, but weaker, less-used muscles too. It, therefore, enables one to achieve a perfectly toned body and realize true fitness potential [2]. Early 20th century, Pilates created by Joseph Pilates combines ancient wisdom with contemporary knowledge. It was designed to enhance the body's potential by correcting muscular imbalances, finding optimal alignment, and creating efficient movement patterns [3]. Pilates exercises try to balance mental and physical health; reshaping the body and altering the physical appearance by improving core strength, flexibility, and overall physical performance. It increases mental control and ultimately self-realization [4].

### Physical benefits of Pilates

There are enormous rewards to be gained from doing Pilates in addition to greater self-confidence and an increased sense of well-being, practising Pilates can offer the following advantages:

- 1. Increased flexibility:** Pilates improves performing workouts effectively and boosts overall flexibility. previews studies in Physical Medicine and Rehabilitation observed strong evidence that Pilates is an effective way to improve flexibility and can effectively improve dynamic balance [5].
- 2. Better balance:** Pilates can improve balance, strong evidence reported that Pilates saw a significant change in dynamic balance (the ability to maintain balance while moving or changing positions) compared to those who did not do Pilates [6,7].
- 3. Improved core engagement:** Effective core engagement can be improved by professional Pilates instructors giving detailed, varied instructions that give better balance, and stability performance, and reduce the risk of low back pain, according to the Mayo Clinic [8].
- 4. More efficient digestion:** Pilates can help to tone and strengthen the muscles of the stomach. Since it also reduces stress, this will help to ease the digestive process. Which shuts down during times of severe stress and tension.
- 5. Increased oxygen intake:** this helps the body's systems to function efficiently.
- 6. Better circulation:** Pilates helps to improve blood flow, which means more efficient circulation of nutrients and oxygen, and easier removal of toxins.

### More Information

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**7. Improved skin:** improved cardiovascular function means more efficient removal of waste products and clearer skin.

**8. Enhance the immune system:** Pilates exercises the muscles, which helps lymph to circulate around the body. Lymph carries white blood cells, which fight disease.

**9. Body awareness:** The mindfulness aspect of Pilates can give you a better sense of how you are moving your body. That, in turn, can translate into better body awareness in everyday life.

**10. Low-impact exercise:** Pilates is a low-impact form of exercise that is gentle on your bones and joints. That means it can be a great fitness option for people who can't do high-impact activities, like running or jumping.

**11. Better coordination:** Pilates can build total-body coordination, because it incorporates a lot of exercises that require multiple body parts to work in tandem. Which can help move more effectively, and efficiently and reduce the risk of injury.

**12. Breath awareness:** The emphasis in Pilates on breathing deeply and deliberately through movements can help you perform other exercises better; it can also trickle over to day-to-day life making you feel rested and relaxed.

**13. Total-body strengthening:** Pilates strengthens the entire body, that includes big and small muscle groups, like glutes, quads, hamstrings, back, and chest stabilizing muscles, including those that support shoulders and spine.

**14. Enhanced athletic performance:** Pilates is a complement component to all forms of fitness because it helps enhance flexibility, mobility, and strength which improves efficiency by increasing body awareness, which can help the brain more efficiently access your muscles when needed.

**15. Improved control and precision:** Control and precision are developing strongly in Pilates exercise, this allows performing movements with grace and energy and effort saving.

### Mental benefits of pilates

1. Sense of empowerment owning the power of your body.
2. Ability to strong focus and grace.
3. Mood boosting decreasing anxiety and depression, awesome stress buster, and mood booster [9].

Many researchers conducted studies on the effects of Pilates exercise programs on body composition and body mass index. In 2018 meta-analysis of eight Pilates studies found that those who practiced Pilates reported a reduction in symptoms of depression, anxiety, and fatigue, as well

as an increase in energy [10]. In 2019 study of 90 people published in the Journal of Exercise Rehabilitation found that participants who practiced Pilates for one hour three times a week for eight weeks improved their scores on a functional movement screen, which measures things like balance, stability, and mobility, more than people who did yoga instead (or who did not exercise at all) [11]. One 2010 study published in the Journal of Strength & Conditioning Research found that people who did 1 hour of Pilates twice a week for 12 weeks reported significant increases in abdominal endurance, hamstring flexibility, and upper-body muscular endurance [12]. The researchers theorize that the scapular stabilization cues throughout the moves (when you're told to bring your shoulder blades together or down), combined with the increase in core strength and endurance, can translate to upper-body strength improvements. forms of exercise, Pilates and yoga each have been demonstrated to have direct benefits on both physical and mental health through improvement of posture, flexibility, muscle tone, cardiovascular function, weight management, and stress reduction. In elderly women, Pilates was shown to improve functional autonomy, static balance, and quality of life [13]. Pilates was also shown to improve dynamic balance, flexibility, and strength in a study of people 65 years and older [14,15].

The purpose of this study was to investigate the effect of a mat Pilates exercise program in improving the body mass index and body composition of non-physically active working women. The study aimed to answer the following questions: Are there any statistically significant differences between the pretest and posttest in body mass index and body composition of working women after participating in a mat Pilates exercise program?

And also between the control group and experiment group in body mass index and body composition of working women after participating in mat Pilates exercise program?

## Materials and methods

### Research design

The researcher used the true experimental design, pre-test-posttest control group design. Two primary objectives were studied in this paper, first to examine the impact of the mat Pilates exercise program on body mass index, and second to investigate the impact of the mat Pilates exercise program on body composition.

### Participants

The samples in the current study were randomized assignments consisting of sixteen (16) females from the south of Iraq non-physically active women. The age of the participants ranged from 35 to 40 (M: 38.35; SD: 2.56). Mean weight, height, and BMI at pretest were 62.75 kg (SD 12.34), 1.65 m (SD 0.07), and 23.05 kg/m<sup>2</sup> (SD 4.06), respectively. The samples were selected according to certain basics, all of them



are: (1) less than 20 min of self-reported physical activity per day (e.g. walking to and from school); (2) exercise less than once a week in leisure time; (3) non-physically active for at least one year; and (4) medically healthy in terms of (a) not being insulin dependent, (b) not suffering from hypertension.

**Procedures**

The participants were randomly assigned to the control group 8 women (non-exercise) and the experimental group 8 women (exercise group), experimental group participated in 12 week Pilates training program. The control group did not perform any kind of organized exercises or any treatment after applying for the exercise program.

All participants gave written consent to take part in this study. Details were provided about the purpose, activities, and expectations and all participants were informed that they were free to leave the project at any time. A PAR-Q health questionnaire was also completed by each participant. The study was approved by the Ethics Committee of Basrah University, Basrah, Iraq. Pretests were taken before applying the exercise program then posttests were taken for all participants again individually. The methodology was the same as the pretest. All criterion measures are taken from the sample shown in Table 1.

The dependent variables in the current were body mass index and Body Composition, and The independent variable was the Pilates exercise program.

The beginner mat Pilates program includes full-body exercise that is done by a certified personal trainer. The Pilates instructor will break down all the exercises, giving tips to complete them efficiently and safely, as well as modifications that can make them fit their fitness level.

The Pilates exercise program is shown in Table 2. The Pilates classes were performed three times weekly, for 12 weeks 3 times a week. Each training session lasted 60 min and consisted of (a) warm-up; (b) Pilates exercise workout; and (c) cool down and stretch. The participants completed a 5-minute jog, and 5 minutes of stretching before they engaged in 40 minutes of Pilates activity then 5 minutes of core conditioning, 5 minutes of stretching, and breathing.

**Data analysis**

In order to find out the effect of selected Pilates exercises

**Table 1:** Criterion Measures.

Tool	Variables	Scoring
Body Composition tests	Fat on the shoulder blade	Cm
	Fat in the biceps muscle	
	Fat in the triceps muscle	
	Waist Circumference (cm)	
	Hip Circumference (cm)	
Body Mass Index (BMI)	Thigh circumference(cm)	Meter
	Height	
	Weight	

on the body mass index and body composition of non-physically active women, a paired 't-test was used at a 0.05 level of significance.

**Results**

It can be derived from Table 3 that the mean BMI of the pre-test of the experimental group and post-test of the experimental group was 28.09 and 24.67 respectively, whereas the mean BMI of the pre-test of control and post-test of the control group was 27.30 and 26.77. The "t" value in the case of the experimental group was 5.24 and for the control group, it was 0.659. Since calculated t (=5.24) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

It can be derived from Table 4 that the mean body weight of the pre-test of the experimental group and post-test of the experimental group was 88.50 and 80.22 respectively, whereas the mean body weight of the pre-test of control and

**Table 2:** Pilates Training Programme.

Sequencing	Exercises	Duration of Time
Warm-up:	1. Hundred 2. Roll Up 3. One Leg Circle 4. Rolling Like a Ball	2 weeks each week 3 times
Abdominals:	5. Single Leg Stretch 6. Double Leg Stretch 7. Single Straight Leg Stretch 8. Double Straight Leg Lower Lift 9. Criss Cross	2 weeks each week 3 times
Spine Stretch Group:	10. Spine Stretch Forward 11. Open Leg Rocker 12. Corkscrew 13. Saw	2 weeks each week 3 times
Side Kick Series:	18. Front & Back 19. Up & Down 20. Passé 21. Small 22. Inner Thigh Lifts & Circles 23. Beats on Belly	2 weeks each week 3 times
Teaser Group:	26. One Leg Teaser 27. Teaser 28. Swimming 29. Leg Pull Front Prep	2 weeks each week 3 times
Mermaid to Push-Up:	28. Mermaid Stretch 29. Seal 30. Push-Up Series	2 weeks each week 3 times

**Table 3:** Body Mass Index (kg/m2) of the Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	28.09	4.33	-3.42	5.24	000*
Experimental Post	24.67	1.88			
Control Pre	27.30	6.63	0.476	0.659	
Control Post	26.77	2.98			

\* Significant at 0.05 level.

**Table 4:** Bodyweight (kg) of Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	88.50	5.11	-8.28	10.39	000*
Experimental Post	80.22	2.12			
Control Pre	87.30	6.63	0.476	0.287	
Control Post	86.77	2.98			

\* Significant at 0.05 level.



post-test of the control group was 87.30 and 86.77. The “t” value in the case of the experimental group was 10.39 and for the control group, it was 0.287. Since calculated t (=10.39) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

The Table 5 shows that the mean fat on the shoulder blade of the pre-test of the experimental group and post-test of the experimental group was 33.43 and 26.12 respectively, whereas the mean shoulder blade of the pre-test of the control and post-test of the control group was 32.55 and 32.03. The “t” value in the case of the experimental group was 23.75 and for the control group, it was 0.287. Since calculated t (=23.75) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

Table 6 shows that the mean biceps muscle of the pre-test of the experimental group and post-test of the experimental group was 24.67 and 20.04 respectively, whereas the mean biceps muscle of the pre-test of the control and post-test of the control group was 25.03 and 24.83. The “t” value in the case of the experimental group was 14.31 and for the control group, it was 0.377. Since calculated t (=14.31) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

Table 7 shows that the mean triceps muscle of the pre-test of the experimental group and post-test of the experimental group was 31.79 and 27.68 respectively, whereas the mean triceps muscle of the pre-test of control and post-test of the control group was 31.33 and 30.58. The “t” value in the case of the experimental group was 15.99 and for the control group, it was 0.445. Since calculated t (=15.99) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

**Table 5:** Fat in the shoulder blade of the Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	33.43	5.55	7.31-	23.75	000*
Experimental Post	26.12	1.98			
Control Pre	32.55	3.89	0.612	0.344	
Control Post	32.03	1.65			

\* Significant at 0.05 level.

**Table 6:** Fat in the biceps muscle of the Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	24.67	6.29	6.63-	14.31	000*
Experimental Post	20.04	2.11			
Control Pre	25.03	7.19	0.377	0.587	
Control Post	24.83	2.69			

\* Significant at 0.05 level.

**Table 7:** Fat in the triceps muscle of the Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	31.79	4.09	4.11-	15.99	000*
Experimental Post	27.68	0.44			
Control Pre	31.33	2.43	0.967	0.445	
Control Post	30.58	4.98			

\* Significant at 0.05 level.

It can be derived from Table 8 that the mean Waist Circumference of the pre-test of the experimental group and post-test of the experimental group was 79.12 and 75.78 respectively, whereas the mean Waist Circumference of the pre-test of control and post-test of the control group was 79.55 and 78.72. The “t” value in the case of the experimental group was 11.71 and for the control group, it was 0.22. Since calculated t (=11.71) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

The Table 9 shows that mean the Hip Circumference of the pre-test of the experimental group and post-test of the experimental group was 92.21 and 94.90 respectively, whereas the mean Hip Circumference of the pre-test of the control and post-test of the control group was 96.89 and 96.22. The “t” value in the case of the experimental group was 11.49 and for the control group, it was 0.41. Since calculated t (=11.49) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

It can be derived from Table 10 that the mean Thigh Circumference of the pre-test of the experimental group and post-test of the experimental group was 48.56 and 45.23 respectively, whereas the mean Thigh Circumference of the pre-test of control and post-test of the control group was 49.10 and 96.22. The “t” value in the case of the experimental group was 8.68 and for the control group, it was 0.32. Since calculated t (=8.68) > tab t .05 (7) (=2.36), the results of this study showed that statistically significant and explained its effects positively.

## Discussion

The purpose of the study was to examine the effects of

**Table 8:** Waist Circumference (cm) of Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	79.12	3.56	3.34	11.71	000*
Experimental Post	75.78	1.33			
Control Pre	79.55	1.65	0.408	0.22	
Control Post	78.72	8.32			

\* Significant at 0.05 level.

**Table 9:** Hip Circumference (cm) of Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	97.21	5.09	2.31	11.49	000*
Experimental Post	94.90	0.98			
Control Pre	96.89	2.87	0.730	0.41	
Control Post	96.22	3.91			

\* Significant at 0.05 level.

**Table 10:** Thigh Circumference (cm) of Experimental and Control group.

Groups	M	SD	Mean Difference	t	p
Experimental Pre	48.56	4.11	3.33	8.68	000*
Experimental Post	45.23	142.			
Control Pre	49.10	1.92	0.114	0.32	
Control Post	96.22	6.25			

\* Significant at 0.05 level.



the Pilates exercise program on body mass index and body composition of undergraduate female students at Basra University.

In the analysis, the results showed that there are significant differences between the pre-test and post-test, in body mass index and all dimensions of body composition in the pilates exercise group. It is clear that some effects did occur over the course of the intervention. It was found that body mass index and body composition have greater improvement for exercisers than for non-exercisers. This finding corroborates the studies of researchers Rahul & Kumar [16] and Soumya & Ashoke [17] who found the efficiency of Pilates exercises on body weight, body mass index, body fat percentage & visceral fat level of obese people. this mechanism works by promoting the strengthening of abdominal muscles and improving diaphragmatic function. This finding supports previous research into this area; Baltaci, et al. [18], and Jago, et al. [19] conducted a pilates program (60 min 5 t/wk for 4 wk) they found decreases in body weight, body fat, and BMI percentile. Carvalho, et al. [20], and Pan [21] applied an experiment pilates program (60 min 2 t/wk for 12 wk) they illustrated a greater decrease in body weight, body fat, and waist and gluteus circumference [22].

## Conclusion

The conclusions are made on the basis of the discussion in relation to the objectives of this study. There are significant differences between the pre-test and post-test in body mass index and all dimensions of body composition in the Pilates exercise group. The findings of this study may be of collaboration to educators and fitness professionals in identifying the ways in which Pilates exercise are expressed and represented to influence and position body mass index and body composition, presenting a better understanding of the nature of Pilates exercise, and sharpen awareness of mental health and healthy lifestyle.

## Recommendations

Pilates exercise programs should be part of a multi-agency approach to Iraqi working women and offer an important resource for enhancing physical and mental health. which means improving career commitment among working women, and as a vehicle for promoting character-building and economic development.

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