International Journal of Science and Healthcare Research
Vol.7; Issue: 3; July-Sept. 2022
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Effects of Pilates Training Program on Functional Capacity in Post Menopausal Women

Ankita Gupta[1], Dr. Mayuri Ghumatkar[2], Dr. Ajay Kumar[3]

[1]Intern, DPO's NETT College of Physiotherapy, Thane, Maharashtra, India.
[2]Associate Professor, DPO's NETT College of Physiotherapy, Thane, Maharashtra, India
[3]Principal, DPO's NETT College of Physiotherapy, Thane, Maharashtra, India

Corresponding Author: Dr. Mayuri Ghumatkar

DOI: https://doi.org/10.52403/ijshr.20220705

ABSTRACT

Background: Loss of Functional Capacity post-menopause is a common feature of aging and is often associated with physical inactivity and the age-related loss of muscle mass, muscle strength and decrease in aerobic capacity. Functional capacity depends on lower limb muscle strength and abdominal obesity in active postmenopausal women. Pilates exercises are a combination of exercises which focuses on lumbopelvic stabilization and activation of the deep muscle of the trunk. They are isometric, low- impact exercises of the core muscles that generate force without motion and stabilize the spine.
Aim: To study the effects of 4- weeks of Pilates training program on functional capacity in postmenopausal women.
Methodology: 30 naturally post- menopausal participants were selected on the basis of selection criteria. Functional capacity was assessed by a 6 Minute Walk Test pre and post Pilates exercise program. Participants received 4 weeks of Pilates training program, including 12 sessions, 3 sessions per week.
Results: The results showed that there was significant improvement in the functional capacity after 4 weeks of Pilates training protocol.
Conclusion: The study concluded that the functional capacity was improved as the distance walked in 6MWT post- intervention was more than the distance walked in 6MWT pre- intervention, and the data was proven to have significant p- value.

***Keywords*:** Functional Capacity, 6 Minute Walk Test, Pilates training program.

INTRODUCTION

Menopause is defined as the time of the final menstrual period, which is followed by 12 months of amenorrhea. The period following the final menses is described as Post-menopause[1]. Functional capacity is defined as a person's capacity to function in different work tasks, determining a person's ability to participate in different circumstances and work. The assessment of functional capacity indicates the ability to perform activities of daily living that undergo sustained aerobic metabolism.[2] Loss of Functional Capacity (FC) post menopause is a common feature of aging and is often associated with physical inactivity and the age-related loss of muscle mass, muscle strength, fat mass gain, and inherent decrease of aerobic capacity. The strongest predictor of FC was lower-limb muscle strength relative to body weight.[3] Among the methods of functional capacity evaluation, the six minute walk test is applied due to its simplicity and easy use. The six minute walk test assesses the tolerance to self limited exercises and is similar to daily life activities. The American thoracic society (ATS) stabilised indications safety measures and procedures to apply the six minute walk test. The distance walked during the six minute walk test is used as a closure for the evaluation of adjustments for the study of factors associated with functional capacity. Menopause related physiological, psychological, physical

changes may affect the functional capacity.[4] Pilates exercises are a combination of exercises which focuses on lumbopelvic stabilization and activation of the deep muscle of the trunk. They are isometric, low- impact exercises of the core muscles that generate force without motion and stabilize the spine. The method is based on isometric exercises of the abdominal muscles that generate force without motion and stabilize the spine. These are low-impact muscle exercises. The exercises are performed in different positions and have a low impact on the body's structures, particularly on the spine, muscles, joints, and ligaments and particularly on the sacral lumbar region. Thus, people of any age can benefit from the Pilates method of exercise.[10] Joseph's original principles and exercises comprised the following principle: Breathing, Concentration, Control, Centering, Precision and Flow.[12] Various studies previously done on obese individuals, breast cancer patients, older individuals summarised the effect of Pilates training program on functional capacity and flexibility. [10, 13, 14] However, the effects of functional capacity related Pilates exercise on healthy menopausal women are sparse. Thus, the purpose of the study was to study the effects of 4- weeks of Pilates training program on functional capacity in postmenopausal women.

MATERIALS AND METHODOLOGY

FOR 6MWT

1. Mechanical lap counter.
2. Measuring tape.
3. White chalks.
4. Two small cones to indicate the turnaround points.
5. A chair which can be easily moved along the walking course.
6. Case record form on a clipboard.
7. Sphygmomanometer.
8. Stopwatch.
9. Borg scale. [5]

FOR PILATES

1. Mat.
2. Chairs.
3. Demographic data form.
4. Paper and pen.

Methodology

1. SAMPLE DESIGN
- Sample size- 30.
- Sample population- naturally postmenopausal women.
- Sampling technique- convenient sampling.

2. STUDY DESIGN
- Type of study- Experimental study.
- Duration of study- 12 months.
- Study Place- Mumbai Metropolitan city.
- Outcome measure- 6MWT.

SELECTION CRITERIA

Inclusion Criteria

Women who are postmenopausal (amenorrhea for at least 12 months);
Women between the ages of 45 and 60 willing to participate
Not indulged in any kind of structured physical activities or exercise program for 6 months.

Exclusion Criteria

Use hormone replacement therapies.
Uncontrolled diabetes and hypertension.
Recent surgery or trauma.
Cognitive impairments and neurological disorders.

PROCEDURE

ASSESSMENT PROCEDURE

FUNCTIONAL CAPACITY: It was assessed by the 6MWT, which is a practical simple test that required a 100-ft hallway and no exercise equipment or advanced training. Walking is a basic activity performed by all on a daily basis. This test measured the distance that an individual walked easily on a flat, hard surface in a period of 6 minutes (the 6MWD).[5] Participants were asked to walk as far as they could in 6 minutes allowing as many

rests as needed during that time. The therapist continually monitored the patients responses during exercise to better understand the individual's tolerance- heart rate, respiratory rate, blood pressure, SpO_2, were checked to provide a good picture of their aerobic capacity. [6, 7] As per the guidelines of The American Thoracic Society (ATS) specific reference values for the distance walked in 6 Minutes for the Indian population.

Indian males: 6MWD = 561.022 - (2.507 × age [years]) + (1.505 × weight [kg]) - (0.055 × height [cm]).

Indian females: 6MWD = 30.325 - (0.809 × age [years]) - (2.074 × weight [kg]) + (4.235 × height [cm]) [8]

After the test, the data and values were notes in the table given below:

BASALS	PRE 6MWT	POST 6MWT	3MINS	6 MINS	15 MINS
B.P.	mmHg	mmHg			
P.R.	Beats/min	Beats/min			
R.R.	Breaths/min	Breaths/min			
SpO_2					

INTERVENTION PROCEDURE: A 4 week protocol was made. The average length of every session was 40 to 50 minutes which included 5 minutes of warm up and cool-down each. The exercise prescription was formed by the FITT (Frequency, Intensity, Time and Type of exercise) principle which included frequency of 3 days a week for 4 weeks. Intensity was calculated according to the Rate of perceived exertion (RPE) scale and the progressions were done with the same scale and were given an interval of 10 seconds between each performed exercise. The exercises included in this intervention were considered as beginners and intermediate level exercise in order to fulfil the desired result. Therapist demonstrated the activities by visual and verbal instructions to the patient and educated the patient about the correct form of exercise and how to perform it correctly.

PILATES PROTOCOL:

Warm up: 10 minutes.

Main program: 30 minutes

Cool down: 10 minutes.

The main program consists of 12 exercises. They are:

Supine spine stabilization and mobilization:

1. Pelvic tilt (lumbar spine mobilization),
2. Hip rolls,
3. Thigh arcs (exercising the iliopsoas muscle),
4. Ab prep,
5. The hundred.

Prone posterior hip muscle strengthening:

1. Gluteal squeezes,
2. Gluteal strengthener with flexed knee,
3. Heel squeeze prone,
4. Swimming.

Side lying lateral hip rotators and hip abductors strengthening:

1. Top leg abduction,
2. The oyster.

Quadruped series:

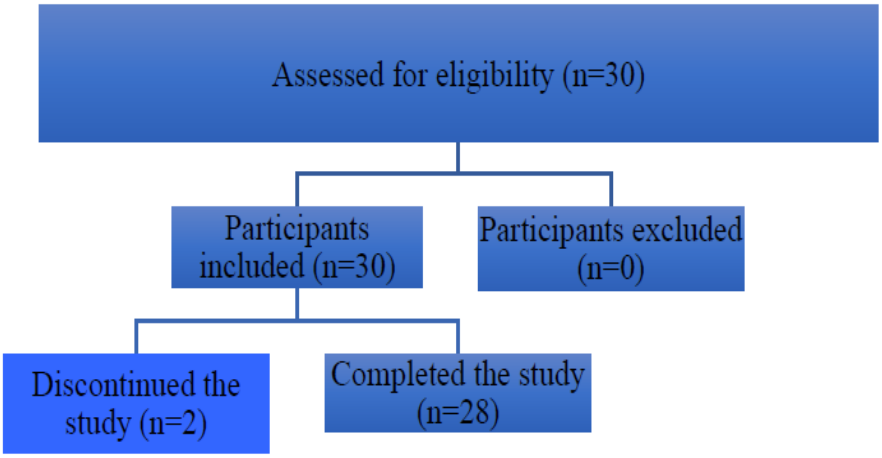
1. Arm and leg lifts.

- Each exercise was repeated 10 times for 2 sets, with a 10-sec rest per repetition and 60 sec between sets.
- To gradually increase the program intensity the rate of perceived exertion (RPE) was used.

DATA ANALYSIS AND INTERPRETATION

All data was analysed using GraphPad Prism 9.4.0 (673) and Microsoft Excel version 2016. The Shapiro-Wilk test was done to assess whether the data was normally distributed. The test proved that the data was normally distributed. Hence, a

parametric test, Paired- t test was used to assess the pre- intervention and post- intervention values of 6 Minute Walk Test.



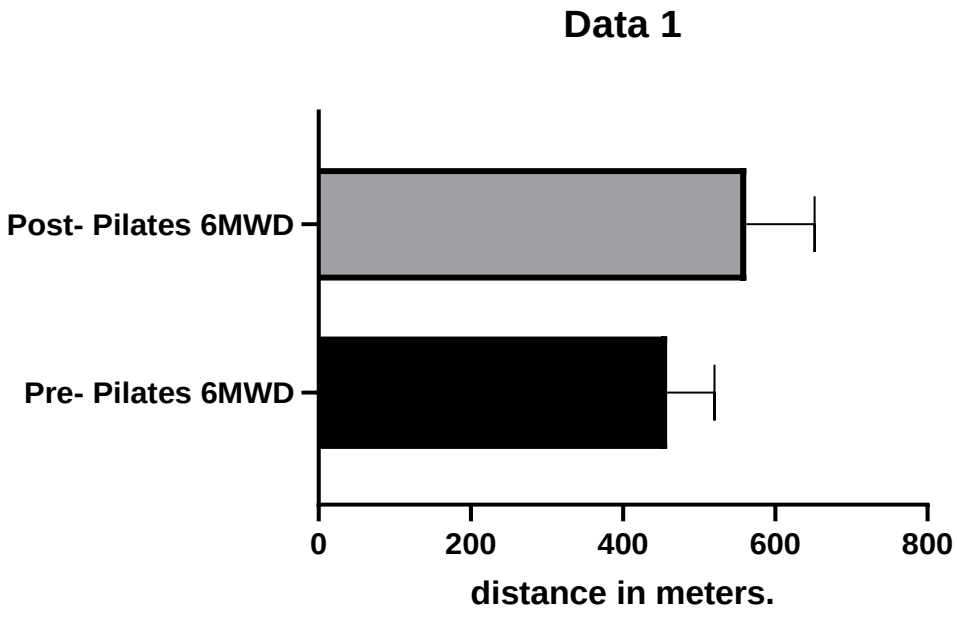
RESULTS

TABLE 1

Demographic data	Number of female participants	28
	Age Mean (±SD)	50.93(±4.68)
	Height Mean (±SD)	158.63(±11.31)
	Weight Mean (±SD)	76.57(±10.08)
	BMI Mean (±SD)	29.67(±9.29)

A basic demographic data of all the participants was recorded, shown in Table 1. All the 28 participants received 12 sessions of the Pilates training program.

Graph 1: Comparison between the distances walked in 6 minutes pre- Pilates training program sessions and post- Pilates training program sessions.



Inference: As the distance between the pre- Pilates and post- Pilates score of all the 28 participants was increased, the same can be seen in the bar graph respectively.

TABLE 2

6MWT	Pre- Pilates Mean (±SD) (in meters)	Post- Pilates Mean (±SD) (in meters)	P-value
	469.428(±61.066)	603.142(±88.501)	<0.0001

As the data passed the normality test, a parametric test paired t test was used to assess the pre- intervention and post-intervention values of 6 Minute Walk Test.

TABLE 3

Paired t test	
Two tailed P value	<0.0001
Significantly different (P < 0.05)?	Yes

Table 3 shows the statistics of the Parametric paired t test, the p- value is shown as <0.0001 which can be interpreted as showing a statistically significant difference.

Inference: As the data passed the normality test, parametric paired t test was done, where a significant difference was demonstrated. As the distance walked in the 6 Minute Walk Test increased after the 4 weeks of Pilates training program in all the 28 participants, the same can be seen in the bar graph respectively.

DISCUSSION

The study was done among the sample size of 28 menopausal women, their age group ranging from 45 to 60 years. The subjects were naturally menopausal, and subjects undergone hysterectomy were excluded from the study. The subjects included had amenorrhea for more than 12 months. Their functional capacity was assessed by using a 6 Minute Walk Test before the program and after the completion of program at the 4th week. The Pilates training program was continued for 4 weeks, three sessions per week.

Principal health concerns of menopausal women include vasomotor symptoms, urogenital atrophy, osteoporosis, cardiovascular disease, cancer, psychiatric symptoms, cognitive decline, and sexual problems.[1] Loss of functional capacity post menopause is due to physical inactivity and the age-related loss of muscle mass, muscle strength, and inherent decrease of aerobic capacity. An association was found between abdominal obesity, reduced lower limb muscle strength and functional capacity (FC) in post- menopausal women. (Maude C. Dulac, Livia Pinheiro Carvalho). It was observed that deep core muscles, especially the transversus abdominis and multifidus muscles became activated during the practice of Pilates. Accordingly, a Pilates exercise repertoire which focused on lumbopelvic stabilization and activation of the deep muscle of the trunk was formed. Eventually progressive limb loading exercises along with core activation was added in the protocol.

In the present study, the sessions were conducted on a mat in an open space. A group therapy of 5 to 6 women was given in order to provide the benefits of group therapy where the group members can support, reassure, and help each other improve throughout the study duration. The Therapist demonstrated the activities by visual and verbal instructions to the patient and educated the patient about the correct form of exercise and how to perform it correctly. Out of 30 women who were included in the study, 2 of them discontinued, accordingly the analysis was done from the data obtained by 28 menopausal women.

The result of the study indicated that there was statistically significant effect of Pilates training program on functional capacity in post- menopausal women aged 45 to 60 years, (p- value <0.0001). Our findings revealed that a 4- week Pilates training program improved the mean distance walked in 6 Minute Walk Test immediately post intervention when compared to the mean distance walked in 6 Minute Walk Test pre intervention. (603.142(±88.501), 469.428(±61.066) respectively).

The reason for improvement was that the Pilates movements used in the study improved muscle strength and flexibility by gradually reinforcing the muscles, cartilage, and conjunctive tissue of the trunk segment. It is also stated that Pilates exercise helps to stabilize and strengthen the lumbar muscles by focusing on the powerhouse of the body that is the core musculature. Several studies have shown that there is deterioration in

health and lower quality of life in menopausal women as they are more prone to sedentary habits and loss of fitness. **(**Patricia Alexandra García-Garro, Fidel Hita-Contreras et al). As far as we know, this is the first study linking a Pilates program with functional capacity in post-menopausal women. In addition to this study various other studies on Pilates in breast cancer patients, obese individuals, and healthy individual concluded that there was increased isokinetic control of the muscles, increased recruitment of core muscles, fascia unloading, reduction in fat mass and thereby reducing BMI as well as an improvement in quality of life. Therefore, it is important for menopausal women to change their sedentary lifestyles by performing physical activities like Pilates exercises. [9]

On that account, Pilates is a good intervention for menopausal women as it helps improve not only physical fitness like balance and flexibility but also mental fitness. In this study, the Pilates exercise program also increased the subjects' flexibility and strength by breath control, which causes the muscles to relax. Hence, the combined effects of Pilates training program on soft tissues connectivity, stability and mobility contributed in improving the functional capacity in menopausal women. This study helps to recognize the need for early intervention of physiotherapy, along with dietary modifications in menopausal women on regular basis. This study conducted also highlights the harmful effects of sedentary lifestyle in menopausal women. Core muscle recruitment and activation exercises reduce the metabolic fat mass and improves muscular strength. The group therapy sessions boost confidence and mental assurity.

This study can be performed using a large sample size. It can be performed using two controlled groups, one receiving the Pilates training program and the other receiving a conventional therapy to compare the extent of effects in both groups. A longer duration intervention can be done to study the long term effects of Pilates training.

CONCLUSION

Our study concluded there was a significant effect of 4 weeks of Pilates training program on functional capacity in post- menopausal women, with increase in 6 Minute Walk Distance after the intervention.

ACKNOWLEDGMENT

I take this wonderful opportunity to thank all the "HANDS" which have joined together to make this project a SUCCESS. It's my great pleasure and privilege to express my deep-felt gratitude to our respected Principal Sir Dr. Ajay Kumar, Guide Dr. Mayuri Ghumatkar (P.T.) who immensely helped me and rendered their advice, precious time, constant encouragement, knowledge and relevant information regarding my study and whose suggestions and guidance has enlightened me on this subject. It is my great pleasure to thank all my subjects who participated in this study, without them this study would not have been possible. I also take this opportunity to thank the Statistician, Librarian, all the Teaching and Non-teaching staff, my friends and colleagues for their support. Above all, I would like to thank my parents for their blessings, love, constant support, affection and encouragement. Praise and Glory to the God Almighty, who is the source of strength, foundation of my knowledge and the source of inspiration in every walk of life.

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

REFERENCES

1. Dalal PK, Agarwal M. Postmenopausal syndrome. Indian journal of psychiatry. 2015 Jul; 57 (Suppl 2):S222.
2. Bondarev D, Laakkonen EK, Finni T, Kokko K, Kujala UM, Aukee P, Kovanen V, Sipilä S. Physical performance in relation

to menopause status and physical activity. Menopause. 2018 Dec;25(12):1432-1441. doi: 10.1097/GME.0000000000001137. PMID: 29787482.
3. Dulac MC, Carvalho LP, Aubertin-Leheudre M. Functional capacity depends on lower limb muscle strength rather than on abdominal obesity in active postmenopausal women. Menopause. 2018 Feb 1; 25(2):176-81.
4. Harshada S Jumle HS, Palkar A, Kumar A. Correlation of functional capacity and quality of life in hypertensive post-menopausal females. Int J Health Sci Res. 2020; 10(8):190-194.
5. ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories. ATS statement: guidelines for the six-minute walk test. Am J Respir Crit Care Med. 2002 Jul 1;166(1):111-7. doi: 10.1164/ajrccm.166.1.at1102. Erratum in: Am J Respir Crit Care Med. 2016 May 15;193(10):1185. PMID: 12091180.
6. O'Sullivan SB, Schmitz TJ, Fulk G. Physical rehabilitation. FA Davis; 2019 Jan 25.
7. Kisner C, Colby LA, Borstad J. Therapeutic exercise: foundations and techniques. Fa Davis; 2017 Oct 18.
8. Ramanathan RP, Chandrasekaran B. Reference equations for 6-min walk test in healthy Indian subjects (25-80 years). Lung India: official organ of Indian Chest Society. 2014 Jan; 31(1):35.
9. Lee H, Caguicla JM, Park S, Kwak DJ, Won DY, Park Y, Kim J, Kim M. Effects of 8-week Pilates exercise program on menopausal symptoms and lumbar strength and flexibility in postmenopausal women. Journal of exercise rehabilitation. 2016 Jun; 12(3):247.
10. Niehues JR, Gonzáles I, Lemos RR, Haas P. Pilates Method for Lung Function and Functional Capacity in Obese Adults. Altern Ther Health Med. 2015 Sep-Oct;21(5):73-80. PMID: 26393994.
11. Wood S. Pilates for Rehabilitation. Human Kinetics; 2018 Jan
12. Paterson J. E-Book Teaching Pilates for Postural Faults, Illness and Injury: a practical guide. Elsevier Health Sciences; 2008 Dec 17.
13. García-Garro PA, Hita-Contreras F, Martínez-Amat A, Achalandabaso-Ochoa A, Jiménez-García JD, Cruz-Díaz D, Aibar-Almazán A. Effectiveness of a pilates training program on cognitive and functional abilities in postmenopausal women. International Journal of Environmental Research and Public Health. 2020 Jan; 17(10):3580.
14. Eyigor S, Karapolat H, Yesil H, Uslu R, Durmaz B. Effects of pilates exercises on functional capacity, flexibility, fatigue, depression and quality of life in female breast cancer patients: a randomized controlled study. Eur J Phys Rehabil Med. 2010 Dec; 46(4):481-7. PMID: 21224783.

How to cite this article: Ankita Gupta, Mayuri Ghumatkar, Ajay Kumar. Effects of pilates training program on functional capacity in post menopausal women. *International Journal of Science & Healthcare Research.* 2022; 7(3): 20-26. DOI: *https://doi.org/10.52403/ijshr.20220705*

******