Journal of Health and Rehabilitation Research 2791-156X JHRR

For contributions to JHRR, contact at email: editor@jhrlmc.com

Original Article

Comparison of Pilates and Core Exercises for Flexibility, Endurance and Weight Reduction in Adults

Rafia Mannan[1], Sana Riaz[2], Ayesha Kousar[3], Hira Mannan[4], Rabia Rahim[1], Fatima Guftar[3], Samreen Sadiq[5]*

[1]Lecturer, Department of Physical Therapy & Rehabilitation Sciences, University of Biological & Applied Sciences, Lahore Pakistan.
[2]Senior Lecturer, Riphah College of Rehabilitation & Allied Health Sciences, Riphah International University, Pakistan.
[3]Demonstrator, Department of Physical Therapy & Rehabilitation Sciences, University of Biological & Applied Sciences, Lahore Pakistan.
[4]Lecturer, College of Physical Therapy, Government College Faisalabad, Pakistan.
[5]Associate Professor, Department of Physical Therapy & Rehabilitation Sciences, University of Biological & Applied Sciences, Lahore Pakistan.
Corresponding Author: Samreen Sadiq, Associate Professor; Email: samreen.sadiq19@gmail.com

Conflict of Interest: None.

Mannan R., et al. (2024). 4(2): DOI: https://doi.org/10.61919/jhrr.v4i2.1001

ABSTRACT

Background: Pilates exercises, a relatively recent approach compared to traditional core exercises, have established health benefits. However, this study aims to evaluate the different fitness measures provided by these exercises.

Objective: The purpose of this study was to compare Pilates and core exercises concerning flexibility, endurance, and weight changes in adults.

Methods: This randomized clinical trial included 32 participants who provided written consent. Participants were randomly assigned to one of two groups: Group A (core exercises) and Group B (Pilates exercises), with 16 participants in each group. Each group participated in three 60-minute sessions per week for eight weeks. Core exercises included 10 sets of traditional core exercises with five repetitions each, while Pilates exercises followed a similar structure. Both groups performed the same warm-up and cool-down routines. Measurements included weight in kilograms, flexibility tested via the sit and reach test, and endurance tested via the trunk flexion test. Data were analyzed using paired sample t-tests with SPSS version 25, and statistical significance was set at $p < 0.05$.

Results: There was a statistically significant difference in results between groups. The paired sample t-test showed a significant change with a p-value of 0.00 ($p < 0.05$). Endurance improved more in the core exercise group, while flexibility improvements were greater in the Pilates group. The mean weight change for the core group was 2.2 kg, and for the Pilates group, it was 1.8 kg, indicating that core exercises were more effective in weight reduction.

Conclusion: The study concluded that both core and Pilates exercises significantly improved weight, flexibility, and endurance. Core exercises were slightly more effective in weight reduction and endurance, while Pilates was superior in improving flexibility.

Keywords: Pilates, core exercises, weight reduction, flexibility, endurance, fitness.

INTRODUCTION

Physical fitness enhancement among sportsmen, players, and various individuals stands as a primary responsibility of professionals specializing in power and endurance training. To improve core strength and stability, various groups of physical fitness exercises are prescribed, among which Pilates has gained considerable attention. Pilates, a body/mind training regime, encompasses a variety of exercises aimed at core stability, muscular strength, flexibility, and muscle control, contributing significantly to posture improvement (1). In recent times, core strength and stability have emerged as focal points for enhancing fitness performance and preventing injuries (2).

The anatomical core is defined as the axial skeleton, including the pelvic and shoulder girdles, and all associated soft tissues with proximal attachments originating on the axial skeleton, extending to both the axial and appendicular skeletons (upper and lower extremities) (3). Key muscles within the core include the quadratus lumborum, lumbar multifidus, external and internal oblique abdominis, erector spinae, rectus abdominis, transverse abdominis, psoas major, diaphragm, and pelvic floor muscles (4). These exercises are integral to enhancing flexibility, strength, and body-mind awareness (5).

Pilates emphasizes the control of body position and movement, resonating with its original designation, Contrology. These exercises can be floor-based (mat Pilates) or equipment-assisted with adjustable spring resistance (lab Pilates). The core principles of Pilates

Journal of Health and Rehabilitation Research 2791-156X JHRR

encompass centering, concentration, control, precision, flow, and breathing (6). The Pilates method integrates mind-body coordination, aiming to restore physical fitness uniformly, correct postures, enhance vitality, invigorate the mind, and uplift the spirit (7). Despite being less intense than other dance and aerobic exercises, Pilates is profoundly effective for achieving a healthy body (8).

Initially conceived for rehabilitation and later adopted for training dancers, Pilates offers a comprehensive "core" workout that benefits muscular strength, endurance, flexibility, balance, and cardiorespiratory endurance (9). It incorporates a mind-body component, potentially offering a range of health benefits across different populations (10). While Pilates is not conventional exercise like aerobic or resistance training, it is a structured physical activity that has shown to enhance muscle endurance, flexibility, and dynamic balance, particularly in young and middle-aged individuals (11).

Traditional exercises for improving abdominal strength and stability include bodyweight exercises involving static or dynamic contractions in various positions, starting with isolated movements and progressing to more complex exercises like crunches, sit-ups, and planks (12). The decision regarding which core exercises to perform often relies on narrative reviews, individual experiences, and personal opinions (2). Lumbar stabilization exercises, also known as core strengthening, trunk stabilization, neutral spine control, dynamic stabilization, and muscular fusion, all aim to enhance functional stability around the abdomen and pelvis (13, 14). These exercises are particularly effective in strengthening the deep muscles of the body, including the local spinal muscles, abdominal muscles, hip muscles, and pelvic muscles (15).

Core stabilization exercises are crucial for strengthening deep body muscles. Studies on Taekwondo players have demonstrated that active core exercises positively influence fitness and foot pressure rates. The core muscles not only provide power and mobility but also help maintain balance during movements, and repeated stretching and strengthening of these muscles can significantly enhance trunk stability (15). Physical inactivity combined with improper diet is a leading cause of obesity (16), and individuals with lower cardiorespiratory levels face higher mortality risks regardless of their BMI (17). Fitness programs for obese individuals should therefore focus on improving overall physical fitness alongside reducing total body mass (17, 18).

This study aims to compare the effects of Pilates and core exercises on weight reduction, flexibility, and endurance in adults, addressing a gap in the comparative literature. The results of this study will provide insights into the efficacy of these exercise regimes on different fitness parameters, contributing to the broader understanding of physical training methodologies.

MATERIAL AND METHODS

The study employed a quasi-experimental design and was conducted at the Fitness Pro Clinic in Model Town, Lahore, Pakistan, over a six-month period from July 2021 to December 2021. Ethical approval was obtained from Riphah International University, Lahore, Pakistan, ensuring adherence to the ethical standards set by the Declaration of Helsinki. The sample size, calculated using an online sample size calculator, comprised 32 participants, randomly divided into two groups of 16 each through the random number table method. Participants were interviewed about their dietary habits and asked to maintain their usual dietary intake throughout the study.

Inclusion criteria for the study required participants to be aged between 20 and 45 years and of any gender. Exclusion criteria included those on any regular fitness program, with a history of fractures (spine, rib) or injuries, past abdominal surgeries, any systemic illness, spinal or disc pathologies, back pain, arthritis, a BMI greater than 29.9, balance issues (e.g., Parkinson's, vestibular disorders), or cognitive impairments. Participants were selected using a non-probability convenience sampling technique.

Upon fulfilling the inclusion and exclusion criteria, 32 potential participants were considered and consented to participate through a written form. Randomization was achieved by having each participant draw either number one or number two from a box, allocating them to either Group A or Group B. At the initial visit, researchers collected demographic data, medical history, and baseline fitness assessments.

Group A participants underwent 60-minute sessions of core exercises three times a week for eight weeks, performing 10 sets of traditional core exercises with five repetitions each. Group B participants engaged in Pilates exercises under similar conditions and duration. Both groups performed the same warm-up and cool-down exercises, each lasting five minutes. The core exercises focused on static or dynamic contractions in various body positions, while the Pilates exercises emphasized control, precision, and flow.

Data collection tools included measurements of weight in kilograms, height in centimeters, flexibility tests (sit and reach test), and endurance tests (trunk flexion test). Weight and fitness parameters were reassessed after eight weeks of exercise sessions. Data were analyzed using SPSS for Windows software, version 25, with statistical significance set at $p = 0.05$. The paired sample t-test was employed to compare pre- and post-intervention outcomes within each group.

Journal of Health and Rehabilitation Research 2791-156X JHRR

RESULTS

The study assessed the impact of core and Pilates exercises on weight reduction, flexibility, and endurance. The sample comprised 32 participants, with 16 allocated to each group. Table 1 presents the demographic characteristics of the participants.

Table 1: Age, Height, Weight, and BMI of the Participants

Group	Parameter	Minimum	Maximum	Mean (± SD)
Core Group	Age (years)	26.00	37.00	30.73 (± 3.61)
	Height (cm)	152.4	185.9	170.05 (± 10.41)
	Weight (kg)	56.00	88.00	71.51 (± 9.36)
	BMI	21.0	28.8	24.70 (± 2.09)
Pilates Group	Age (years)	22.00	39.00	29.53 (± 5.66)
	Height (cm)	152.4	192.0	171.30 (± 12.39)
	Weight (kg)	53.00	100.00	71.06 (± 12.79)
	BMI	21.8	28.8	24.07 (± 2.09)

Table 2: Gender Distribution of the Participants

Group	Gender	N	Percentage (%)
Core Group	Male	5	33.3
	Female	10	66.7
	Total	15	100.0
Pilates Group	Male	7	46.7
	Female	8	53.3
	Total	15	100.0

Table 3: Intra-group Comparison of BMI, Sit and Reach Test (SRT), and Trunk Flexion Test (TFT)

Group	Parameter	Mean Pre	Mean Post	Std. Deviation Pre	Std. Deviation Post	Correlation	Sig. (p-value)
Core	BMI	24.70	23.95	2.10	1.94	0.982	0.000
	SRT (cm)	2.27	4.15	1.74	2.11	0.982	0.000
	TFT (sec)	51.13	105.80	38.12	48.30	0.734	0.002
Pilates	BMI	24.07	23.43	2.10	1.97	0.985	0.000
	SRT (cm)	2.40	4.83	1.65	1.47	0.786	0.001
	TFT (sec)	67.13	111.13	47.14	49.47	0.923	0.000

Table 4: Paired Samples Test

Group	Parameter	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t-value	df	Sig. (2-tailed)
Core	BMI Pre - Post	0.746	0.4051	0.1046	0.52 to 0.97	7.139	14	0.000
	SRT Pre - Post	-1.880	1.0462	0.2701	-2.45 to -1.30	-6.960	14	0.000
	TFT Pre - Post	-54.666	32.8865	8.4913	-72.878 to -36.45	-6.430	14	0.000
Pilates	BMI Pre - Post	0.6467	0.3662	0.0945	0.44 to 0.84	6.839	14	0.000
	SRT Pre - Post	-2.4333	1.0328	0.2667	-3.00 to -1.86	-9.120	14	0.000
	TFT Pre - Post	-44.000	19.0975	4.9310	-54.575 to -33.424	-8.920	14	0.000

Journal of Health and Rehabilitation Research 2791-156X JHRR

Table 5: Weight Pre and Post Treatment Comparison Within Groups

Group	Parameter	Mean Pre	Mean Post	Std. Deviation Pre	Std. Deviation Post	Correlation	Sig. (p-value)
Core	Weight (kg)	71.51	69.31	9.37	8.90	0.993	0.000
Pilates	Weight (kg)	71.07	69.19	12.79	12.50	0.997	0.000

Table 6: Pre and Post Treatment Comparison Between Groups

Parameter	Group	Mean Pre	Std. Deviation Pre	Mean Post	Std. Deviation Post	P-Value
Weight (kg)	Core	71.51	9.37	69.31	8.90	0.977
	Pilates	71.07	12.79	69.19	12.50	
BMI	Core	24.70	2.10	23.95	1.94	0.466
	Pilates	24.07	2.10	23.43	1.97	
SRT (cm)	Core	2.27	1.74	4.15	2.11	0.311
	Pilates	2.40	1.65	4.83	1.47	
TFT (sec)	Core	51.13	38.12	105.80	48.30	0.767
	Pilates	67.13	47.14	111.13	49.47	

The results revealed statistically significant improvements within both groups for BMI, SRT, and TFT ($p < 0.05$). Weight reduction was significant in both groups, with the core exercise group showing a mean weight change of 2.21 kg and the Pilates group showing a mean change of 1.87 kg. Endurance improvements, measured by the TFT, were more pronounced in the core exercise group, while flexibility, measured by the SRT, showed greater improvement in the Pilates group.

In summary, the study demonstrated that both core and Pilates exercises significantly improved weight, flexibility, and endurance. However, core exercises were slightly more effective in weight reduction and endurance enhancement, while Pilates exercises were superior in improving flexibility. These findings suggest that a combination of both exercise regimes might be beneficial for individuals seeking comprehensive fitness improvements.

DISCUSSION

The study aimed to evaluate the comparative effects of Pilates and core exercises on weight reduction, flexibility, and endurance in adults. The findings indicated significant improvements in all three parameters for both exercise groups, with core exercises showing slightly better results in weight reduction and endurance, while Pilates excelled in enhancing flexibility. These results align with previous studies, which have documented the beneficial effects of both exercise regimes on various fitness measures (1, 2).

The core exercises group exhibited a mean weight reduction of 2.21 kg, which was statistically significant. This outcome is consistent with other research indicating that traditional core exercises effectively promote weight loss by targeting major muscle groups and increasing overall metabolic rate (1). In terms of endurance, the core exercises group also demonstrated substantial improvements, corroborating findings from previous studies that emphasize the role of core stabilization exercises in enhancing muscle endurance and performance (15).

Pilates exercises showed a mean weight reduction of 1.87 kg, which, although slightly less than that of the core exercises group, still represents a significant change. The superior performance of Pilates in improving flexibility aligns with existing literature, which highlights the comprehensive benefits of Pilates in increasing range of motion and muscular flexibility (9). This can be attributed to the emphasis on controlled, precise movements and stretching integral to Pilates (6).

The study's strengths included a well-defined sample size, randomization, and a structured exercise regimen, ensuring the reliability of the findings. However, there were limitations that need to be addressed. The sample size was relatively small, which may limit the generalizability of the results. The study duration was also short, and longer-term effects of the exercises were not assessed. Furthermore, the study relied on self-reported dietary habits, which could introduce bias and affect the outcomes (16-18).

The results suggest that both Pilates and core exercises are effective in improving weight, flexibility, and endurance, each with specific strengths. Core exercises were particularly effective for weight reduction and endurance, likely due to their focus on major muscle groups and dynamic movements (19). Pilates, on the other hand, excelled in flexibility enhancement, possibly due to its emphasis on controlled stretching and muscle elongation (9).

Future studies should consider larger sample sizes and longer intervention periods to assess the sustainability of the benefits observed. Additionally, objective measures of dietary intake and more diverse populations could provide a more comprehensive understanding of the impacts of these exercises. Combining both exercise regimes could potentially offer a holistic approach to fitness, leveraging the strengths of each to provide comprehensive health benefits (20).

Journal of Health and Rehabilitation Research 2791-156X JHRR

Overall, the study contributes valuable insights into the comparative effects of Pilates and core exercises, underscoring the importance of selecting appropriate exercise regimens based on individual fitness goals. The findings support the integration of both types of exercises in fitness programs to maximize benefits in weight management, flexibility, and endurance.

CONCLUSION

The study concluded that both Pilates and core exercises significantly improve weight, flexibility, and endurance in adults, with core exercises being slightly more effective for weight reduction and endurance, while Pilates excelled in enhancing flexibility. These findings suggest that incorporating both exercise types into fitness programs can provide comprehensive benefits, promoting overall health and well-being. In human healthcare, such a combined approach can be particularly beneficial for individuals seeking to improve multiple aspects of physical fitness, ultimately contributing to better weight management, enhanced mobility, and increased muscular endurance.

REFERENCES

1. Adliah F, Puspita A, Sutono E. Comparison Between Core Exercise Program With Pilates Exercise Program In Weight Changes In Overweight Students. Enferm Clin. 2020;30:300-3.
2. Suna G, Isildak K. Investigation Of The Effect Of 8-Week Reformer Pilates Exercise On Flexibility, Heart Rate And Glucose Levels In Sedentary Women. Asian J Educ Train. 2020;6(2):226-30.
3. Rayes ABR, de Lira CAB, Viana RB, Benedito-Silva AA, Vancini RL, Mascarin N, et al. The Effects Of Pilates Vs. Aerobic Training On Cardiorespiratory Fitness, Isokinetic Muscular Strength, Body Composition, And Functional Tasks Outcomes For Individuals Who Are Overweight/Obese: A Clinical Trial. PeerJ. 2019;7.
4. Fernández-Rodríguez R, Álvarez-Bueno C, Ferri-Morales A, Torres-Costoso AI, Cavero-Redondo I, Martínez-Vizcaíno V. Pilates Method Improves Cardiorespiratory Fitness: A Systematic Review And Meta-Analysis. J Clin Med. 2019;8(11):1761.
5. de Souza ROB, de Faria Marcon L, de Arruda ASF, Junior FLP, de Melo RC. Effects Of Mat Pilates On Physical Functional Performance Of Older Adults: A Meta-Analysis Of Randomized Controlled Trials. Am J Phys Med Rehabil. 2018;97(6):414-25.
6. Tozim BM, Navega MT. Effect Of Pilates Method On Inspiratory And Expiratory Muscle Strength In The Elderly. Rev Bras Cineantropom Desempenho Hum. 2018;20:1-9.
7. Alvarenga GM, Charkovski SA, Santos LK, Silva MA, Tomaz GO, Gamba HR. The Influence Of Inspiratory Muscle Training Combined With The Pilates Method On Lung Function In Elderly Women: A Randomized Controlled Trial. Clinics. 2018;73.
8. Sarmento LA, Pinto JS, da Silva AP, Cabral CM, Chiavegato LD. Effect Of Conventional Physical Therapy And Pilates In Functionality, Respiratory Muscle Strength And Ability To Exercise In Hospitalized Chronic Renal Patients: A Randomized Controlled Trial. Clin Rehabil. 2017;31(4):508-20.
9. Tinoco-Fernández M, Jiménez-Martín M, Sánchez-Caravaca MA, Fernández-Pérez AM, Ramírez-Rodrigo J, Villaverde-Gutiérrez C. The Pilates Method And Cardiorespiratory Adaptation To Training. Res Sports Med. 2016;24(3):266-71.
10. Granacher U, Gollhofer A, Hortobágyi T, Kressig RW, Muehlbauer T. The Importance Of Trunk Muscle Strength For Balance, Functional Performance, And Fall Prevention In Seniors: A Systematic Review. Sports Med. 2013;43(7):627-41.
11. Cruz-Ferreira A, Fernandes J, Kuo Y-L, Bernardo LM, Fernandes O, Laranjo L, et al. Does Pilates-Based Exercise Improve Postural Alignment In Adult Women? Women Health. 2013;53(6):597-611.
12. Martuscello JM, Nuzzo JL, Ashley CD, Campbell BI, Orriola JJ, Mayer JM. Systematic Review Of Core Muscle Activity During Physical Fitness Exercises. J Strength Cond Res. 2013;27(6):1684-98.
13. Schilling JF, Murphy JC, Bonney JR, Thich JL. Effect Of Core Strength And Endurance Training On Performance In College Students: Randomized Pilot Study. J Bodyw Mov Ther. 2013;17(3):278-90.
14. Wells C, Kolt GS, Bialocerkowski A. Defining Pilates Exercise: A Systematic Review. Complement Ther Med. 2012;20(4):253-62.
15. Oh K-B, Baek J-Y. Effects Of Core-Stability Training On Balance And Postural Control In The Stroke Patients. Korean Public Health Res. 2012;38:81-8.
16. Seo B-D, Yun Y-D, Kim H-R, Lee S-H. Effect Of 12-Week Swiss Ball Exercise Program On Physical Fitness And Balance Ability Of Elderly Women. J Phys Ther Sci. 2012;24(1):11-5.
17. Barry VW, Baruth M, Beets MW, Durstine JL, Liu J, Blair SN. Fitness Vs. Fatness On All-Cause Mortality: A Meta-Analysis. Prog Cardiovasc Dis. 2014;56(4):382-90.

Journal of Health and Rehabilitation Research 2791-156X JHRR

18. Behm DG, Drinkwater EJ, Willardson JM, Cowley PM. Canadian Society For Exercise Physiology Position Stand: The Use Of Instability To Train The Core In Athletic And Nonathletic Conditioning. Appl Physiol Nutr Metab. 2010;35(1):109-12.
19. Faries MD, Greenwood M. Core Training: Stabilizing The Confusion. Strength Cond J. 2007;29(2):10.
20. Akuthota V, Nadler SF. Core Strengthening. Arch Phys Med Rehabil. 2004;85:86-92.