

Evaluation of an Evidence-Based Physiotherapy Approach for Delaying Symptoms of Menopause During Perimenopause

Tabassum¹, Sharda Sharma², Anjali Chaudhary³

¹Ph.D Scholar MPT Obs & Gynae Rehabilitation, Faculty of Physiotherapy, SMIH & SPAHS, SGRRU, Dehradun, Email: tabassum@sgrmc.com & drtabassumazm22@gmail.com, ORCID ID:- <https://orcid.org/0009-0008-7592-9478>

²Associate professor, Ph. D Physiotherapy Department of physiotherapy, School of Allied and health care, Shri Guru Ram Rai University, Patel Nagar Dehradun, Email: shardasharna.physio@gmail.com & shardasharma@sgrmc.com, ORCID ID: <https://orcid.org/0009-0006-6538-7842>

³Professor, Obstetrics & Gynaecology Department, Institute of Medical & Health Sciences, Shri Guru Ram Rai University, Dehradun, Email: anjalichaudhary@sgrmc.com, ORCID -ID <https://orcid.org/0009-0000-1588-7247>

***Author for correspondence:**

Tabassum

Ph.D Scholar MPT Obs & Gynae Rehabilitation, Faculty of Physiotherapy, SMIH & SPAHS, SGRRU, Dehradun, Email: tabassum@sgrmc.com & drtabassumazm22@gmail.com, ORCID ID:- <https://orcid.org/0009-0008-7592-9478>

ABSTRACT

Introduction: Perimenopause is a transitional stage in a woman's life that is often associated with hormonal changes and various physical symptoms such as pelvic floor weakness, low back pain, pelvic pain, and urinary incontinence. These changes can affect daily functioning and overall well-being. Early management during this phase is essential to delay or reduce the severity of menopausal symptoms. Pelvic floor and core muscle training are commonly used conservative approaches to improve muscular support and pelvic stability, while transcutaneous electrical nerve stimulation (TENS) may help reduce pain.

Need of the study: The need of this study was to evaluate an evidence-based physiotherapy approach for delaying symptoms of menopause during perimenopause.

Methodology: This was an experimental, total 51 subjects (Perimenopausal women) was included in the study by Purposive Sampling method, G* Power used to calculate the sample size. Purposive Sampling Technique was used for interventional Study.

Result: Since the p-value was less than 0.05, significant improvements were observed in the Menopause Rating Scale (MRS), Modified Oxford Grading Scale, Visual Analog Scale (VAS) for back pain & pelvic pain, International Consultation on Incontinence Questionnaire–Urinary Incontinence (ICIQ–UI), indicating that the intervention was effective. However, no statistically significant improvement was found in the WHOQOL–BREF.

Conclusion: the intervention was effective in improving menopausal symptoms, pelvic floor muscle strength, pain levels, and urinary incontinence, as reflected by significant changes in the Menopause Rating Scale (MRS), Modified Oxford Grading Scale, Visual Analog Scale (VAS), and International Consultation on Incontinence Questionnaire–Urinary Incontinence (ICIQ–UI). Although the intervention improved physical and functional outcomes, meaningful gains in overall quality of life may require longer-term or additional psychosocial support to address psychological and social factors.

Keywords: Perimenopause, Pelvic Floor Muscle Training, Core Muscle Strengthening, Transcutaneous Electrical Nerve Stimulation (TENS), Urinary Incontinence, Quality of Life.

How to cite this article: Tabassum, Sharma S, Chaudhary A. Evaluation of an Evidence-Based Physiotherapy Approach for Delaying Symptoms of Menopause During Perimenopause. Int J Drug Deliv Technol. 2026;16(34s):791-804. DOI: 10.25258/ijddt.16.34s.99

INTRODUCTION

Menopause (from Greek meno-month, pasis-stop) is defined as a definite stop of the menstruation. This physiological condition takes up to 40% of a woman’s life, assuming an average life expectancy of about 80 years in developed nations. It plays a significant role in shaping women’s overall health due to the substantial physical and hormonal changes it brings. Menopause is linked to approximately 57% - 67% of all the sexual dysfunctions that a woman may suffer during her life cases experienced by women, often leading to alterations in desire, arousal, lubrication, orgasm, satisfaction, and the occurrence of pain during intercourse [Rochera M.B., et al., 2017].

Currently, the term “menopause” is often considered less precise and has largely been replaced by “perimenopause”. This broader concept includes three phases: premenopause: regular menstrual cycles with ≥12 menstruations during the past 12 months, menopausal transition:several menstruations but <12 during the past 12 months, and early postmenopause: no menstruations during the past 12 months [Li RX et al., 2016].

According to guidelines developed by the World Health Organization (WHO, 1981–1999) through its Scientific Group on Research in the “Menopause”, natural menopause is defined as the permanent cessation of menstruation caused by the decline of ovarian follicular function. It is considered to have occurred after a continuous period of 12 months without menstruation, provided there are no other identifiable medical or physiological reasons. As seen in [Figure No-1.1], menopause corresponds to the final menstrual period (FMP) [Ambikairajah,A et al., 2022].

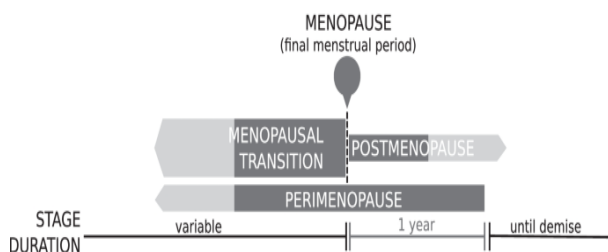


Figure No -1.1: Stages of Menopause

The Study of Women's Health Across the Nation's (SWAN's) mission, launched in 1996. It was to define the Menopausal Transition (MT), including its biological and psychosocial causes and outcomes, using a racially and ethnically diverse group of participants (Black, Chinese, Hispanic, Japanese, and White women).

SWAN categorized the following stages: premenopause (no noticeable changes in menstrual patterns); early perimenopause (variations in cycle length or intervals between periods); late perimenopause (absence of menstruation for 3–11 months); natural postmenopause (no menstruation for 12 months unrelated to hysterectomy); surgical menopause (removal of both ovaries, with or without hysterectomy); hysterectomy with one or both ovaries preserved; and hormone use prior to the final menstrual period (FMP). To separate the effects Menopausal Transition (MT) from those of normal aging, researchers analyzed both factors simultaneously to determine their independent influences. Because hormone use may mask the “Final Menstrual Period”, SWAN also accounted for hormone use when evaluating different stages of the menopausal transition [El Khoudary SR et al., 2019].

According to Whelan et al., even 80% of women suffer from various symptoms including pain in the perimenopausal period ,which is usually defined as the age range of 45-55 Going from a premenopausal period to a postmenopausal one is a result of slower production of female hormones by ovaries. This process is gradual and spread over time, and a natural part of aging. Numerous symptoms associated with the perimenopausal period have been identified. Physical ones can include spine and joint pain, hot flashes night sweats, chronic tiredness; psychological symptoms can include irritation and anxiety, mood swings, depression and sleep disorders [Kozinoga M et al., 2015].

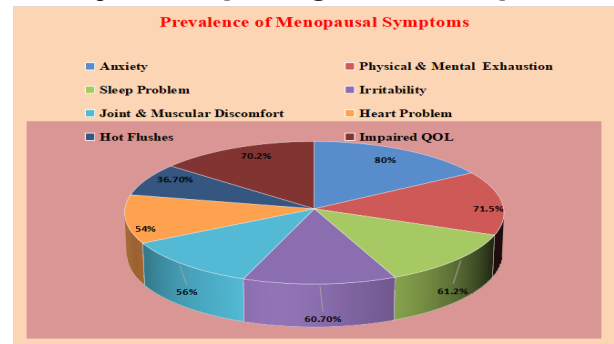


Figure No-1.2: Reproductive stages spanning the menopausal transition

In 1948, Kegel exercises were first described by Arnold Kegel for pelvic floor muscle strengthening. Kegel exercises aim to strengthen the pelvic floor muscles.. There are lots of treatments to manage the pelvic floor weakness, including drugs and surgical procedures. Pelvic Floor Muscle strengthening exercises are among the most popular therapies because people can perform themselves [Huang YC et al., 2023].

Physical activity plays a significant role in alleviating menopausal symptoms among middle-aged female

medical staff undergoing perimenopause. Regular engagement in exercise has been shown to markedly decrease the severity of common symptoms. Exercise influences menopausal symptoms and lifestyle behaviors. The findings indicated that a 12-week intervention combining nutrition education and exercise supervision effectively reduced perimenopausal symptoms [Zhang J et al., 2014 & Xi S et al., 2017].

A study conducted in 2018 reported that consistent pelvic floor muscle training can enhance quality of life, particularly in individuals experiencing urinary incontinence, some symptoms of uterine prolapse include, heaviness or pressure in the pelvis, pelvic pain, abdominal pain, back pain, painful sex, frequent bladder infections, unusual excessive discharge, constipation, urinary leaks, frequency, and urgency [Eun-Jeong Cho et al., 2022].

Most importantly, a good functioning pelvic floor ensures we don't let out pee or poop unexpectedly. Dr. Kegel's study showed that the exercises could help to prevent cystocele, rectocele, and urinary stress incontinence [KEGEL AH, 1948].

Core Stability (CS) was introduced by Hodges and Richardson in 1990s during his study of trunk muscles in patients with chronic low back pain. Core strengthening has become a major trend in rehabilitation [Narayanan N, et al., 2021].

There are many studies that have proved core muscle recruitment during swiss ball abdominal exercises. Hence, we can refer as swiss ball as an beneficial object for the subjects. The elastic band manufacturers (Thera band) provide a range of such products of various resistance which can be distinguished by colours. Each colour signifying a level of resistance which would be offered to the patient by the band. The use of thera-band exercises have been effective method of providing resistance and improving muscle strength [Vishakha Panchal et al., 2019].

The Pain Gate control theory was introduced by Melzack and Wall in 1965, the role of psychological factors in the maintenance of pain symptoms [Johnson et al., 2021]. Studies show that the use of TENS may lead to modest improvements in pain levels in postmenopausal women suffering from chronic pelvic pain [Babazadeh-Zavieh SS et al., 2023].

AIMS & OBJECTIVES OF THE STUDY

Aim of the Study:

The aim of study was to evaluate an evidence-based physiotherapy approach for delaying symptoms of menopause during perimenopause.

Objectives of the Study:

- 1) To evaluate the efficacy of Pelvic Floor & Core Muscles Training to increase Pelvic Floor & Core Muscles Strength in women with Perimenopausal symptoms.
- 2) To evaluate the efficacy of Pelvic Floor & Core Muscles Training along with Transcutaneous Electrical Nerve Stimulation to alleviate back pain & pelvic pain in women with Perimenopausal symptoms.
- 3) To determine the efficacy of Pelvic Floor & Core Muscles Training along with Transcutaneous Electrical Nerve Stimulation to prevent urinary incontinence & prolapse and to improve the quality of life & delayed symptoms of menopause in women with Perimenopausal symptoms.

MATERIALS and METHODS

Ethical consideration

Ethical approval was obtained from the Institutional Ethical Committee (IEC) to the commencement of the study (SGRR/IEC/03/24). It has also registered in Clinical Trial Registry of India registration (CTRI/2025/06/089873) and Copyright Office Government of India (Registration No. LD-27299/2015) was done and lastly, written informed consent was obtained from all participants. The study was conducted in Shri Mahant Indires Hospital, Patel Nagar, Dehradun NOC of Medical Superintendent of Hospital .

Research Design and settings

Total 51 subjects (Perimenopausal women) was included in the study by Purposive Sampling method, G* Power used to calculate the sample size. Purposive Sampling Technique was used for intervention experimental Study. Study conducted in the Out Patient Door (OPD) Department of Physiotherapy and simultaneously Subjects referred from Obs & Gynaecology Units at the Shri Mahant Indires Hospital (SMIH) Patel Nagar, Dehradun.

Study Duration: 45-60 min/day, 3 days/week on alternate days for 24 weeks (6 month).

Eligibility Criteria: Inclusion Criteria: Females with clear perimenopausal diagnosis. Perimenopausal women according MRS, Perimenopausal women should meet one of the following criteria. History of amenorrhea for the last 3-11 months from the consent day (visit 1). Perineal Laxity. Pelvic Pain & Back pain , Urinary Incontinence [Hao S, et al., 2022, Sañudo B, et al., 2017, & Sayali P Banole, et al., 2022]

Exclusion criteria:Regular menstruation.Women with severe menorrhagia.Women on Hormone Replacement Therapy (HRT)Non-hormonal climacteric medicine within past 2 weeks before the study.Hysterectomy & oophorectomyWomen with any organic lesions of reproductive tract like tuberculosis, carcinoma and congenital deformities or any other pelvic pathology.Women with known case of adrenal hyperplasia, androgen secreting neoplasm, Cushing’s syndrome, cardiac disease.

Procedure

The study began after approval from the ethical committee. Peri-menopausal women were approached. The subjects were given information about study .Subjects were selected according to inclusion and exclusion criteria. The data collected was systematically entered into a Microsoft Office Excel sheet and was analysed along with charts and tables accordingly.Outcome Measures: [Table No-2.5.1]

OUTCOME MEASURES	S. No.	VARIABLES	MEASUREMENTS
Primary Outcome measures	1.	Menopause Rating Sale	For assess Symptoms Of Menopauase
	2.	Modified Oxford Grading Scale	For assess The PFM Strength
	3.	Visual Analogue Scale(VAS)	For evaluate the severity of back & Pelvic Pain
Secondary Outcome measure	4.	The International Consultation on Incontinence Questionnaire of Urinary Incontinence Short Form (ICIQ-UI SF)	For assess the urinary Incontinence
	5.	World Health Organization Quality Of Life Assessments (WHOQOL)	For measuring the quality of life

Table No -2.5.1: Outcome Measurements

MATERIALS

Data Recording Sheet

Data were collected from all participating women and documented systematically in a data recording sheet.

Standard Weight and Height Scale

A standardized weighing scale and stadiometer were used to measure the body weight and height of all participants.

Cotton and Disinfectant Solution

Cotton and appropriate disinfectant solutions were used to maintain hygiene during procedures.

Pillows, Cushions, and Sheets

Supportive items such as pillows, cushions, and sheets were utilized to ensure comfort during assessment and intervention.

Swiss Ball and TheraBand Exercises

Plinth, Mat, Swiss balls and TheraBands were used to perform and facilitate the prescribed exercise interventions.

Physiotherapy Intervention:

Total 51 subjects (Perimenopausal women) was included in the study by Purposive sampling method [Table No-2.5.2]

NO. OF SUBJECTS	Physiotherapy Intervention
51	Pelvic Floor Muscle Training Core Muscles Training: By using SWISS BALL & THERA BAND Along with Trans- cutaneous Electrical Nerve Stimulation (TENS) .

Table No -2.5.2: Physiotherapy Intervention for Experimental study

Detailed Exercise Protocol for Pelvic Floor and Core Muscle: Training By using SWISS BALL & THERA BAND along with Conventional therapy: Trans-cutaneous Electrical Nerve Stimulation (TENS), detailed description [Table No-2.5.3] with exercises

performance. Well explained frequency and duration, cool down & warm up period in [Table No-2.5.4] Intensity were progressively increased [Table No-2.5.5].

Group-A Detailed Exercise Protocol for Pelvic Floor and Core Muscle Training By using SWISS BALL & THERA BAND along with Conventional therapy: Trans- cutaneous Electrical Nerve Stimulation (TENS) and Paced Breathing).

Section	No.	Exercise Name	Starting Position	Procedure / Steps	Focus / Target Muscles
Pelvic Floor Muscle Training (PFMT)	1	Squeeze and Release (Quick Flicks)	Supine or seated, knees bent	Contract pelvic floor muscles (as if stopping urine flow), hold for 1–2 sec, then relax for 2 sec. Continue rhythmically.	Pelvic floor (fast-twitch fibers)
	2	Squat	Standing, feet shoulder-width apart	Lower hips back and down while maintaining neutral spine; engage pelvic floor and core throughout. Return to standing.	Glutes, quadriceps, pelvic floor
	3	Bridge (Shoulder Bridge)	Supine, knees bent, feet flat	Lift hips to form a straight line (shoulders–hips–knees). Engage glutes and pelvic floor. Lower slowly.	Glutes, hamstrings, pelvic floor
	4	Bird Dog	Quadruped position	Extend opposite arm and leg while engaging core and pelvic floor. Hold 3–5 sec, then switch.	Back extensors, core stabilizers, pelvic floor
	5	Transverse Abdominal March	Supine, legs tabletop position	Engage core and pelvic floor; lower one foot to floor while maintaining neutral spine. Alternate legs.	Transverse abdominis, pelvic floor
Core Muscle Training with Swiss Ball	1	Back Extension on Swiss Ball	Prone over Swiss ball, feet anchored	Extend trunk upward by activating back extensors; hold briefly, return slowly.	Erector spinae, glutes, core
	2	Plank on Swiss Ball	Forearms on ball, feet extended	Engage core to hold straight plank position; avoid sagging hips.	Core stabilizers, shoulders

Group-A Detailed Exercise Protocol for Pelvic Floor and Core Muscle Training By using SWISS BALL & THERA BAND along with Conventional therapy: Trans- cutaneous Electrical Nerve Stimulation (TENS) and Paced Breathing).					
Section	No.	Exercise Name	Starting Position	Procedure / Steps	Focus / Target Muscles
			behind		
	3	Bridging on Swiss Ball	Supine, feet on ball, arms by side	Lift hips to align shoulders–hips–knees; keep ball stable. Lower slowly.	Glutes, hamstrings, core
	4	Spine Rotation on Swiss Ball	Seated upright on ball	Rotate torso slowly side to side, maintaining upright posture.	Obliques, spinal rotators
Core Muscle Training using Thera Band / Resistance Band	1	Trunk Curl-Up	Supine, knees bent, band anchored behind head	Pull band gently while curling trunk upward, engaging abdominals.	Rectus abdominis, obliques
	2	Trunk Twist	Standing or seated, band anchored at shoulder height	Hold band with both hands; rotate trunk away from anchor point against resistance.	Obliques, spinal rotators
	3	Back Extension	Standing, band anchored low	Hold band with both hands, extend spine backward slightly, controlling motion.	Erector spinae, core
	4	Side Bend	Standing, band anchored at side	Hold handle with one hand, resist pull as you bend sideways; return to center.	Obliques, lateral core

Table No. 2.5.3: Detailed Exercise Protocol for Pelvic Floor and Core Muscle Training

Component	Details
Frequency	3 days alternatively per week
Session Duration	45–60 minutes per session
Warm-up (5–10 minutes)	<ul style="list-style-type: none"> • Gentle stretching of major muscle groups • Diaphragmatic breathing exercises • Pelvic tilts and light mobility movements
Cool-down (5 minutes)	<ul style="list-style-type: none"> • Relaxation and deep breathing exercises • Gentle spinal and hip mobility movements

Table No.- 2.5.4 : Frequency,Duration, Warm up & Cool Down Period

Training Phase	Duration (Weeks)	Sets	Repetitions	Rest Interval
Phase I	1st – 4th week	1 set	15 repetitions	2 minutes rest after each set
Phase II	5th – 8th week	2 sets	15 repetitions	2 minutes rest after each set
Phase III	9th – 12th week	2 sets	20 repetitions	2 minutes rest after each set
Phase IV	13th – 16th week	2 sets	20 repetitions	2 minutes rest after each set
Phase V	17th – 20th week	2 sets	25 repetitions	2 minutes rest after each set
Phase VI	21st – 24th week	2 sets	25 repetitions	2 minutes rest after each set

Table No.- 2.5.5 : Progression of Exercise Intensity

Conventional Therapy : Transcutaneous Electrical Nerve Stimulation (TENS)

Lower Back + Pelvic Pain (Combined)

Position 1: One pair of electrodes was placed on the lower back (L4–S3 area), and another pair was placed on the upper buttocks (for some patients)

Position 2: One pair of electrodes was placed over the sacrum, while the other pair was placed above the pubic bone (front) or on the perineum/inner buttock area (back) (For some patients)

3. RESULT

Total 51 patients were included in the study by simple random sampling method in Experimental group. Every 0 week, 8 week, 12 week and 24 were recorded.I saw

the within experimental group effectiveness by using single way repeated measure ANOVA test were used.

STATISTICAL SOFTWARE:

Statistical analysis was carried out physically as well as with statistical software SPSS 23 version and Microsoft word, Excel has been used to generate graphs table etc. Various statistical measures such as mean, standard deviation, repeated measure ANOVA were utilized for all the scores of participants included in the study.Statistical software SPSS 23 version was used for analysis the data.

3.1:To analyze the difference in the MENOPAUSE RATING SCALE (MRS) repeated measure ANOVA test was used[Table No-3.1.1].

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	13.7451± 3.94	133.66	<0.0000 00005	SIGNIFICANT
6 week	10.2352 ± 2.99			
12 week	6.5882±2.22			
24 week	3.2549±1.36			

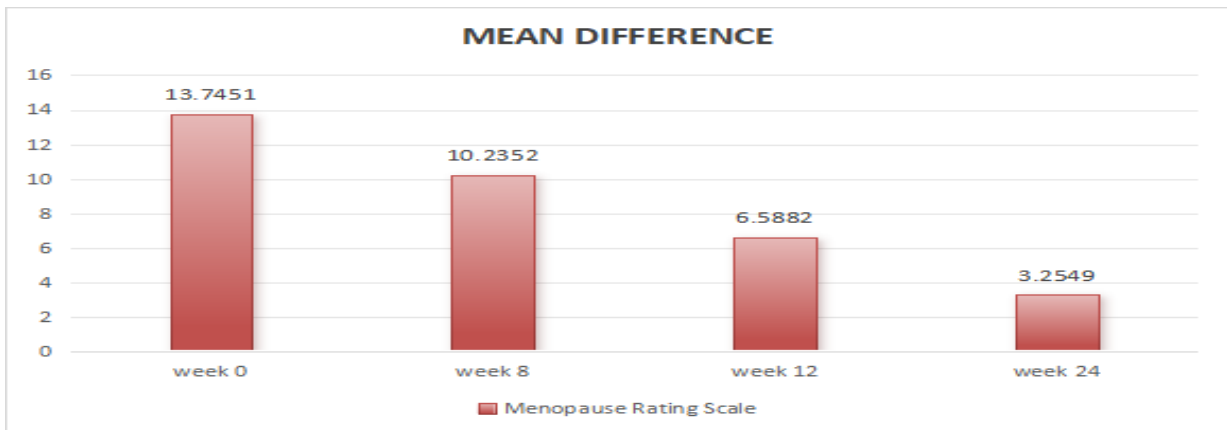
Table No-3.1.1: Comparison within intervention showing Mean ±SD of MENOPAUSE RATING SCALE (MRS) 0 week, 6 week, 12 week and 24 week measurement.

It was found that P value was less than 0.05 which implies statistical improvement in menopausal symptoms score of MENOPAUSE RATING SCALE

(MRS) 0 Week, 6 week, 12 week and 24 week measurement scores [Graph No-3.1.2]. Thus, it says that there is statistical significant difference in

MENOPAUSE RATING SCALE (MRS) participants from 0 Week, 6 week, 12 week and 24 week

measurement. i.e. accepting the alternative hypothesis (H1) and rejecting the null hypothesis(H0).



Graph No -3.1.2 : To Analysis the difference within MENOPAUSE RATING SCALE (MRS) for menopausal symptoms.

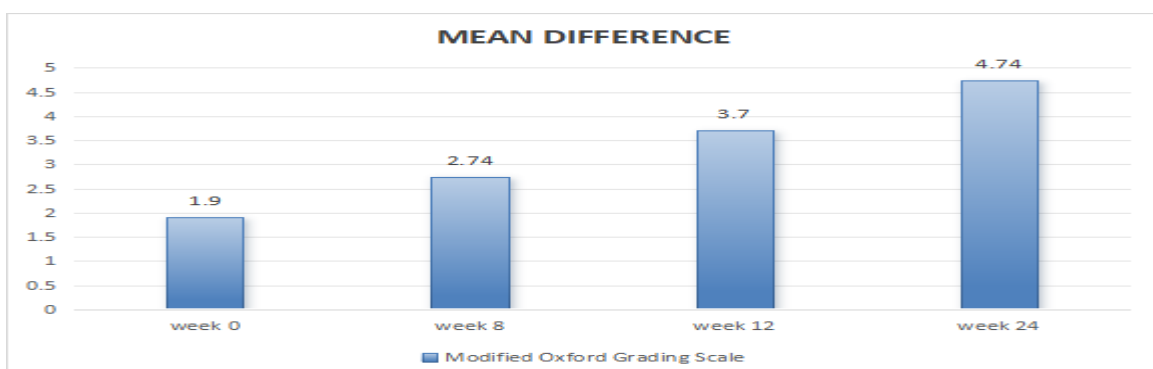
3.2 :To Analysis the difference within MODIFIED OXFORD GRADING SCALE [Table No-3.2.1]

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	1.90± 0.67	2214.09	<0.00001	SIGNIFICANT
6 week	2.74 ± 0.65			
12 week	3.70 ±0.57			
24 week	4.74±0.44			

Table No-3.2.1: Comparison within intervention showing Mean ±SD of MODIFIED OXFORD GRADING SCALE 0 week, 6 week, 12 week and 24 week measurement.

It was found that P value was less than 0.05 which implies statistical improvement in pain score of MODIFIED OXFORD GRADING SCALE 0 Week, 6 week, 12 week and 24 week measurement [Graph No-3.2.2]. Scores. Thus, it says that there is statistical

significant difference in MODIFIED OXFORD GRADING SCALE participants from 0 Week, 6 week, 12 week and 24 week measurement i.e. accepting the alternative hypothesis (H1) and rejecting the null hypothesis(H0).



Graph No-3.2.2: To Analysis the difference within in MODIFIED OXFORD GRADING SCALE

3.3: To analyze the difference within groups repeated measure ANOVA test was used. To Analysis the

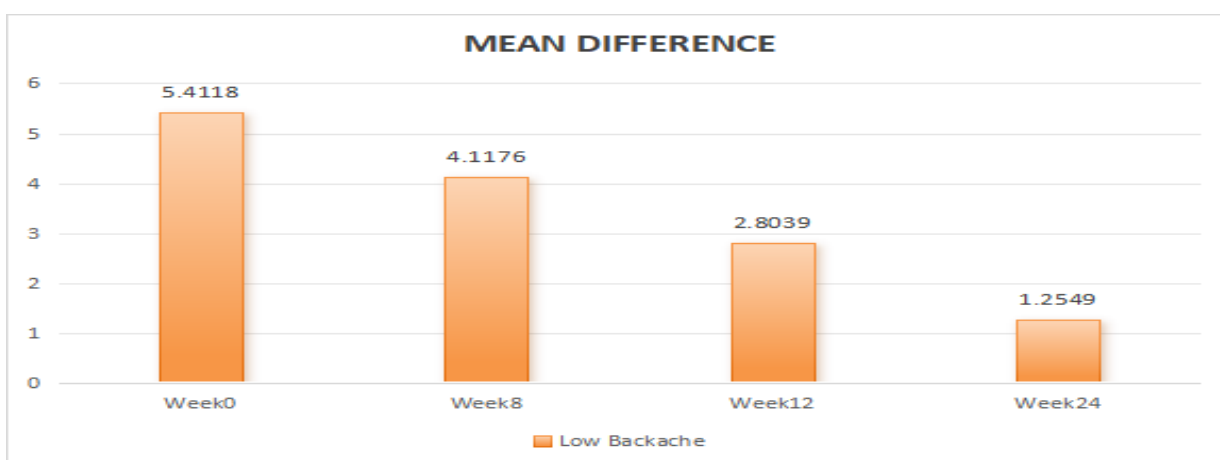
difference within VISUAL ANALOG SCALE (VAS) for Low backache [Table No-3.3.1]

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	5.4118 ±1.87	78.67	<0.05	Significant
6 week	4.1176 ±1.58			
12 week	2.8039 ±1.24			
24 week	1.2549 ±0.7			

Table-3.3.1 : Comparison within intervention showing Mean ±SD of VISUAL ANALOG SCALE (VAS) for Low backache at 0 week, 6 week , 12 week and 24 week Measurement.

It was found that P value was less than 0.05 which implies statistical improvement in VISUAL ANALOG SCALE (VAS) for Low backache 0 Week, 6 week, 12 week and 24 week measurement [Graph No-3.3.2]t.. Thus, it says that there is statistical significant

difference in VISUAL ANALOG SCALE (VAS) for Low backache participants from 0 Week, 6 week, 12 week and 24 week measurement.i.e. accepting the alternative hypothesis (H1) and rejecting the null hypothesis(H0).



Graph No -3.3.2: To Analysis the difference within VISUAL ANALOG SCALE (VAS) for Low Back Pain

To analyze the difference in the VISUAL ANALOG SCALE (VAS) for Pelvic Pain repeated measure ANOVA test was used[Table No-3.3.3].

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	5.4118 ±1.87	78.67	<0.05	Significant
6 week	4.1176 ±1.58			
12 week	2.8039 ±1.24			
24 week	1.2549 ±0.7			

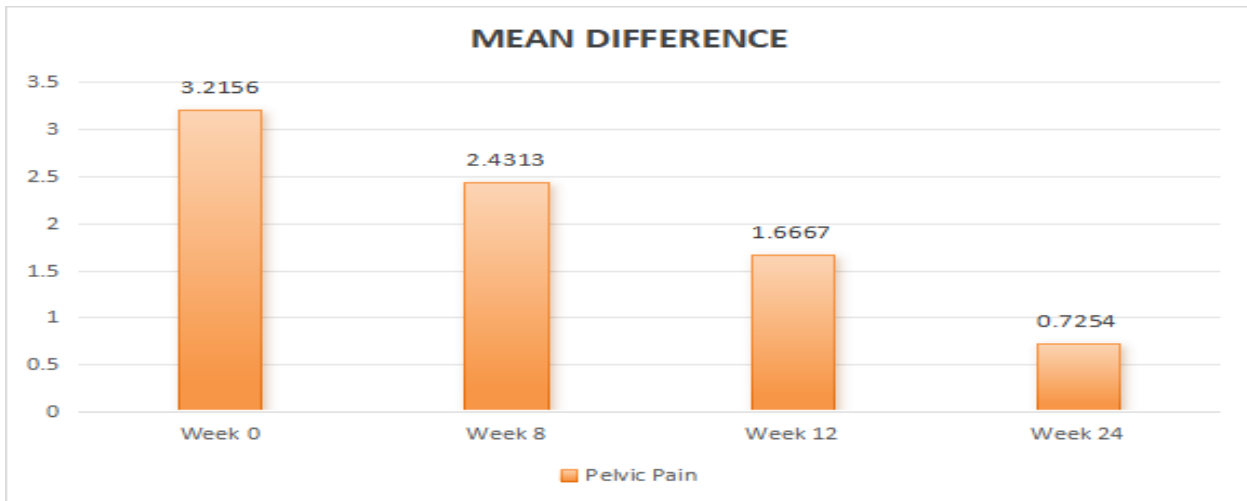
Table No-3.3.3: Comparison within intervention showing Mean ±SD of Pelvic Pain 0 week, 6 week ,12 week and 24 week measurement.

It was found that P value was less than 0.05 which implies statistical improvement in VISUAL ANALOG

SCALE (VAS) for Pelvic Pain 0 Week, 6 week, 12 week and 24 week measurement [Graph No-3.3.4].

Thus, it says that there is statistical significant difference in VISUAL ANALOG SCALE (VAS) for Pelvic Pain participants from 0 Week, 6 week, 12 week

and 24 week measurement i.e. accepting the alternative hypothesis (H1) and rejecting the null hypothesis (H0).



Graph No-3.3.4: To Analysis the difference within VISUAL ANALOG SCALE (VAS) for Pelvic Pain

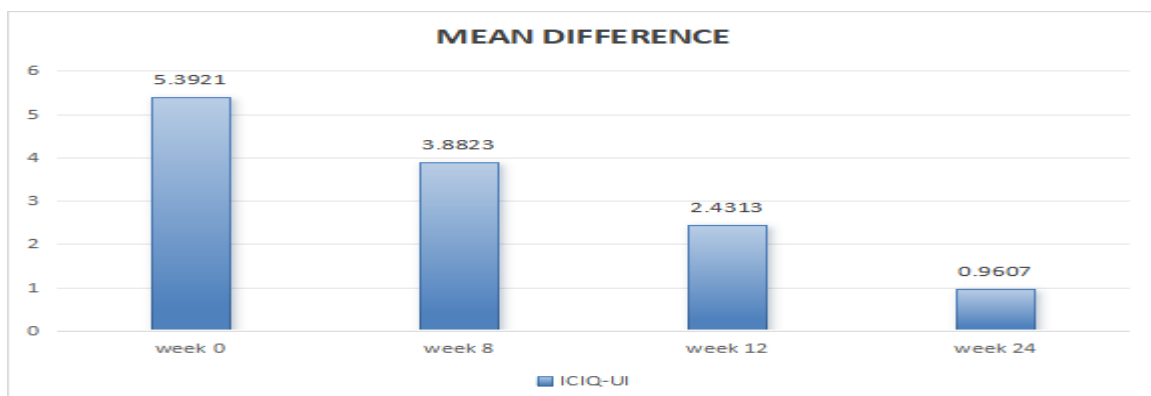
3.4:To Analysis the difference within The International Consultation on Incontinence Questionnaire of Urinary Incontinence [Table No-3.4.1

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	5.3921± 4.02	25.529	<0.00000 000001	SIGNIFICANT
6 week	3.8823 ± 2.86			
12 week	2.4313±1.93			
24 week	0.9607±0.89			

Table-3.4.1: Comparison within intervention showing Mean ±SD of ICIQ-UI 0 week, 6 week, 12 week and 24 week measurement.

It was found that P value was less than 0.05 which implies statistical improvement in pain score of ICIQ-UI 0 Week, 6 week, 12 week and 24 week measurement[Graph No-3.4.2] . Scores.Thus, it says

that there is statistical significant difference in ICIQ-UI participants from 0 Week, 6 week, 12 week and 24 week measurement.i.e. accepting the alternative hypothesis (H1) and rejecting the null hypothesis(H0).



Graph No-3.4.2: To Analysis the difference within International Consultation on Incontinence Questionnaire of Urinary Incontinence

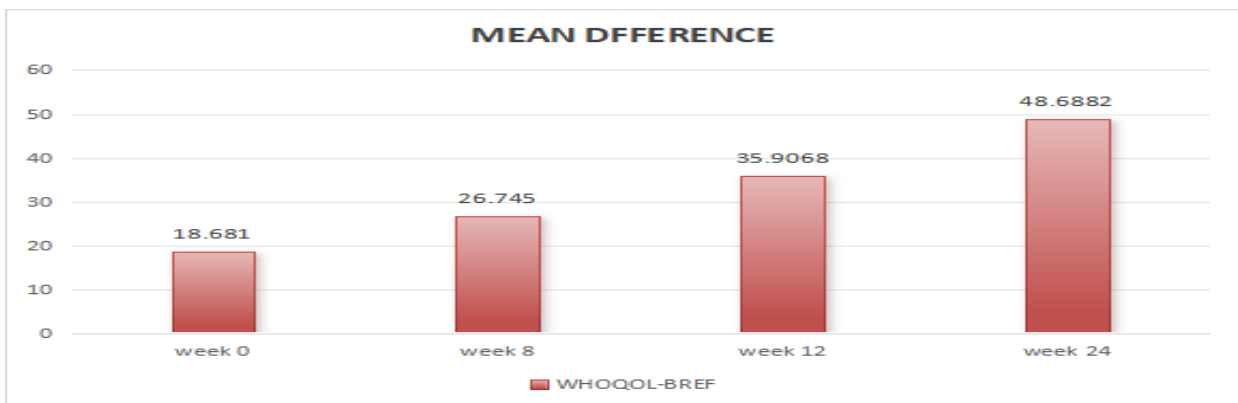
3.5: To Analysis the difference within World Health Organization Quality Of Life Assessments (WHOQOL-BREF) [Table No-3.5.1].

Duration	Mean ±SD	F-value	P- Value	Result
0 Week	18.6813± 2.59	748.001	< 0.05	NOT SIGNIFICANT
6 week	26.7450 ± 3.32			
12 week	35.9068±4.78			
24 week	48.6882±2.12			

Table-3.5.1: Comparison within intervention showing Mean ±SD of WHOQOL 0 week, 6 week, 12 week and 24 week measurement.

It was found that P value was not greater than 0.05 which implies a statistical improvement in pain score of WHOQOL-BREF SCALE 0 Week, 6 week, 12 week and 24 week measurement. Scores. Thus, it says that there is a statistically significant difference in

WHOQOL-BREF SCALE participants from 0 Week, 6 week, 12 week and 24 week measurement. i.e. accepting the alternative hypothesis (H1) and rejecting the a hypothesis (H0).



Graph No-3.5.2: To Analysis the difference within WHOQOL-BREF for Quality of Life

DISCUSSION

The present study evaluated the effectiveness of pelvic floor and core muscle training combined with transcutaneous electrical nerve stimulation in women experiencing perimenopausal symptoms. Multiple standardized outcome measures were used, including the Menopause Rating Scale (MRS), Modified Oxford Grading Scale, Visual Analog Scale (VAS) for low back pain and pelvic pain, International Consultation on Incontinence Questionnaire–Urinary Incontinence (ICIQ-UI), and WHOQOL-BREF. The statistical analysis demonstrated significant improvements in menopausal symptoms, pelvic floor muscle strength, pain levels, and urinary incontinence across the

intervention period, whereas quality of life did not show statistically significant change

Menopausal Symptoms: The present study demonstrated a statistically significant reduction in menopausal symptoms as measured by the **Menopause Rating Scale (MRS)** across 0 week, 6 weeks, 12 weeks, and 24 weeks, as the p value was less than 0.05. This indicates that the intervention contributed to the reduction of perimenopausal symptoms among the participants. Menopausal symptoms are known to affect physical and psychological wellbeing in midlife women. Supporting this finding, Whiteley J., et al., 2013 and **Eun-Jeong Cho et al., 2022** reported that menopausal symptoms significantly influence women’s

daily functioning and wellbeing, and that appropriate management strategies can help reduce symptom severity and improve health outcomes.

Pelvic Floor Muscle Strength: The study demonstrated a statistically significant improvement in pelvic floor muscle strength measured using the Modified Oxford Grading Scale. The present findings are also consistent with the results reported by **Huang YC et al., 2023** and colleagues, who demonstrated that pelvic floor exercise programs significantly improved muscle strength, Kegel exercises help strengthen the pelvic floor muscles. Although pelvic floor weakness can be treated with medications or surgery, pelvic floor muscle exercises are commonly preferred because they are simple and can be performed independently in postmenopausal women. A strong pelvic floor is vital for continence and preventing pelvic organ prolapse. **Kegel (1948)** showed that exercises could prevent cystocele, rectocele, and stress urinary incontinence. Recent studies confirm that regular pelvic floor training improves muscle strength, function, and quality of life, making it an effective, non-invasive intervention **Felicissimo MF et al., 2010**.

Pain Reduction (Low Back Pain and Pelvic Pain): A significant reduction in pain intensity was observed for both low back pain and pelvic pain as measured using the Visual Analog Scale across all follow-up periods. These findings suggest that the intervention protocol contributed to the effective management of musculoskeletal pain in women experiencing perimenopausal symptoms. Low back and pelvic pain are common complaints among women during the perimenopausal stage due to hormonal changes, muscle weakness, and reduced pelvic stability. Strengthening exercises help improve spinal stability, muscle coordination, and postural control, which can reduce mechanical stress on the lumbar spine and pelvic structures. Furthermore, the use of transcutaneous electrical nerve stimulation may have enhanced the pain-relieving effects of the intervention. According to **Babazadeh Zavieh SS et al., 2023** transcutaneous electrical nerve stimulation has been shown to reduce chronic pelvic pain by modulating pain signals through neural pathways and promoting analgesic effects. Additionally, **Narayanan N et al., 2021** and colleagues emphasized that strengthening of core musculature improves postural stability and functional mobility in older adults, which may indirectly reduce musculoskeletal pain and improve overall functional performance.

Urinary Incontinence: A significant improvement was also observed in urinary incontinence symptoms assessed using the ICIQ-UI scale. Pelvic floor muscle

training improves the strength and coordination of the muscles responsible for bladder control, thereby reducing urinary leakage episodes. Exercise-based interventions have been reported to improve awareness and management of urinary incontinence among women. **Suchithra BS et al., 2020** demonstrated that targeted interventions significantly improved women's understanding and management of urinary incontinence, highlighting the importance of both therapeutic exercises and patient education in addressing this condition.

Similarly, **Felicissimo MF et al., 2010** and colleagues reported that supervised pelvic floor muscle training significantly improved stress urinary incontinence compared with unsupervised training programs. Their findings suggest that structured and monitored exercise protocols may produce better therapeutic outcomes.

Quality of Life: A statistically significant improvement was observed in overall quality of life. However, from a psychological perspective, quality of life is a multidimensional construct influenced not only by physical health but also by emotional wellbeing, social relationships, and environmental factors, as described in the WHO-BREF. Although the intervention resulted in significant improvements in specific clinical outcomes such as pain, urinary incontinence, and menopausal discomfort, these improvements may not fully translate into uniform enhancement across all domains of quality of life. This suggests that while physiotherapy interventions are effective in addressing physical symptoms, broader improvements in overall quality of life may require a more holistic approach. Incorporating longer intervention duration along with targeted psychosocial strategies could help achieve more comprehensive and sustained improvements in quality of life among perimenopausal women. **Whiteley J. et al., 2013** reported that menopausal symptoms affect not only physical wellbeing but also psychological, social, and economic aspects, highlighting that improvements in physical symptoms alone may not immediately translate into measurable gains in overall quality of life.

LIMITATIONS

One limitation of the study was that some participants had limited prior knowledge of pelvic floor exercises, which may have affected their initial performance and adherence to the intervention. Additionally, misconceptions or lack of awareness about the importance of pelvic floor and core muscle training could have influenced motivation and consistency in performing exercises outside supervised sessions. The study also did not assess participants' understanding or

engagement with lifestyle modifications that could support pelvic health, such as posture, ergonomics, or daily physical activity. Finally, variations in participants' educational background, health literacy, and cultural beliefs may have influenced how effectively they followed the intervention protocol.

CONCLUSION

The findings of the present study indicate that pelvic floor and core muscle training combined with transcutaneous electrical nerve stimulation was effective in improving pelvic floor muscle strength, reducing pain, and alleviating perimenopausal symptoms among women. This was demonstrated by the significant improvement in the Menopause Rating Scale (MRS), Modified Oxford Grading Scale, and Visual Analog Scale (VAS) for low back pain and pelvic pain, as well as the International Consultation on Incontinence Questionnaire–Urinary Incontinence (ICIQ–UI). However, statistically significant improvement was observed in overall quality of life measured using the WHOQOL–BREF during the study period. From a psychological perspective, quality of life is influenced not only by physical health but also by emotional wellbeing, social relationships, and environmental factors, as described in the World Health Organization framework for quality of life. These results suggest that targeted physiotherapy interventions—such as “Pelvic floor & Core Muscles Training along with Transcutaneous Electrical Nerve Stimulation (TENS) play a crucial role in managing early perimenopausal changes and may contribute to delaying the onset and intensity of menopausal symptoms. Therefore, although the intervention improved physical and functional outcomes, broader psychological and social determinants may require longer-term interventions or additional psychosocial support to produce significant improvements in overall quality of life.

DECLARATIONS:

Ethics approval and consent to participate
Not applicable.

Consent for publication

Not applicable.

Availability of data and material

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding was received for this study.

Authors' contributions

T reviewed and edited the original manuscript, NK helps in plagiarism & draft of the manuscript.

REFERENCES

1. Ambikairajah A, Walsh E, Cherbuin N. A review of menopause nomenclature. *Reprod Health*. 2022;19:29. doi:10.1186/s12978-022-01336-7. ISSN:1742-4755
2. Babazadeh-Zavieh SS & Bashardoust Tajali S et al. A Effects of Transcutaneous Electrical Nerve Stimulation on Chronic Pelvic Pain in Women: A Systematic Review and Meta-Analysis. (2023) Volume-30(2) DOI: 10.1159/000528133. Epub 2022 Nov 21. PMID: 36412569.
3. Cho EJ, Choi Y, Jung SJ, Kwak HB. Role of exercise in estrogen deficiency-induced sarcopenia. *J Exerc Rehabil*. 2022;18(1):2–9. doi:10.12965/jer.2244004.002.
4. El Khoudary SR, Greendale G, Crawford SL, et al. The menopause transition and women's health at midlife: a progress report from the Study of Women's Health Across the Nation (SWAN). *Menopause*. 2019;26(10):1213–1227. doi:10.1097/GME.0000000000001424. PMID:31568098; PMCID:PMC6784846. ISSN:1072-3714.
5. Felicissimo MF, Carneiro MM, et al. Intensive supervised versus unsupervised pelvic floor muscle training for the treatment of stress urinary incontinence: a randomized comparative trial. *International Urogynecology Journal* (2010). Volume- 21.PP:835–840
DOI: 10.1007/s00192-010-1125-1
: <https://www.researchgate.net/publication/41548952>
6. Huang YC, Chang KV. Kegel exercises. *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; 2023. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK555898/>
7. Kegel AH. Progressive resistance exercise in the functional restoration of the perineal muscles. *Am J Obstet Gynecol*. 1948;56(2):238–248. doi:10.1016/0002-9378(48)90266-X. PMID:18877152.
8. Kozinoga M, Majchrzycki M, Piotrowska S. Low back pain in women before and after menopause. *Prz Menopauzalny*. 2015;14(3):203–207. doi:10.5114/pm.2015.54347. PMID:26528111; PMCID:PMC4612559
9. Li RX, Ma M, Xiao X, Xu Y, Chen X. Perimenopausal syndrome and mood disorders. *Medicine (Baltimore)*. 2016;95(32):e4466. doi:10.1097/MD.0000000000004466. PMID:27512863; PMCID:PMC4985318

10. Narayanan NK, Manjusha K. Effectiveness of core strength training to improve functional mobility and balance in geriatric population: a literature review. *Ortho Res Online J.* 2021;9(1). doi:10.31031/OPROJ.2021.09.000701
11. Rochera MB, Andreu CS, Madrid YC, Bouallalene K, Pau EM, et al. Physiotherapy as a way to maintain vaginal health during menopause. *Adv Sex Med.* 2017;7:97–104. doi:10.4236/asm.2017.72007. ISSN:2164-5205 (Online); ISSN:2164-5191 (
12. Sañudo B, de Hoyo M, Del Pozo-Cruz J, et al. Exercise effects on bone health. *Menopause.* 2017;24(10):1208–1216. doi:10.1097/GME.872
13. Sayali P Banole , Razia M Nagarwala,& Rachana P Dabadghav Knowledge,et al. Knowlwdge attitude and perception of perimenopausal and menopausal changes in middle age women (40-45 years) of urban population: *Indian Journal of Obstetrics and Gynecology Research*(2022).Volume-9(2). PP:198–203 DOI: <https://doi.org/10.18231/j.ijogr.2022.039>
14. Suchithra BS, Dsilva F, et al. Enhancing knowledge of women on urinary incontinence: a pre- and post-interventional study. *Journal of Clinical and Diagnostic Research.* 2020 Nov;14(11):LC01–LC04. doi:10.7860/JCDR/2020/46298.14226.
15. Vishakha Panchal, Amrutkuvar Pawar&Trupti Yadav et al. Effect of Core Stability Exercise Programme Using Swiss Ball, Theraband and Floor Exercises on Abdominal Girth and Core Strength in Post Menopausal Wome :*Indian Journal of Public Health Research and Development.* 2019 Volume 10(4). DOI: 10.5958/0976- 5506.2019.00661.2.
16. Whiteley J, Di Bonaventura MD, Wagner JS, Alvir J, Shah S. The impact of menopausal symptoms on quality of life, productivity, and economic outcomes. *J Womens Health (Larchmt).* 2013;22(11):983–990. doi:10.1089/jwh.2012.3719
17. WHOQOL Group. Development of the WHOQOL-BREF quality of life assessment. *Psychol Med.* 1998;28(3):551–558. doi:10.1017/S0033291798006667. ISSN:0033-2917
18. Xi S, Mao L, Chen X, Bai W. Effect of health education combining diet and exercise supervision in Chinese women with perimenopausal symptoms: a randomized controlled trial. *Climacteric.* 2017;20(2):151–156. doi:10.1080/13697137.2017.12819031
19. Zhang J, Chen G, Lu W, Yan X, Zhu S, Dai Y, Xi S, Yao C, Bai W. Effects of physical exercise on health-related quality of life and blood lipids in perimenopausal women: a randomized placebo-controlled trial. *Menopause.* 2014 Dec;21(12):1269–1276. doi:10.1097/GME.0000000000000264. PMID:24937024.