

# Impact of Severity of Menopausal Symptoms and Correlation with Core Strength and Peak Expiratory Flow Rate in Perimenopausal Women-A Correlational Study

Kareena Prakash Lalwani\*, Ankita Mane, Jaywant Nagulkar, Saheen Shaikh, Monish Chanchalani

Department of Physiotherapy, Dr. Ulhas Patil College of Physiotherapy, Jalgaon, India

## ABSTRACT

**Aim:** To find impact of severity of menopausal symptoms and correlation with core strength and peak expiratory flow rate in perimenopausal women.

**Methodology and analysis:** A correlational study was conducted among 61 perimenopausal women aged 40 years-50 years using non probability purposive sampling. Women with any respiratory or cardiovascular disease or underwent hormonal replacement therapy or hysterectomy or having cough, diabetes mellitus, hypertension were excluded. Menopausal symptoms were graded using menopausal rating scale, core strength was assessed using pressure biofeedback and lung functional capacity was assessed using peak expiratory flow meter.

**Result:** Correlation coefficient was calculated by Pearson test. The p-value for the correlation between severity of menopausal symptoms and core strength=0.18 and between severity of menopausal symptoms and PEF=0.05.

**Conclusion:** We found that there is no correlation between severity of menopausal symptoms and core strength.

**Keywords:** Perimenopausal symptoms; Menopausal rating scale; Pressure biofeedback; PEF

## INTRODUCTION

Menopause is the permanent cessation of menstruation, which is determined by twelve months of amenorrhea during the midlife period and the most identifiable event of the perimenopausal women. The perimenopause is an ill-defined time period that surrounds the final years of a woman's reproductive life. It begins with the first onset of menstrual irregularity and ends after 1 year of amenorrhea. The menopausal transition implies a series of hormonal and metabolic changes. As ovarian function decreases and fertility disappears, circulating estrogen levels first increase and then decrease. There are two stages to perimenopausal or menopause transition: Late perimenopause was defined as no menses for the last three to 12 months and early menopause defined as menses in the last three months but menstruation was not predictable. The average age of perimenopause in Indian women is  $44.69 \pm 3.79$  years [1].

During the menopausal transition women undergo various, physical, psychological and social changes that can affect their quality of life. Symptoms that occur frequently in perimenopausal

period are hot flushes, night sweats, vaginal dryness, depression, irritability, headaches and sleep disorders, cognitive impairment. The nature, frequency and severity of symptoms vary not only among the individuals of the same population with different cultures and women from different countries, but also at different stages of menopause. Menopausal symptoms can be a significant humanistic and economic burden on women. Experiencing the symptoms of menopause in individual depends on influence of many factors, not just hormonal changes but also external factors; e.g. living condition, general health, social functioning and perception of aging. Menopause has a great impact on quality of life. The more intense menopausal symptoms, the poor the quality of life. The core muscles are group of muscles for maintaining spinal stability. These are divided into two groups, first group consist of deep core muscles, called local stabilizing muscles and the second group consists of shallow core muscles which are also known as global stabilizing muscles. It is a muscular cylinder with the abdominals in front, erector spinae and gluteal muscles in back, and the diaphragm as roof and pelvic floor and hip girdle musculature in bottom. The core is the center of functional kinetic chain providing stability

**Correspondence to:** Kareena Prakash Lalwani, Department of Physiotherapy, Dr. Ulhas Patil College of Physiotherapy, Jalgaon, India; E-mail: lkareena154@gmail.com

**Received:** 01-Sep-2023, Manuscript No. JYPT-23-26446; **Editor assigned:** 04-Sep-2023, PreQC No. JYPT-23-26446 (PQ); **Reviewed:** 18-Sep-2023, QC No. JYPT-23-26446; **Revised:** 13-Jan-2025, Manuscript No. JYPT-23-26446 (R); **Published:** 20-Jan-2025, DOI: 10.35248/2157-7595.25.15.420

**Citation:** Lalwani KP, Mane A, Nagulkar J, Shaikh S, Chanchalani M (2025) Impact of Severity of Menopausal Symptoms and Correlation with Core Strength and Peak Expiratory Flow Rate in Perimenopausal Women-A Correlational Study. J Yoga Phys Ther. 15:420.

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for distal mobility and function of limbs. The core muscles support upper rib cage, shoulder, spine and hips. A strong core locks the spine and posture in place and allows using latissimus dorsi, chest, shoulders, gluteus muscles and quadriceps. Good core strength results in maximum range of motion at hips and shoulders. Transverse abdominal act like a canister with diaphragm and pelvic floor muscles [2].

Menopause has been associated with increased respiratory disorder. Menopausal period has been linked with hormonal variation causing weakening of respiratory function. Menopause is marked with reduction in levels of estradiol and has important effects on female physiology. Loss of lung function occurs quickly in post-menopausal women and respiratory muscle strength decreases with age. There are evidences suggesting that peak expiratory flow rate, force expiratory flows were reduced in postmenopausal women. Peak expiratory flow rate is the method of assessing the ventilator capacity with single breath.

The core muscles help to enhance endurance of respiratory muscles and in turn increase breathing capacity. Core muscles work by contracting the abdominal muscles, creating high pressure in abdomen, allowing diaphragm relaxation. Hence, good core strength will facilitate pulmonary function. There is limited data on potential changes in respiratory health when women enter the menopausal transition. Also, there is limited data on core strength in perimenopausal women. Therefore, the present study attempts to observe the impact of severity of menopausal symptoms and correlation with core strength and peak expiratory flow rate in perimenopausal women. Purpose of study was to elucidate the correlation of severity of menopausal symptoms with core strength and peak expiratory flow rate in perimenopausal women [3].

## Aim

To find impact of severity of menopausal symptoms and correlation with core strength and peak expiratory flow rate in perimenopausal women.

## Objective

- To find severity of menopausal symptoms using menopausal rating scale among perimenopausal women.
- To find core strength using pressure biofeedback unit among perimenopausal women.
- To find peak expiratory flow rate using peak flow mete among perimenopausal women.

To find correlation between:

- Severity of menopausal symptoms and core strength among perimenopausal women.
- Severity of menopausal symptoms and peak expiratory flow rate among perimenopausal women.

## MATERIALS AND METHODS

The study design is observational and study type is correlational study. It was conducted in Jalgaon. The duration for the study was 6 months. The method selected for sampling was purposive sampling and the sample size was 61.

## Inclusion criteria

- Females between ages 40-50 years of age.
- Subjects willing to participate.
- Women able to understand and communicate.
- Females were included on the basis of STRAW (Stages of Reproductive Ageing Workshop) criteria.

## Exclusion criteria

- Women with history of respiratory or cardiovascular disease.
- Women have undergone hormonal replacement therapy.
- Women underwent hysterectomy.
- Women with cough, dyspnea.
- Women with diabetes mellitus, hypertension.

## Out-come measures

**Menopausal rating scale:** It is a self-administered questionnaire-based scale and consists of 11 items and divided into 3 sub scales: Somatic, psychological, and urogenital. The individual were asked the questions and severity of menopausal symptoms was recorded. The symptoms in the scale were: Hot flashes, sweating, heart discomfort, sleep problems, depressive mood, anxiety, irritability, physical and mental exhaustion, sexual problems, bladder problems, dryness of vagina joint and muscular discomfort.

**Interpretation:** 0 to 11 were asymptomatic; 12-35: Mild to moderate; 36 and more: Severe

## Pressure biofeedback

Core strength was assessed by pressure biofeedback. PBU is a tool designed to facilitate muscle re-education by detecting movement of lumbar spine associated with deep abdominal contraction in relation to an air-filled reservoir [4].

- **Patient position:** Prone lying.
- **Placement:** The pressure biofeedback unit was placed under the abdomen with the lower edge just below the anterior superior iliac spine (naval at the strength).
- **Procedure:** Inflate to 70 mm Hg.
- **Standard instructions:** The females were asked to take breath in and as she exhaled gently draw her naval in toward her spine in order to promote the contraction of only transverse abdominis. The subject was asked to maintain the contraction for 10 seconds.
- **Precaution:** Limit overaggressive force generation or any need to modify pelvic or spinal position.
- If done properly the pressure drops to 6 to 10 mm Hg.
- The reading was recorded during normal breathing at the end of the expiration (Figure 1).



Figure 1: Prone lying position.



Figure 2: Peak flow meter.

### Peak flow meter

Peak expiratory flow rate is the maximal flow which is achieved during expiration which is delivered with maximal force, starting from the level of maximal lung inflation, following maximal inspiration which is expressed in liters/min.

- It is how fast a person can exhale.
- Patient position Stand up/sit upright.

**Procedure:** The marker was set to zero. Mouthpiece was connected. The process was done 3-4 times and means value was recorded (Figure 2).

**Instructions:** She was told to take deep breath in and hold it. Place the mouthpiece in her mouth and form as tight seal as possible around it with her lips, do not put your tongue against or inside the hole. Blow out as hard and fast as she can in a single blow. The reading was recorded [5].

**Interpretation by using formula:** For adult women- $((\text{height in m} \times 3.72) + 2.24) - (\text{Age} \times 0.03) \times 60$

### Procedure

To conduct the study permission was taken by the ethical committee. A correlational study was administered and subjects were screened on the basis of inclusion exclusion criteria. A brief demographic data was obtained and a written consent was taken from all the participants, and the nature and purpose of the study was explained to them. First, severity of menopausal symptoms using menopausal rating scale was assessed. Then core strength was assessed by using pressure biofeedback. Then peak expiratory flow rate was assessed by peak flow meter. After data collection, data entry was done. Statistical analysis was done using InStat (version 3.05) [6].

### Statistical analysis

A total 61 participants were screened in the study. Microsoft-excel 2010 was used for data entry and basic descriptive statistics. Descriptive statistics were applied to categorical variables where mean, SD and frequency was expressed in %. Mean and SD were computed. Simple graphs were analyzed using Microsoft-excel 2010. Normality of the data was confirmed by Kolmogorov and Smirnov test using InStat which is shown in the Table 1 [7].

Parametric test: Pearson correlation coefficient test was used to find association between severity of menopausal symptoms, core strength and peak expiratory flow rate in perimenopausal women which is shown in Table 7.

## RESULTS

### Normality of the given set of data

Pearson correlation test was used to find the normality of set of data which indicated that the p value of all the variables MRS

scale, PBU and PEFR was more than 0.05 explaining that this data follow normal distribution, as shown in Table 1.

**Table 1:** Normality of data.

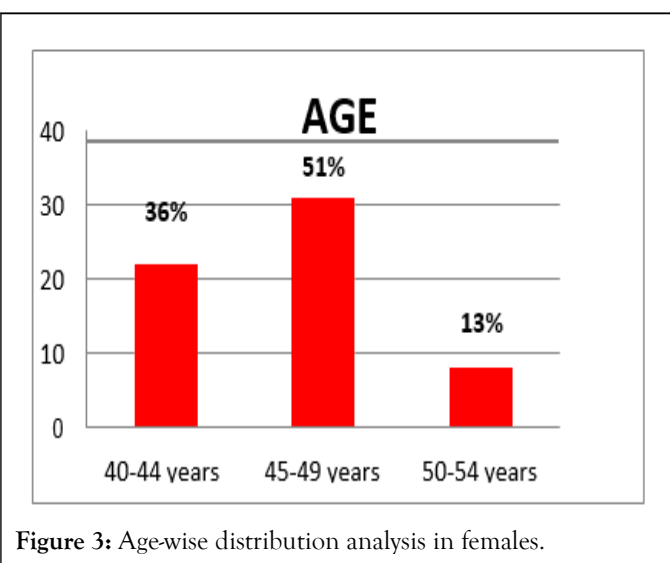
Outcome measure	p-value
MRS	0.07
PBU	>0.1
PEFR	>0.1

**Interpretation:** p value of all the variables MRS scale, PBU and PEFR was more than 0.05 explaining that this data follow normal distribution.

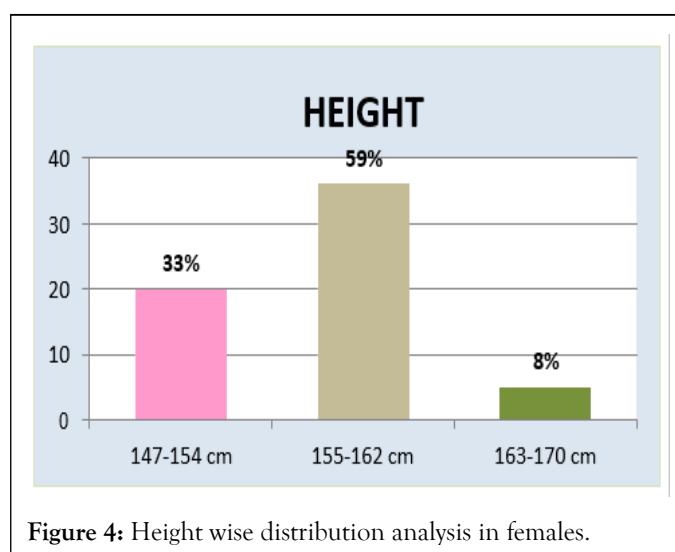
Total 61 samples were collected for the study, assessment and analysis was carried out. In our study, the mean age of participants was  $45.6 \pm 3.5$  (Table 2 and Figure 3)

**Table 2:** Represents analysis of basic descriptive statistics of participant's variables (mean  $\pm$  SD).

Variables	Mean $\pm$ SD
Age (years)	$45.6 \pm 3.5$
Height (cm)	$156.2 \pm 4.9$
MRS	$15.1 \pm 5.8$
PBU	$6.3 \pm 2.6$
PEFR	$309.5 \pm 52.7$



**Inference:** Out of 61 participants, majority of females were of age 45-49 Years (51%) (Figure 4).



**Inference:** Among 61 participants, maximum (59%) were having height between 155-162 cm (Figure 5).

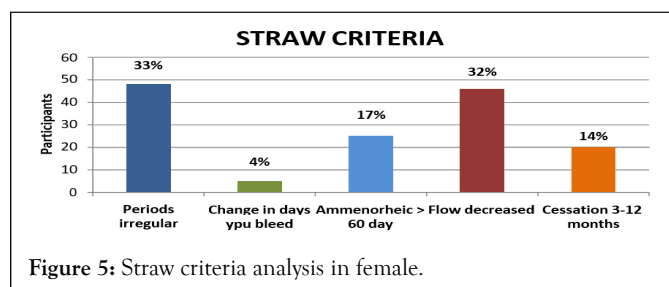


Figure 5: Straw criteria analysis in female.

**Inference:** Out of 61 participants, only 4% (n=5) females were having changes in days they bleed and maximum women were having complaint of irregular periods 33% (n=48) (Table 3).

Table 3: Represents the MRS score of 61 females.

MRS % (n)						
Domain	Q	None (0)	Mild (1)	Moderate (2)	Severe (3)	Extremely severe (4)
Somatic	Q.1	39% (24)	23% (14)	21% (13)	15% (9)	2% (1)
	Q.2	38% (23)	29% (18)	15% (9)	15% (9)	3% (2)
	Q.3	21% (13)	26% (16)	25% (15)	20% (12)	8% (5)
	Q.11	0	11% (7)	48% (29)	26% (16)	15% (9)
Psychological	Q.4	13% (8)	34% (21)	31% (19)	12% (7)	10% (6)
	Q.5	18% (11)	39% (24)	21% (13)	15% (9)	10% (4)
	Q.6	23% (14)	39% (24)	33% (20)	5% (3)	0
	Q.7	10% (1)	38% (6)	33% (23)	17% (20)	18% (11)
Urogenital	Q.8	33% (20)	36% (22)	15% (9)	16% (10)	0
	Q.9	87% (53)	8% (5)	3% (2)	0	2% (1)
	Q.10	66% (40)	21% (13)	8% (5)	5% (3)	0

**Inference:** Only 2% females were having extremely severe hot flushes complain and 15% females were having complaint of joint discomfort. The Urogenital changes were seen less than somatic and psychological (Figure 6).

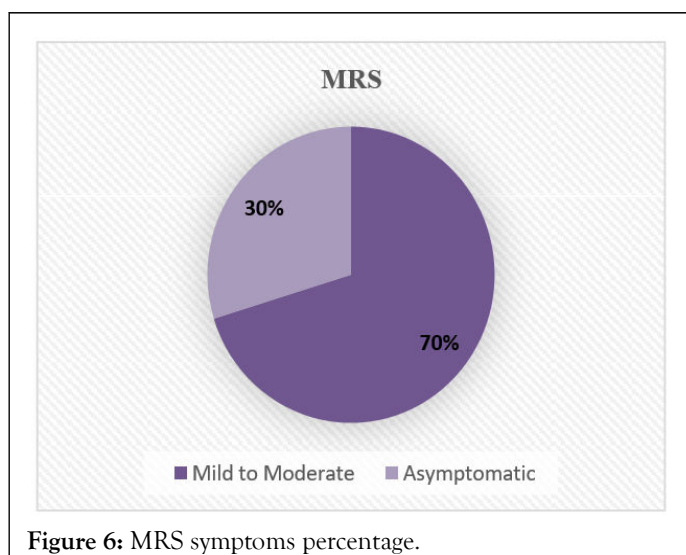


Figure 6: MRS symptoms percentage.

**Inference:** Out of 61 participants maximum were having (70%) mild to moderate symptoms and 30% were asymptomatic (Figure 7).

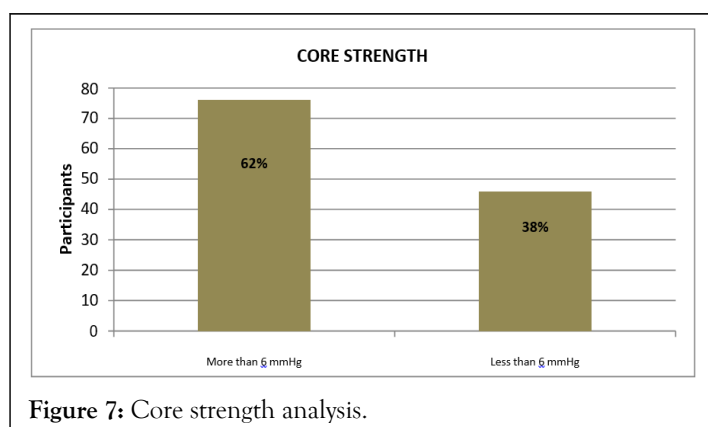
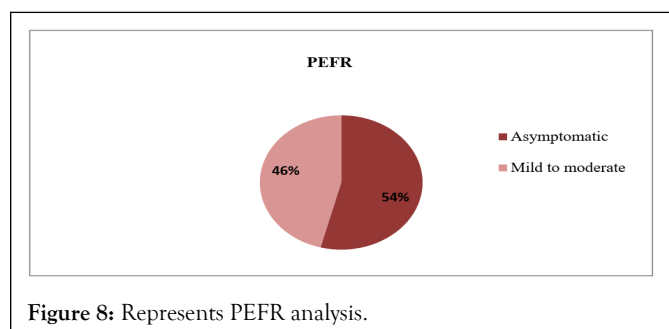


Figure 7: Core strength analysis.

**Inference:** Maximum females had core strength more than 6 mmHg (n=39) (Figure 8).





**Inference:** Out of 61 participants, 54% were asymptomatic and 46% had mild to moderate symptoms.

Pearson correlation test was conducted to correlate the outcome measures as shown below: Correlation between severity of menopausal symptoms and core strength in perimenopausal women (Table 4).

**Table 4:** Pearson test.

p-value	0.1831
Correlation coefficient (r)	-0.1727
Correlation is not significant.	

**Interpretation:** There is no correlation between severity of menopausal symptoms and core strength means as menopausal symptoms increases it doesn't affect the core strength.

Correlation between severity of menopausal symptoms and PEFR in perimenopausal women (Table 5).

**Table 4:** Pearson test 2.

p-value	0.0506
Correlation coefficient (r)	-0.2515
Correlation is not significant	

**Interpretation:** There is no correlation between severity of menopausal symptoms and peak expiratory flow rate that means as menopausal symptoms increases it doesn't affect the expiratory flow rate.

## DISCUSSION

The study aimed at analyzing the impact of severity of menopausal women on core strength and peak expiratory flow rate in perimenopausal women. Menopausal symptoms are important issue in females which affects their quality of life. While entering in menopausal transition stage women face many changes in their body related to somatic, psychological and urogenital changes [8-12].

In our study 30% (n=43) women were asymptomatic and 70% were having mild to moderate symptoms and 0% females were having severe symptoms. Marzieh Masjoudi et al. in 2017 found that 55% perimenopausal women were asymptomatic and 45% women were having mild to moderate symptoms and 0% were having severe symptoms. We found somatic and psychological problems were more common than Urogenital. In somatic domain, sleep problems and joint discomfort were found among maximum women. This may be due to fluctuation of estrogen which occurs the most during this phase. Dhillon et al. in 2015 stated that perimenopausal women noted to experience more symptoms of hot flushes, sweating and night sweats. There are studies comparing perimenopausal and postmenopausal women which states that menopausal symptoms are more severe in postmenopausal women [13-15].

Core strength and stability are very important part in women for maintaining low back pain to prevent spinal injuries and fracture. In our study we found 62% females with core strength more than 6 mmHg. The women having joint discomfort like back, neck pain and more physical exhaustion were having decreased core strength due to less physical activity. Estradiol is beneficial for muscular strength. In perimenopause, there is estrogen fluctuation, which affect the body mechanism. During contraction of skeletal muscles estradiol showed influence over binding of myosin and actin filaments. Estrogen increase muscle mass and strength by increasing the collagen content of muscles. Various studies has proven core strengthening to be effective in reduction of pain, disability and improve quality of life. Bhosale et al. in 2021 concluded that earlier the age of menopause moreover is the decline in core strength [16].

The peak expiratory flow rate decreases with increase in age due to elastic recoil of lungs and airway size and it is also increased in taller height individual due to greater chest volume and the growth of airway passages and expiratory muscle effort also increases with increase in height. In this study, some females were found asymptomatic while some presented with mild to moderate symptoms. It is due to decrease level of estrogen and progesterone which cause decreased relaxation of bronchial smooth muscles and increase compression of thoracic spine. In very few studies only 2-3% females were having severely decreased PEFR. Missouri, et al. in 2014 in their study stated that transverse abdominis was found to be a major contributor in generating intra-abdominal pressure during forceful maneuvers. During forceful exhalation there is posterior pull of abdomen

which decreases the abdominis circumference, this increases intra-abdominal pressure and pushes the diaphragm upward into thoracic cavity [17].

In our study we found no correlation between menopausal symptoms with core strength and peak expiratory flow rate this may be because of variability of symptoms as maximum participants presented with mild to moderate perimenopausal symptoms.

May be this correlation will be found in postmenopausal women as there are many studies on severity of menopausal symptoms, core strength and decreased PEFR in postmenopausal women individually but lacks to establish their relationship collectively. Even perimenopausal women with severe symptoms may show this correlation. Hence, future studies should find correlation between severity of menopausal symptoms with core strength and peak expiratory flow rate in postmenopausal women [18].

## CONCLUSION

This study concludes that there is no impact of mild to moderate menopausal symptoms on core strength and peak expiratory flow rate. Therefore, change in severity of menopausal symptoms does not affect core strength and peak flow rate among perimenopausal women.

## LIMITATIONS

- Obese women were not categorized separately.
- Sample size was small; hence results cannot be generalized.

## FUTURE SCOPE

**Future studies should:** Include severe symptomatic perimenopausal women and postmenopausal women. Should be carried out in large number of females to generalize the results.

## CLINICAL IMPLICATION

During menopause women are at high risk of osteoporosis as there is calcium deficiency in body and increased bone loss. Even there is more fat deposition which makes them prone to obesity. Also, they experience breathlessness. Hence, finding severity of menopausal symptoms, core strength, peak flow rate and their correlation collectively might help to establish a significant clinical fitness programme for females which will reduce these difficulties and maintain their quality of life after menopause.

## ACKNOWLEDGEMENT

I would like to thank Dr. Jaywant Nagulkar, Principal, Dr. Ulhas Patil college of Physiotherapy, Jalgaon for allowing me to conduct this study. I am highly grateful to Dr. Ankita Mane, Assistant Professor Dr. Ulhas Patil College of Physiotherapy, Jalgaon, for her guidance, encouragement and support. I would

like to thank all my teachers for their immense support and guidance. Lastly, I would like to devote my heartily gratitude towards my friends and family for their love, support without which this effort would not have been fruitful.

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