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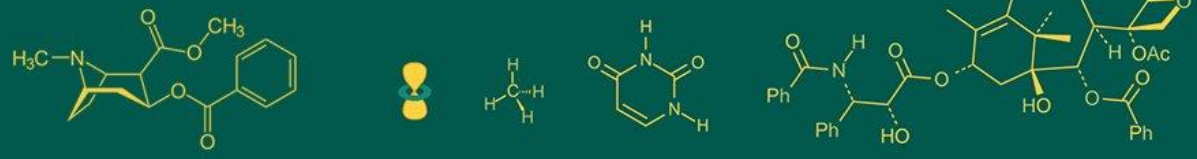

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The impact of body mass index on physical well-being of menopausal women

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Abstract
Menopause is an important period in a woman's life marked by the cessation of the menstrual cycle, which results in various changes in the life of women. BMI also controls menstrual irregularities. This study aims to find out the association between Body mass index and Menopausal health-related problems among women. The present study was conducted on 200 menopausal women of the Ambedkar Nagar district of Uttar Pradesh using Anthropometric measurements and the MRS scale. The data was analysed using descriptive statistics and Pearson's correlation test. The findings revealed that BMI is positively correlated with MRS (r = 0.015) and Urogenital problems (r = 0.090). In contrast, BMI shows a negative correlation with somatic problems (r = -0.012) and psychological problems (r = -0.104).

Keywords: Menopause, menopause rating scale (MRS), BMI

Introduction
Menopause represents a natural biological transition marking the end of ovarian function and reproductive capability in women. Clinically, it is diagnosed retrospectively after 12 consecutive months of amenorrhea, in the absence of other pathological or physiological causes (Howkins & Bourne, n.d.). Although the typical age of onset ranges between 45 and 50 years, with an average age of around 47, it is not uncommon for some women to experience menstruation beyond 50. This variability is often influenced by factors such as nutritional status, genetic background and overall health (Erdélyi *et al*., 2023) [3].

In India, approximately 60 million women are aged 55 years or older and many are now spending nearly one-third of their lifespan in the postmenopausal stage (Meeta *et al*., 2020) [9]. With this demographic shift, there is a growing need to recognize, understand and manage the health challenges associated with menopause, especially those linked to estrogen deficiency. The hormonal alterations during the menopausal transition, namely the decline in estrogen and relative rise in circulating androgens have profound effects on lipid metabolism, increasing the susceptibility to metabolic disorders such as cardiovascular disease and type 2 diabetes (Deshmukh & Deshpande, 2022) [2].

Disruptions in lipid metabolism during menopause also lead to significant changes in body composition, including increased fat mass, decreased lean mass and impaired fatty acid utilization. These alterations contribute to a decline in basal metabolic rate and increased adiposity, which collectively elevate the risk of obesity. Additionally, menopause is associated with a cascade of metabolic disturbances, including elevated production of free fatty acids, adipokines, pro-inflammatory cytokines and reactive oxygen species. These changes accelerate lipid peroxidation, which plays a critical role in the development of insulin resistance, central adiposity and dyslipidemia (Park & Kim, 2020) [10].

The Body Mass Index (BMI), also known as Quetelet's Index, remains a simple and widely used tool to assess body composition and categorize weight-related health risks. It is calculated using the formula:

$$\text{BMI} = \frac{\text{WEIGHT (in kg)}}{\text{HEIGHT (in m}^2\text{)}}$$

Despite its limitations, BMI remains integral to evaluating obesity and related metabolic risks in menopausal women.

Estrogen deficiency also has significant implications for the musculoskeletal system. One of the most notable outcomes is osteoporosis, characterized by reduced bone density and structural deterioration, increasing the risk of fractures. Moreover, menopause often results in loss of muscle mass, decreased strength and diminished endurance, further elevating the risk of falls and functional decline. These issues often necessitate physiotherapy for both prevention and rehabilitation (Porter, 2003) [11].

In addition to musculoskeletal changes, urogenital symptoms are also common during menopause. Urethral syndrome, a condition marked by dysuria, urinary frequency and mild stress incontinence, is frequently observed in menopausal women and is attributed to estrogen-related atrophy of the urethral mucosa and sphincter weakness (Howkins & Bourne, n.d.).

From a broader perspective, menopause can substantially affect a woman's quality of life (QoL). According to the World Health Organization, QoL is defined as an individual's perception of their position in life, within the context of their culture, value systems, personal goals, expectations and concerns (Erdélyi *et al*., 2023) [3]. To assess menopause-related symptoms and their impact on QoL, the Menopause Rating Scale (MRS) has been developed and validated. It is a self-administered questionnaire that evaluates the severity of symptoms across psychological, somatic-vegetative and urogenital domains. The tool has demonstrated high test-retest reliability, with intraclass correlation coefficients (ICCs) ranging from 0.90 to 0.95 and is frequently used to monitor treatment outcomes such as hormone replacement therapy (Heinemann *et al*., 2004; Susanti *et al*., 2019) [5, 12].

Methodology

Sample Selection

An Observational Study was done on menopausal women in villages (Iltifatganj, Baddupur, Bhiti, Dharmupur, Danpur) of Ambedkar Nagar District.

A total of 200 menopausal women were selected by convenience sampling. The inclusion and exclusion criteria were strictly followed during the selection process.

Inclusion Criteria

- Women aged between 45 to 55 years.
- Women with naturally induced menopause.

Exclusion Criteria

- Women who had undergone a hysterectomy.
- Women with a history of uterine, cervical, or ovarian cancer or who are undergoing chemotherapy for the same.
- Women with a history of menopausal depression or undergoing psychotherapy.

Tools and Techniques

1. Tools used

- Weighing machine
- Measuring tape
- Calculator
- Hard copies of the Menopause Rating Scale

2. Assessment of Menopausal Health Problems

Health issues and menopausal symptoms were assessed using the Menopause Rating Scale (MRS) developed by Heinemann *et al*. (2003) [11]. This standardized tool measures the severity of common menopausal symptoms across psychological, Somatic and urogenital problems.

3. BMI Calculation

Body Mass Index (BMI) was calculated to assess the body weight status of the participants. BMI is a widely used anthropometric indicator that relates a person's weight to their height.

$$\text{BMI} = \frac{\text{WEIGHT (in kg)}}{\text{HEIGHT (in m}^2\text{)}}$$

Based on the calculated BMI, participants were classified according to the World Health Organization (WHO) classification:

- **Underweight:** BMI < 18.5
- **Normal weight:** BMI 18.5-24.9
- **Overweight:** BMI 25.0-29.9
- **Obese:** BMI ≥ 30.0

Data analysis

The collected data were compiled and statistically analyzed using IBM SPSS (Statistical Package for the Social Sciences) software version 20. Descriptive and inferential statistics were applied to interpret the findings.

Results and Discussions

Table 1: Percentage distribution of respondents according to their age

(N = 200)

Demographic Variable		Frequency (f)	Percentage (%)
Age	45-50	48	24
	50-55	86	43
	Above 55	66	33

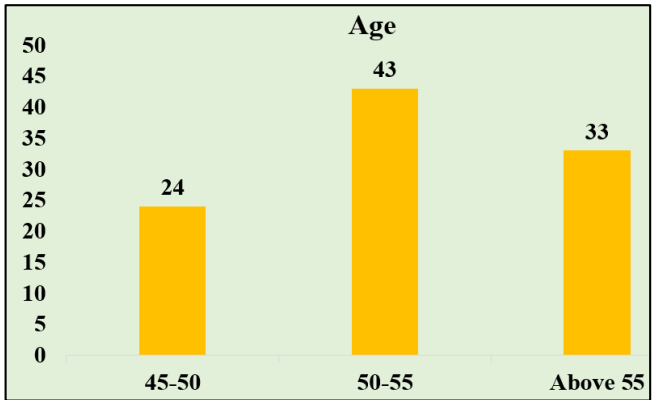

Fig 1: Frequency distribution of the respondents according to their age

Table 1 reveals the information regarding the age distribution of the respondents. A total of 200 participants were selected from the Ambedkar Nagar district of Uttar Pradesh. The data indicated that the largest proportion of respondents (43%) were aged between 50 and 55 years, while 33 percent were above 55 years of age. Approximately 24 percent of the respondents were in the 45 to 50 years age group.

In a similar study, Huang *et al*. (2023) reported that 41.26 percent of women experienced menopause between the ages of 45 and 49 years.

Table 2: Percentage distribution of respondents according to their BMI

(N = 200)

S. No.	BMI Category	Frequency (f)	Percentage (%)
i.	Underweight (16.0 to 18.4 kg/m^2)	7	3.5
ii.	Normal (18.5 to 24.9 kg/m^2)	30	15
iii.	Overweight (25.0 to 29.9 kg/m^2)	144	72
iv.	Class I obese (30.0 to 34.9 kg/m^2)	19	9.5

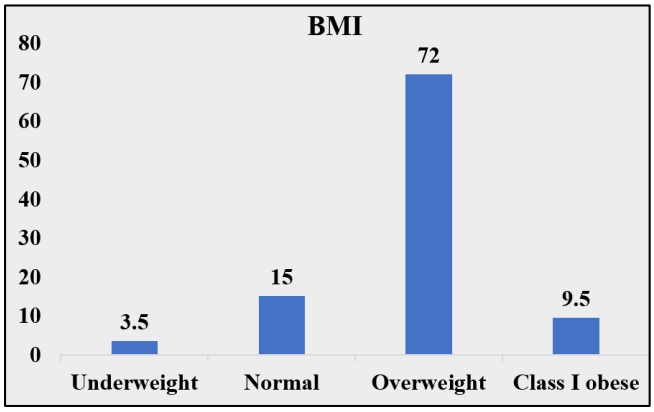

Fig 2: Frequency distribution of the respondents according to their BMI

The association between body mass index (BMI) and health behaviours has been widely explored in research. Despite its limitations, BMI continues to be regarded as a convenient and practical tool for assessing weight status, largely due to its ease of calculation and rapidity of measurement in individuals who can stand upright for height assessment and step, unclothed or minimally clothed, onto a calibrated weighing scale. A majority of the respondents (72%) were classified as overweight, while 15 percent fell within the normal BMI range. A smaller segment (3.5%) was identified as underweight and 9.5 percent of participants were categorized under Class I obesity. These findings underscore the predominance of weight-related concerns among the study population, with potential implications for their overall health and risk of comorbidities.

In a similar study conducted by Deshmukh. M. S. & Deshpande. N. (2022) [2] in Pune district of Maharashtra found that most of the women were overweight, thereby reinforcing the concern that excess body weight is a common health challenge among women transitioning through menopause.

Table 3: Correlation between the BMI with MRS score

N = 200

Variables	Pearson correlation test (r)	p-value
MRS	0.015	0.001*
Somatic problems	-0.012	0.087
Psychological problems	-0.104	0.014*
Urogenital problems	0.090	0.020*
* Significant differences at 5% level		

The correlation analysis between BMI and the Menopause Rating Scale (MRS) revealed a correlation across its various domains. The overall MRS score showed a positive correlation with BMI (r = 0.015). This lower value of correlation shows a weak association between BMI and MRS, which means that BMI alone is not a strong determinant of overall menopausal distress and other factors such as lifestyle, genetics and psychosocial support may play more substantial roles. Somatic problems were negatively correlated with BMI (r = -0.012), suggesting that higher the BMI, lesser the somatic problems. Psychological problems demonstrated a negative correlation (r = -0.104), implying that an increase in BMI was slightly related to fewer psychological symptoms, though the relationship was minimal and statistically significant. Urogenital problems, however, showed a weak positive correlation with BMI (r = 0.090), pointing towards a slight tendency for higher BMI to be linked with increased urogenital concerns. This may be attributed to the physiological effects of excess body weight, including insulin resistance, vascular insufficiency and hormonal imbalance, which can contribute to impaired urogenital health. BMI demonstrated a statistically significant correlation with overall MRS, psychological and urogenital problems, while its association with somatic problems was non-significant.

In a similar study conducted by Deshmukh. M. S. & Deshpande. N. (2022) [2] in Pune district of Maharashtra found that there is a correlation between BMI and MRS, emphasizing that an excessive increase in BMI is closely associated with an increase in menopausal symptoms.

Table 4: Frequency distribution of respondents according to their level of menopausal symptoms

(N = 200)

Menopausal symptoms	None		Mild		Moderate		Severe	
	f	%	f	%	f	%	f	%
Somatic Complaints	2	1	96	48	102	51	0	0
Psychological Complaints	4	2	97	48.5	99	49.5	0	0
Urogenital Complaints	3	1.5	97	48.5	100	50	0	0

Somatic Complaints

Table 4 shows that 48 percent of respondents experienced mild levels of somatic complaints, whereas 52 percent of respondents faced moderate levels of somatic complaints. A negligible 1 percent of respondents had few somatic complaints. It was good that no respondents had severe levels of somatic complaints. This result indicated that while somatic symptoms during menopause are common, they are mostly manageable and fall within mild to moderate levels for the majority of women.

Psychological Complaints

The result revealed that 49.5 percent of respondents faced a moderate level of psychological complaints, followed by 48.5 percent of respondents who faced a mild level of psychological complaints. 2 percent of respondents had few psychological complaints. None of the respondents had severe levels of psychological complaints.

These psychological complaints may be attributed to hormonal fluctuations, lack of emotional support, changes in family roles and limited opportunities for self-expression and personal growth. These findings suggest that psychological discomfort during menopause is prevalent, though not extreme, underscoring the need for mental health support and awareness during this transitional phase of a woman's life.

Urogenital Complaints

Data represented that 48.5 percent of respondents experienced mild levels of urogenital complaints whereas 50 percent of respondents faced moderate levels of urogenital

complaints. Only 1.5 percent of respondents had few urogenital complaints. None of the respondents had severe levels of urogenital complaints.

Urogenital symptoms may arise due to decreased oestrogen levels, leading to vaginal dryness, discomfort, urinary problems and reduced libido, which affect the overall quality of life. This result reflects that urogenital symptoms are a common concern for menopausal women and highlights the need for accessible reproductive health services and timely medical care.

Summary and Conclusion

The present study was conducted on 200 menopausal women of Ambedkar Nagar district, Uttar Pradesh, with the objective of assessing the association between body mass index (BMI) and menopausal health-related problems using anthropometric measurements and the Menopause Rating Scale (MRS). The age distribution indicated that the majority of respondents (43%) were in the age group of 50-55 years, followed by 33 percent above 55 years and 24 percent between 45-50 years. An assessment of BMI revealed that a substantial proportion of women (72%) were overweight, 15 percent were within the normal range, 9.5 percent were categorized under Class I obesity and 3.5 percent were underweight. This highlights the predominance of weight-related concerns within the study population, carrying significant implications for their health and risk of comorbidities.

Correlation analysis showed that BMI had a negligible but statistically significant positive association with the overall MRS score ($r = 0.015$, $p = 0.001$), suggesting that higher BMI was linked to increased menopausal symptom severity. Domain-wise analysis revealed that BMI was negatively correlated with somatic problems ($r = -0.012$, $p = 0.087$) and psychological problems ($r = -0.104$, $p = 0.014$). This indicates that higher BMI was associated with slightly fewer psychological complaints, though the strength of the association remained weak. In contrast, BMI exhibited a weak positive correlation with urogenital problems ($r = 0.090$, $p = 0.020$), suggesting that women with higher BMI experienced marginally more urogenital issues, possibly due to metabolic and hormonal disruptions.

The study concludes that BMI exerts a weak influence on menopausal health problems as measured by the MRS. While BMI was significantly associated with overall menopausal symptoms, psychological concerns and urogenital issues, the effect sizes were small and the relationship with somatic complaints was non-significant. These findings imply that BMI alone cannot be considered a strong determinant of menopausal distress. Instead, menopausal health outcomes are likely shaped by a complex interplay of biological, psychosocial and lifestyle factors.

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