CORRELATION BETWEEN BMI AND HEALTH-RELATED QUALITY OF LIFE IN POSTMENOPAUSAL WOMEN USING THE MENOPAUSE RATING SCALE

An observational study
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Abstract: Background - The termination of ovarian function leading to permanent amenorrhoea is known as menopause, the average age of menopause being 47 years. 60 million women in India are above the age of 55 years, hence a majority of them would spend 1/3rd of their life in the postmenopausal stage. It is important to address the health-related quality of life (HRQoL) during this period which may include problems related to estrogen deficiency, low metabolic rate, dysregulation of lipid metabolism, musculoskeletal, bladder problems, etc to help these women lead a healthy life. For this purpose, the Menopause Rating Scale (MRS) was designed to assess and evaluate the symptoms/complaints of aging women under different conditions.

Methodology – An Observational study was done in which postmenopausal women between the age of 45 to 55 years in and around PCMC, Pune, and Gynaecological clinics were selected by Convenient sampling as per inclusion criteria. Postmenopausal women on hormone replacement therapy, who have undergone hysterectomy, who are having a history of uterine/cervical/ovarian cancer or undergoing Chemotherapy for the same, who are having a history of postmenopausal depression or are undergoing Psychotherapy were excluded. Consent from the Gynaecologist of the respective Gynaecology clinic, as well as consent from the subject was taken. Weight and height were measured and body mass index (BMI) was calculated. The hard copies of the MRS were given to the subject and the subject was asked to fill up the form. Google forms which included the consent, assessment proforma, and MRS were circulated via social media (WhatsApp). Data was collected, a statistical analysis was performed and results were tabulated.

Result – 256 postmenopausal women with naturally induced menopause between the ages of 45 to 55 years were included in this observational study. It was observed that there is a positive correlation between the Body Mass Index (BMI) and MRS score of the postmenopausal females (Correlation coefficient (r) = 0.2969), there is a weak negative correlation between the duration of menopause and the MRS score ((r) = -0.3129), and there is a strong positive correlation between BMI and bladder problems ((r) = 0.5822).

Conclusion - The study concludes that there is a positive correlation between BMI and health-related quality of life of postmenopausal women, there is a weak negative correlation between the duration of menopause and Menopause Rating Scale score, and there is a strong positive correlation between BMI and bladder problems in postmenopausal women.

Keywords – Menopause, Postmenopausal stage, HRQoL, Menopause Rating Scale (MRS), BMI, Bladder problems.

INTRODUCTION-

Menopause is the time of cessation of ovarian function resulting in permanent amenorrhoea. It takes 12 months of amenorrhoea to confirm that menopause has set in, and therefore it is a retrospective diagnosis.[1] Menopause normally occurs between the ages of 45 and 50 years, the average age being 47 years. It is not uncommon, however, to see a woman menstruate well beyond the age of 50 years. This delayed menopause may be related to good nutrition and better health.[1]

60 million women in India are above the age of 55 years. With women living longer than before, a majority would spend one-third of their life in the postmenopausal stage. The health problems cropping up during this period and related to estrogen deficiency of menopause are now obvious and better understood. It is important therefore to address all these menopause-related diseases and apply prophylactic measures so that these women can lead an enjoyable and healthy life.[1]

During the menopausal transition period, there is an emergence of various lipid metabolic disorders due to hormonal changes, namely decreased levels of estrogen and increased levels of circulating androgens; these may lead to the development of metabolic syndromes including cardiovascular diseases and Type 2 diabetes.[2]

Dysregulation of lipid metabolism affects the body fat mass, fat-free mass, fatty acid metabolism, and various aspects of energy metabolism, such as basal metabolic ratio, adiposity, and obesity. Moreover, menopause is also associated with alterations in the levels of various lipids circulating in the blood. Alterations in lipid metabolism and excessive adipose tissue play a key role in the synthesis of excess fatty acids, adipocytokines, proinflammatory cytokines, and reactive oxygen species, which cause lipid peroxidation and result in the development of insulin resistance, abdominal adiposity, and dyslipidemia.[2] Hence measurement of the body fat will help us estimate the health-related risks of the patient.

Body Mass Index (BMI), also called the Quetelet's Index, is used to assess weight relative to height. This technique compares an individual's weight (in kilograms) to their height (in meters, squared). One popular formula for BMI is:

Body Mass Index (kg.m^{-2}) = WT (kg)/HT(m^2)[3]

Musculoskeletal and articular effects; osteoporosis, characterized by low bone mass, is one of the most clinically significant sequelae of estrogen deficiency. Muscular changes are attributed to an overall reduction in muscle mass, with a decrease in both

strength and endurance of muscle tissue. These changes result in an increased risk of falls and injury, which may require Physiotherapy.[4]

Urethral syndrome is one of the common urinary malfunctions in postmenopausal women. A patient with the urethral syndrome is usually a postmenopausal woman complaining of dysuria, frequency of micturition, and occasional stress incontinence. The cause of the urethral syndrome is estrogen deficiency at menopause causing weakening of the internal urethral sphincter and urethral mucosal changes.[1]

Quality of life (QoL) has been defined by the World Health Organization as the "individual's perceptions of their positions in life in the context of the cultural and value systems in which they live and in relation to their goals, expectations, standards, and concerns."[5]

To assess the symptoms/complaints of aging women under different conditions, evaluate the severity of symptoms over time, and measure the changes in pre- and post-menopause replacement therapy, a scale known as the Menopause Rating Scale (MRS) (ICC for test-retest reliability;0.90-0.95) was designed and standardized as a self-administered scale.[6] The MRS measures psychological, somatic-vegetative, and urogenital symptoms using 11 items (questionnaire) obtained from participants' daily symptom records (as per a study).[7]

OBJECTIVES –
1. To study the impact of body weight on the quality of life of postmenopausal women using the Menopause Rating Scale,
2. To find out the correlation between duration of menopause and Menopause Rating Scale score,
3. To find out the correlation between BMI and bladder problems using the Menopause Rating Scale.

METHODOLOGY AND MATERIALS –
METHODOLOGY
An Observational Study was done on postmenopausal women in and around PCMC, Pune, and Gynaecological clinics. Total 256 postmenopausal women were selected by Convenient sampling. The study was completed in 6 months.

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

INCLUSION CRITERIA –
Females in the age group 45 to 55 years.
Females with naturally induced menopause.
Literate females.

EXCLUSION CRITERIA –
Females on hormone replacement therapy.
Females who have undergone hysterectomy.
Females having a history of uterine/cervical/ovarian cancer or undergoing Chemotherapy for the same.
Females having a history of postmenopausal depression or undergoing Psychotherapy.

OUTCOME MEASURES –
- Body Mass Index
- Menopause Rating Scale score

PROCEDURE –
Permission from the Ethical Committee was taken. Consent from the Gynaecologist of the respective Gynaecology clinic, as well as consent from the subject was taken. Weight and height were measured and BMI was calculated. The hard copies of the MRS were given to the subject and the subject was asked to fill up the form. Google forms which included the consent, assessment proforma, and MRS were circulated via social media (WhatsApp). Data was collected, and statistical analysis was performed using the GraphPad instat software for determining Pearson's correlation coefficient (r).

STATISTICAL ANALYSIS –

1. AGE GROUP-WISE DISTRIBUTION
Table-1: Age group

AGE GROUP		
Age (yrs.)	45 to 50	51 to 55
No. of females	118	138

Table 1 shows that out of a total of 256 postmenopausal females,
118 females are between the age of 45 to 50 years,
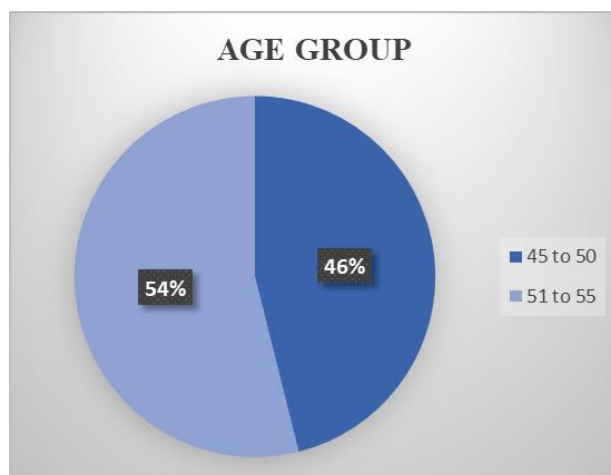138 females are between the age of 51 to 55 years.

Figure- 1
Figure-1 shows that out of a total of 256 postmenopausal females
46% belong to the age group of 45 to 50 years,
54% belong to the age group of 51 to 55 years.

2. DURATION WISE DISTRIBUTION

Table-2: Time since menopause (i.e., duration between the present age
and age of menopause)

TIME SINCE MENOPAUSE			
Years	1 to 5	6 to 10	11 to 15
No. of females	163	80	13

Table 2 shows that out of a total of 256 postmenopausal females,
163 females have a duration of 1 to 5 years between the present age and age of menopause,
80 females have a duration of 6 to 10 years and
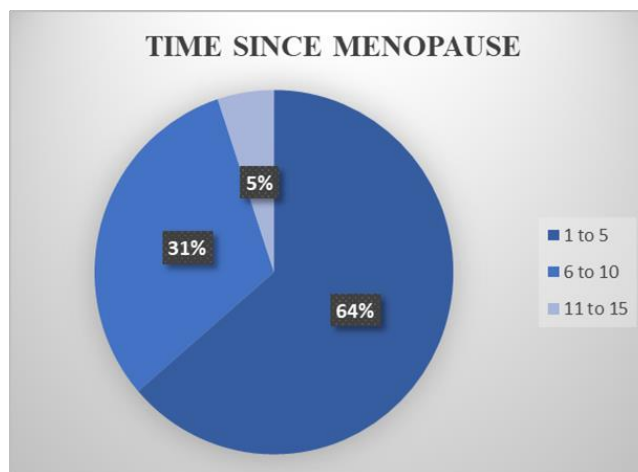13 females have a duration of 11 to 15 years.

Figure- 2
Figure 2 shows that out of a total of 256 postmenopausal females,
64% have a duration of 1 to 5 years between the present age and age of menopause,
31% have a duration of 6 to 10 years and
5% have a duration of 11 to 15 years.

3. BMI WISE DISTRIBUTION

Table-3: BMI categories

BMI CATEGORIES				
Categories	Underweight	Normal	Overweight	Class I obese
No. of females	2	51	187	16

Table 3 shows that out of a total of 256 postmenopausal females,
2 females fall in the 'underweight' category according to the BMI score,
51 females fall in the 'normal' category,
187 females fall in the 'overweight' category and
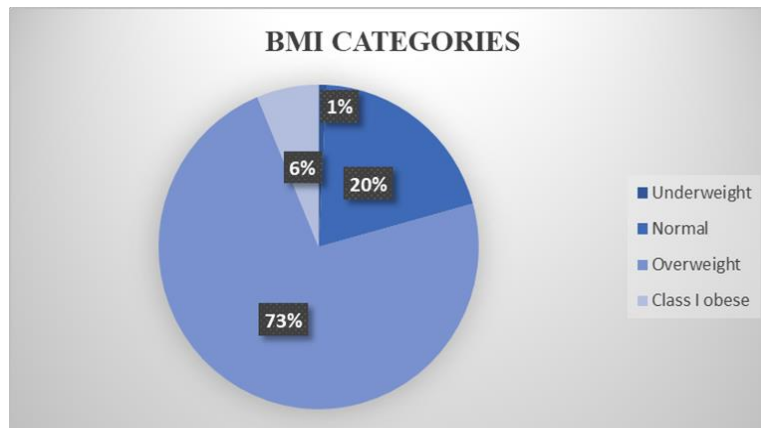16 females fall in the 'Class I obese' category.

Figure- 3
Figure 3 shows that out of a total of 256 postmenopausal females,
1% fall in the 'underweight' category according to the BMI score,
20% fall in the 'normal' category,
73% fall in the 'overweight' category and
6% fall in the 'Class I obese' category.

1. **CORRELATION BETWEEN BMI AND MRS SCORE**
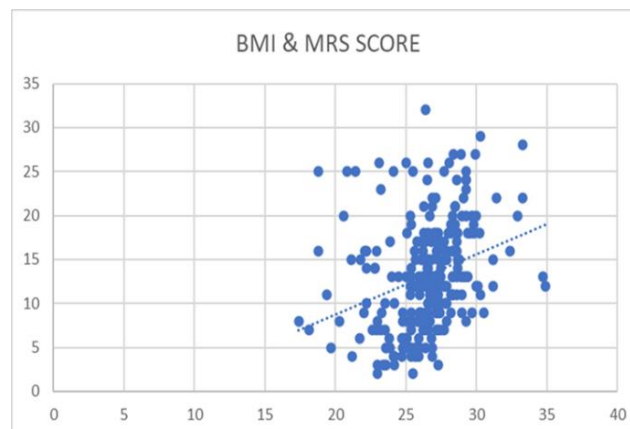Linear Correlation
Sample size = 256
Correlation coefficient (r) = 0.2969
95% confidence interval: 0.1808 to 0.4048
Coefficient of determination (r squared) = 0.08813
Test: Is r significantly different than zero?
The two-tailed P value is < 0.0001, considered extremely significant.

Graph-1: Correlation between BMI and MRS score.
Graph-1 shows that there is a positive correlation between BMI and MRS score of the postmenopausal females. With greater BMI there is a mildly significant increase in MRS score hence affecting the HRQoL.

2. **CORRELATION BETWEEN DURATION OF MENOPAUSE AND MRS SCORE**
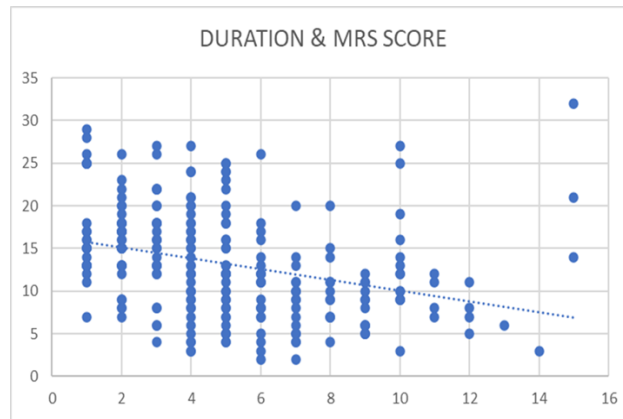
Linear Correlation
Sample size = 256
Correlation coefficient (r) = -0.3129
95% confidence interval: -0.4194 to -0.1978
Coefficient of determination (r squared) = 0.09788
Test: Is r significantly different than zero?
The two-tailed P value is < 0.0001, considered
extremely significant.

Graph-2: Correlation between duration of menopause and MRS score.
Graph-2 shows that there is a weak negative correlation between the duration of menopause and MRS score.

3. **CORRELATION BETWEEN BMI AND BLADDER PROBLEMS**
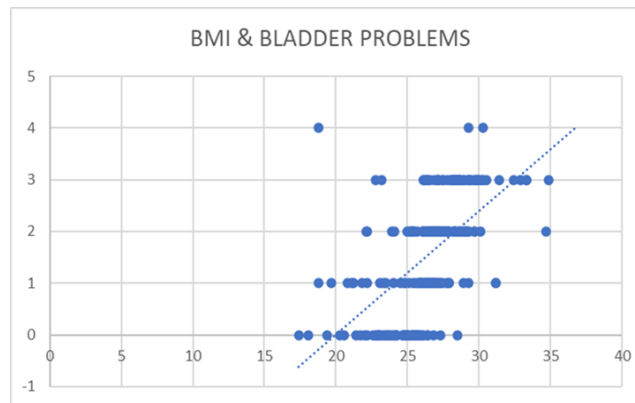
Linear Correlation
Sample size = 256
Correlation coefficient (r) = 0.5822
95% confidence interval: 0.4949 to 0.6579
Coefficient of determination (r squared) = 0.3390
Test: Is r significantly different than zero?
The two-tailed P value is < 0.0001, considered
extremely significant.

Graph-3: Correlation between BMI and bladder problems.
Graph-3 shows that there is a strong positive correlation between BMI and bladder problems. The greater the BMI greater the score for bladder problems in the MRS.

RESULT –

☐ A total of 256 samples are taken in this study, which includes postmenopausal females between the age of 45 to 55 years with naturally induced menopause. The questionnaire was explained to every individual.

☐ Based on statistical analysis,

☐ Table 1 shows that out of a total of 256 postmenopausal females 118 females are between the age of 45 to 50 years, and 138 females are between the age of 51 to 55 years.

☐ Figure 1 shows that out of a total of 256 postmenopausal females 46% belong to the age group of 45 to 50 years, and 54% belong to the age group of 51 to 55 years.

 Table 2 shows that out of a total of 256 postmenopausal females, 163 females have a duration of 1 to 5 years between the present age and age of menopause, 80 females have a duration of 6 to 10 years and 13 females have a duration of 11 to 15 years.

 Figure 2 shows that out of a total of 256 postmenopausal females, 64% have a duration of 1 to 5 years between the present age and age of menopause, 31% have a duration of 6 to 10 years and 5% have a duration of 11 to 15 years.

 Table 3 shows that out of a total of 256 postmenopausal females, 2 females fall in the 'underweight' category according to the BMI score, 51 females fall in the 'normal' category, 187 females fall in the 'overweight' category and 16 females fall in the 'Class I obese' category.

 Figure 3 shows that out of a total of 256 postmenopausal females, 1% fall in the 'underweight' category according to the BMI score, 20% fall in the 'normal' category, 73% fall in the 'overweight' category, and 6% fall in the 'Class I obese' category.

 Graph 1 shows that there is a positive correlation between BMI and MRS score of the postmenopausal females. With greater BMI there is a mildly significant increase in MRS score hence affecting the HRQoL.

 Graph 2 shows that there is a weak negative correlation between the duration of menopause and MRS score.

 Graph 3 shows that there is a strong positive correlation between BMI and bladder problems. The greater the BMI greater the score for bladder problems in the MRS.

DISCUSSION –

Menopause is a critical period in the life of every woman. The time of menopausal transition is often marked by metabolic changes that affect the health of a woman. Recent scientific reports indicate that already before the onset of menopause, referred to as the climacteric, it causes many unpleasant symptoms that worsen the quality of life of many women.[8] According to a survey conducted by Maninder Ahuja Jul-Sep 2016, the average age of menopause of an Indian woman is 46.2 years much less than their Western counterparts (51 years).[9]

The purpose of this study was to determine the correlation between Body Mass Index and Health-Related Quality of Life in Postmenopausal Women.

Nearly, 50% to 80% of women complain of menopausal symptoms such as hot flushing, sweating, sleep disturbance, tiredness, and depression. Menopause can have psychological, physical, and vasomotor symptoms along with sexual dysfunction. These symptoms can affect the quality of life (QOL). A review study in 2015 reported that different sociodemographic factors such as body mass index (BMI), marital dimension, economic dimension, educational level, working status, duration of menopause, parity, and race affected the QOL in menopausal women.[8]

A body mass index (BMI) of 30 kg/m^2 was associated with a poor HRQoL in postmenopausal women. Thus, clinical management of obese postmenopausal women should focus on weight reduction and exercise to improve well-being in these areas.[10] Numerous studies have shown that obesity is associated with a poor HRQoL in women and that this also appears to be worse when compared with men too. One area where the relationship between obesity in women and HRQoL appears particularly important is in relation to the postmenopausal period.[10] In one of the studies by Karen E. Dennis, it was stated that obese postmenopausal women stand at a crossroads between living the remainder of their lives in essentially good health or facing the likely onset of chronic diseases that might have been prevented.[11]

According to a study conducted by Amanda Daley et. al significant BMI effects were found for the subscales vasomotor symptoms $(F[2,1109] = 3.57, P<0.03)$, somatic symptoms $(F[2,1075] = 5.10, P<0.01)$, and attractiveness $(F[2,1086] = 18.10, P<0.001)$. Follow-up tests revealed that women who were obese reported significantly higher vasomotor symptoms $(P<0.01)$ scores than women of normal weight. Women who were obese also reported significantly higher somatic symptom scores than women of normal weight or those who were overweight (all $P<0.01$).[12]

A high BMI implies a greater amount of adipose tissue which converts adrenal androgens to estrogens. This may, in turn, alleviate symptoms. In this way, exercise may increase vasomotor symptoms by reducing adipose tissue. Other authors have proposed that exercise, (which theoretically should lower BMI), may have a similar effect to HRT in the amelioration of vasomotor symptoms by increasing the presence of peripheral serum levels of ß-endorphins, and by stabilizing the thermoregulatory centre, thereby reducing symptoms.[12]

According to a study conducted by Sakineh Mohammad-Alizadeh-Charandabi et al, "Predictors of Health-Related Quality of Life in Postmenopausal Women: A Population-Based Study" Regression analysis showed that a longer duration of post-menopause was not an appropriate predictor of quality of life. Therefore, lower quality of life among women with a duration of post-menopause of more than 4 years could probably be the result of other factors such as aging or the presence of chronic diseases.[13]

While Nelson et al.[14] in their review and Khaledian[15] in his study in Tehran (Iran) failed to establish relations between dimensions of quality of life and duration of menopause, Nisar and Ahmed Sohoo evaluated rural women of Pakistan and found longer duration of post-menopause to be associated with lower scores of quality of life.[16] Such differences might have been caused by various factors such as race, genetics, sociocultural factors, area of the study (rural), and age range of the participants.[13]

Urinary incontinence (UI) is an important social problem that affects more than 50% of postmenopausal women.[8] The number of patients increases from year to year, affected by the rapid social development contributing to a sedentary lifestyle. This trend is particularly evident in the elderly, who often spend their free time watching TV and do not practice sports. These factors weaken the overall performance of the body, leading to weakness of the muscles, the result is the emergence of numerous pathologies and dysfunctions of the body that cause a significant reduction in quality of life.[8]

Urinary incontinence is the main symptom of genitourinary syndrome of menopause (GSM) and is often associated with sexual dysfunctions. GSM is a hypoestrogenic condition with external genital, urological, and sexual implications. This disease causes several symptoms including vaginal dryness, insufficient lubrication, and discomfort during sexual activity.[8]

In postmenopausal women, the incidence of the disease is doubled. This is primarily because urinary tract infection reduces the level of estrogen in the blood. As a result, this situation causes the reduction of the urethra. Sometimes the urethra is shortened to 1-2 cm. Moreover, very often it is followed by muscle weakness and also the reconstruction of the bladder and the muscles

responsible for the excretion of urine. The most dangerous is abdominal obesity. Studies show that obese women are 4-5 times more likely to suffer from incontinence than those of normal weight. Obese person's treatment of UI should start with a weight reduction of at least 5%. Recent scientific reports indicate that weight loss of 5% causes a reduction of objective symptoms of Stress Urinary Incontinence (SUI).[8]

Numerous scientific reports indicate that a Physiotherapy procedure gives a positive result in up to 80% of patients with stage I or SUI and mixed form, and in 50% of patients with stage II SUI. It is now believed that the most effective form of therapy is a combination of electrical stimulation of the pelvic floor muscle training with the active muscle.[8]

CONCLUSION -

The study concludes that,

☐ There is a positive correlation between BMI and health-related quality of life of postmenopausal women i.e., the greater the BMI of the female more severe the symptoms faced, and hence the poor quality of life.

☐ There is a weak negative correlation between the duration of menopause and the Menopause Rating Scale score i.e., the more the duration of menopause, the lesser the severity of symptoms faced.

☐ There is a strong positive correlation between BMI and bladder problems in postmenopausal women i.e., the greater the BMI of the female, bladder problems faced are more severe.

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