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Osteoporosis Knowledge and Preventive Behaviour Among Perimenopausal Women

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ABSTRACT

Osteoporosis is a major public health concern, particularly among perimenopausal women due to hormonal changes that accelerate bone loss. Adequate knowledge and the adoption of preventive behaviors are essential to reduce the risk and burden of osteoporosis in this vulnerable group. The purpose of the study was to assess knowledge and preventive behavior among perimenopausal women in Adatt panchayath, Thrissur. The objectives of the study were to assess the level of knowledge and osteoporosis preventive behavior among perimenopausal women and to find out the correlation and association between level of knowledge and preventive behavior among perimenopausal women with sociodemographic variables. The study was based on a quantitative approach and descriptive research design.

Keywords: Osteoporosis knowledge, Preventive behaviour, Perimenopausal women

INTRODUCTION

Osteoporosis is a progressive metabolic condition that weakens bones without obvious symptoms, often going unnoticed until a fracture occurs[1]. This deterioration increases the risk of fractures, particularly in the spine, hip, and wrist, which can lead to significant disability and reduced mobility. In severe cases, osteoporosis-related fractures can contribute to complications that elevate the risk of mortality. Because of its silent nature, early detection and preventive measures are crucial in minimizing its impact.

Perimenopausal women are at increased risk of osteoporosis due to declining estrogen levels, which play a key role in maintaining bone density. As estrogen decreases during perimenopause, bone resorption (breakdown) outpaces bone formation, leading to weakened bones and a higher risk of fractures. Without proper prevention, such as calcium and vitamin D intake, weight-bearing exercises, and lifestyle modifications, osteoporosis can develop, making bones more fragile and prone to breaks, especially in postmenopausal years[5]

According to the National Osteoporosis Foundation (NOF)[2], an estimated ten million people are currently living with osteoporosis, while nearly 34 million others have low bone mass. This reduced bone density significantly increases their risk of developing osteoporosis in the future, making early detection and preventive measures essential in reducing fractures and associated complications. Globally, osteoporosis affects an estimated 200 million women. It impacts around 10% of women in their 60s, 20% of those in their

70s, 40% of women in their 80s, and 66% of those in their 90s[3].

Perimenopausal women are those going through the transitional stage before menopause, typically in their 40s but sometimes earlier or later. This phase, called perimenopause, can last several years and is marked by fluctuating hormone levels, leading to symptoms such as irregular periods, hot flashes, mood swings, sleep disturbances, and vaginal dryness. Once a woman goes 12 consecutive months without a period, she is considered menopausal, and perimenopause ends[4].

Osteoporosis, a metabolic bone disease characterized by low bone mineral density and deterioration of bone microarchitecture, has led to a high risk of fatal osteoporotic fractures worldwide[6].

Osteoporosis affects more than 30% of postmenopausal women due to hormonal changes that occur during this time[8]. In India, a sizeable share of the female population is in the postmenopausal or perimenopausal stage. Issues related to aging in women are an increased risk of broken bones, a decrease in cortical and cancellous bone thickness, and a decrease in bone mineral density (BMD). Osteoporosis has a severely detrimental effect on the life of women, lowering their standard of living, decreasing the quality of their lives, and increasing their likelihood of fractures.[9]

We are facing an aging society where the average life expectancy continues to increase. In peri-menopausal women and for the next 10 years of their post-menopausal period the BMD loss is 2-3% per year, and then within subsequent years it decreases [7].

A population-based study conducted by Kröger H, Tuppurainen M, Honkanen R, Alhava E, Saarikoski S assessed the impact of menopause and behavioral risk factors on bone mineral density (BMD) in 1,600 perimenopausal women aged 48–59 years from the Kuopio Osteoporosis Risk Factor and Prevention Study. Dual X-ray absorptiometry (DXA) revealed a wide variation in spinal and femoral neck BMD among participants. Menopause was found to significantly lower BMD, with postmenopausal women showing a 6.2% reduction in spinal BMD and a 3.9% reduction in femoral neck BMD compared to premenopausal women. Multiple regression analysis identified weight, menopausal status, age, and grip strength as significant predictors of BMD at both sites. Physical activity was specifically associated with higher femoral BMD, while alcohol consumption influenced spinal BMD. Despite these associations, only 18.7–25.4% of the variability in BMD could be explained by these factors. Therefore, while certain risk factors may guide screening, bone densitometry remains essential for accurately identifying osteoporosis risk.[8]

A descriptive study conducted by Miranda JP, Adhikari P aimed to identify unhealthy lifestyle practices among perimenopausal women using a lifestyle appraisal questionnaire. A total of 148 women aged 45 to 55 participated, with data collected through self-reported responses and standard measurements of BMI and blood pressure. Results revealed that many participants exhibited unhealthy lifestyle habits, such as lack of regular exercise, poor dietary patterns, and limited engagement in relaxation or recreational activities. Emotional and social support was found to be inconsistent, with most women experiencing occasional stress and limited affection from loved ones. The average lifestyle appraisal score indicated a tendency toward unhealthy behaviors, and nearly half of the participants were classified as overweight. These findings underscore the need for greater awareness and support for healthy lifestyle habits during the perimenopausal phase. Implementing simple screening tools can effectively identify risk factors and promote long-term health and well-being among midlife women.[2]

A cross-sectional study was conducted on 1,075 perimenopausal women in Najran City, Saudi Arabia, from January to March 2023. Data were collected using a self-reported questionnaire, including basic

demographics, the OPB scale, an osteoporosis knowledge assessment tool, and the osteoporosis health belief scale. Results showed that 27.8% of participants had high OPB, with an overall mean score of 20.83 ± 5.08. The high OPB group had a higher knowledge mean (11.37 ± 2.99) than the low OPB group (9.93 ± 3.51). All health belief constructs significantly differed between the groups ($p < 0.05$). Factors such as age, occupation, education, training attendance, and fracture history were linked to high OPB. Additionally, osteoporosis knowledge, perceived susceptibility, seriousness, exercise benefits, and health motivation were positive predictors of high OPB ($p < 0.05$). The study highlights the effectiveness of the health belief model in identifying at-risk groups with low OPB and guiding targeted educational interventions[10].

A cross-sectional study at the Military Hospital in Ambala, India (May 2021–December 2023) assessed osteoporosis awareness among 1,326 postmenopausal women (ages 45–70) who had undergone BMD testing. Using the Osteoporosis Knowledge Assessment Tool (OKAT), findings revealed low awareness, with a mean knowledge score of 7.44±3.16 (median: 7.2). Only 16.66% (221 women) had higher knowledge, while 73.13% (983 women) were unaware of osteoporosis. Education influenced awareness, as graduates were better informed, often through hospital staff or family members. Despite their risk, most women lacked sufficient knowledge, attitudes, and behaviors regarding 3osteoporosis, highlighting the need for targeted education and awareness campaigns.[11]

Further research in osteoporosis preventive behavior among perimenopausal women is essential to developing more effective strategies for early intervention and risk reduction. As osteoporosis is a silent disease with long-term consequences, expanding studies in this field can help identify key behavioral, genetic, and environmental factors influencing bone.

STATEMENT OF THE PROBLEM

A study on osteoporosis knowledge and preventive behavior among perimenopausal women in selected community, Thrissur.

OBJECTIVES

1. To assess the level of knowledge regarding osteoporosis among perimenopausal women.
2. To assess the level of osteoporosis preventive behaviors adopted by perimenopausal women.
3. To find the correlation between level of knowledge and preventive behaviour among perimenopausal women.
4. To find the association between level of knowledge and preventive behaviour with selected socio demographic variables.

MATERIALS & METHODS

Research approach

The research approach adopted for this study is quantitative approach.

Research design

The research design used in this study is descriptive design.

Setting of the study

The study is conducted in selected wards of Adatt panchayat, Thrissur.

Population

Women in perimenopausal period from Adatt panchayath.

Sample

Women in perimenopausal period from Adatt panchayath who meets the inclusion criteria.

Sampling Technique: Convenience sampling technique

Sample Size

Sample consists of 79 perimenopausal women from Adatt panchayath.

Inclusion criteria

- Women included are:
- Women aged 40-55 years.
- Willing to participate.
- Able to read and understand Malayalam.

Exclusion Criteria

- The women excluded are:
- Women aged less than 40 years and more than 55 years.
- Women with mental illness.
- Women with any chronic illness affecting bone health

Description of tool

TOOL 1: Sociodemographic tool

I Basic information
II Marital status
III Clinical variables
IV Health and medical history
V Lifestyle and behavioural factors
VI Dietary habits

TOOL 2: Osteoporosis Knowledge Assessment Tool (OKAT)

The Osteoporosis Knowledge Assessment Tool (OKAT) is a standardized instrument used to evaluate an individual's understanding of osteoporosis, including its causes, risk factors, prevention strategies (such as diet and exercise), symptoms, and treatment options.

Scoring

Poor knowledge: 0-5
Acceptable knowledge: 6-10
Average knowledge: 11-15
Good knowledge: 16-20

TOOL 3: Osteoporosis Preventive Behavior (OPB) scale

The Osteoporosis Preventive Behavior Scale (OPB) is a structured questionnaire designed to measure the frequency and adherence to behaviors that help prevent osteoporosis, including nutrition, exercise, lifestyle habits, and health monitoring. It is composed of seven statements rated on a 5-point Likert scale listed as always (5), usually (4), sometimes (3), rarely (2), and never (1).

Scoring

Low osteoporosis preventive behavior :7-21
High osteoporosis preventive behavior: 22-35

Data Collection Procedure

Data collection is the gathering of information to address a research problem. Panchayath approval will be obtained. The data were collected from 79 perimenopausal women selected using convenience technique based on inclusion criteria. The data collection was done with the help of structured questionnaires-Osteoporosis Knowledge Assessment Tool (OKAT) and Osteoporosis Preventive Behaviour Scale (OPB). After a brief self-introduction, the purpose of study was explained and obtained informed consent from the local authority- panchayath, Thrissur. It took a maximum of 15 minutes to fill a questionnaire.

RESULT

The data collected from 79 subjects were organized, tabulated and later subjected to statistical analysis and findings of study have been presented under the following headings.

SECTION A: DISTRIBUTION OF PERIMENOPAUSAL WOMEN ACCORDING TO SOCIODEMOGRAPHIC VARIABLES

Figure 1: Frequency and percentage distribution of perimenopausal women according to age. n= 79

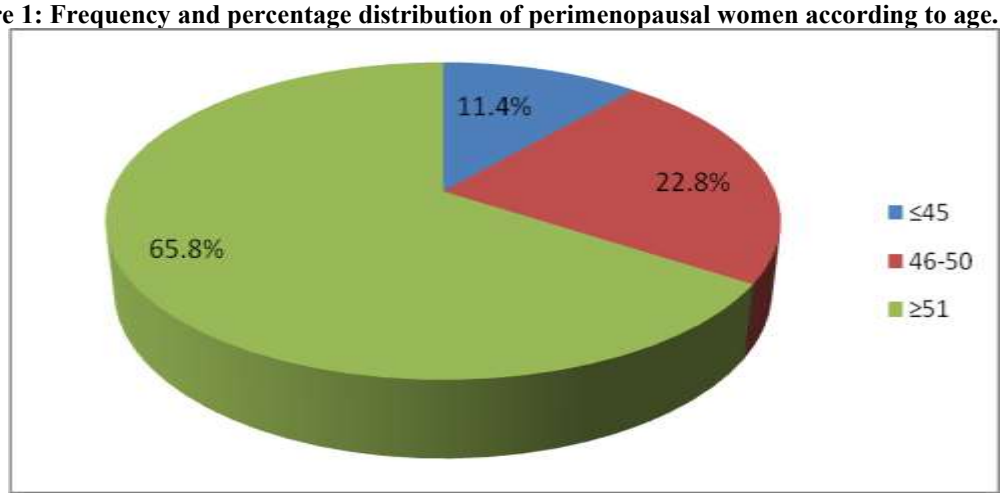


Figure 1 shows that majority (65.8%) of the samples were in the age group above 51 years,22.8% were in the age group of 46-51 years, 11.4% belongs to age group of less than 45 years.

Figure 2: Frequency and percentage distribution of perimenopausal women according to educational status. n=79

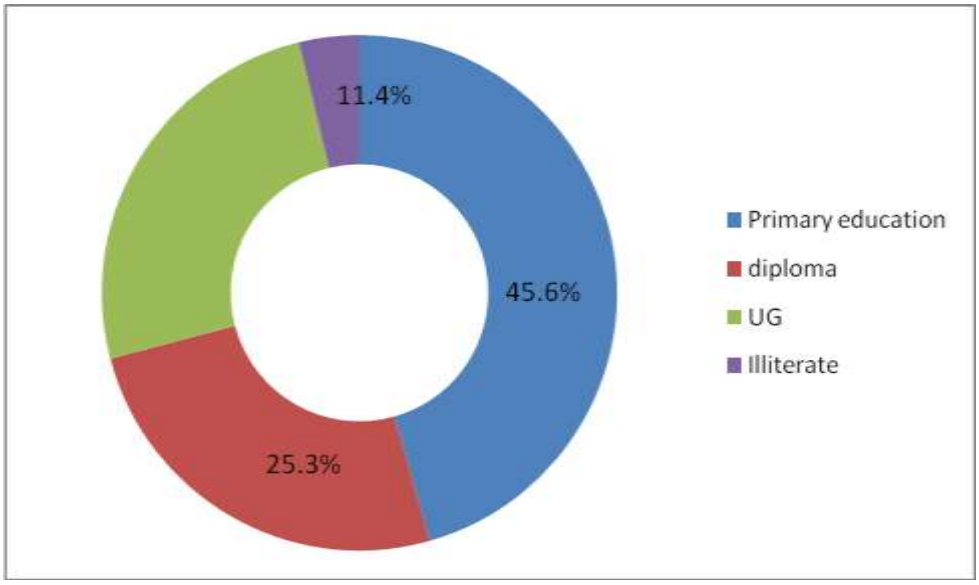


Figure 2 shows that majority 45.6% of the subjects has completed primary education,25.3% has completed diploma, 25.3% were undergraduate and 11.4% were illiterate.

Table 1: Frequency and percentage distribution of perimenopausal women according to occupation. n=79

Occupation	Frequency	Percentage
Private	33	41.8
Government	9	11.4
Others	17	21.5
Nil	20	25.3

Table 1 reveals that nearly 42% are employed in the private sector, while only about 11.4 % hold government jobs. Meanwhile, the nearly one-quarter (25%) labeled “Nil”

Figure 3: Frequency and percentage distribution of perimenopausal women according to marital status. n=79

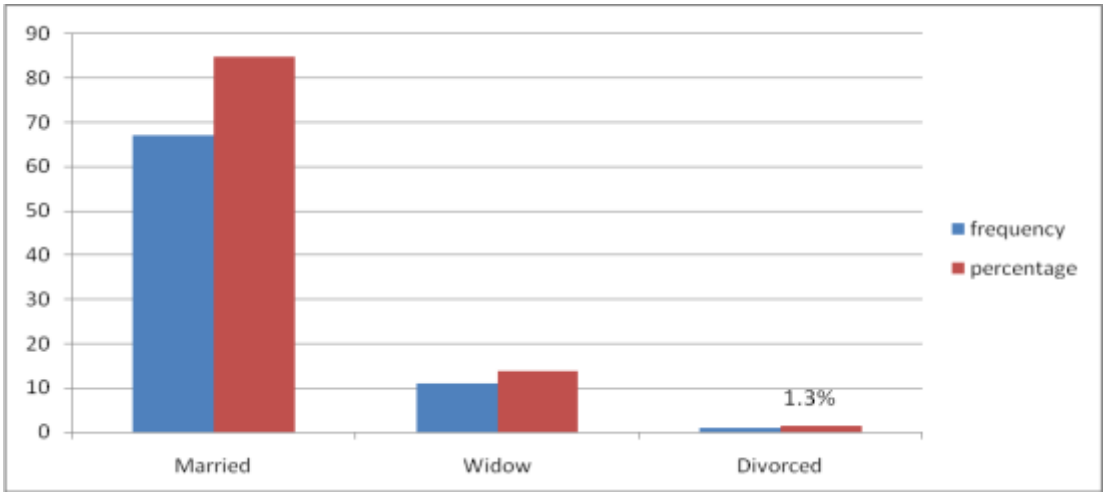


Figure 3 shows the majority (84.8%) of the subjects were married, 13.9% were widow and 1.3% were divorced.

Figure 4: Frequency and percentage distribution of perimenopausal women according to age in menarche. n=79

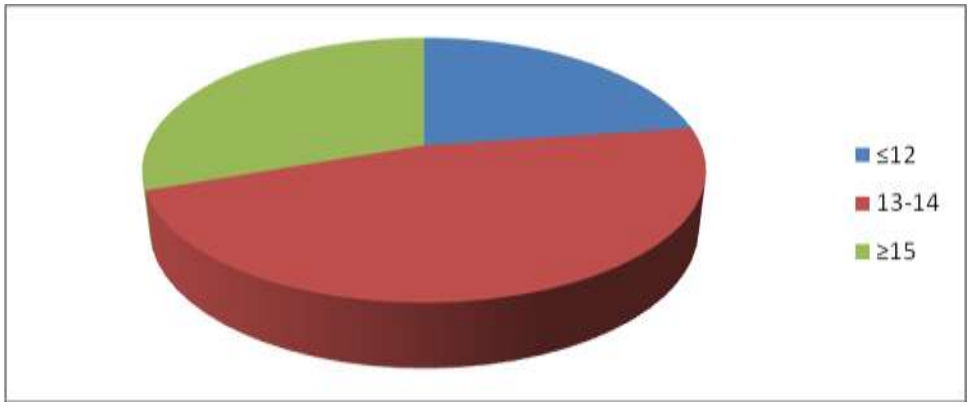


Figure 4, Data reveals that nearly half of the subjects (46.8%) had menarche at the age between 13-14 years, where 30.4% above 15 years, rest of the samples had menarche at the age less than 12 years.

Figure 5: Frequency and percentage distribution of perimenopausal women according to regular and irregular menstruation. n=79

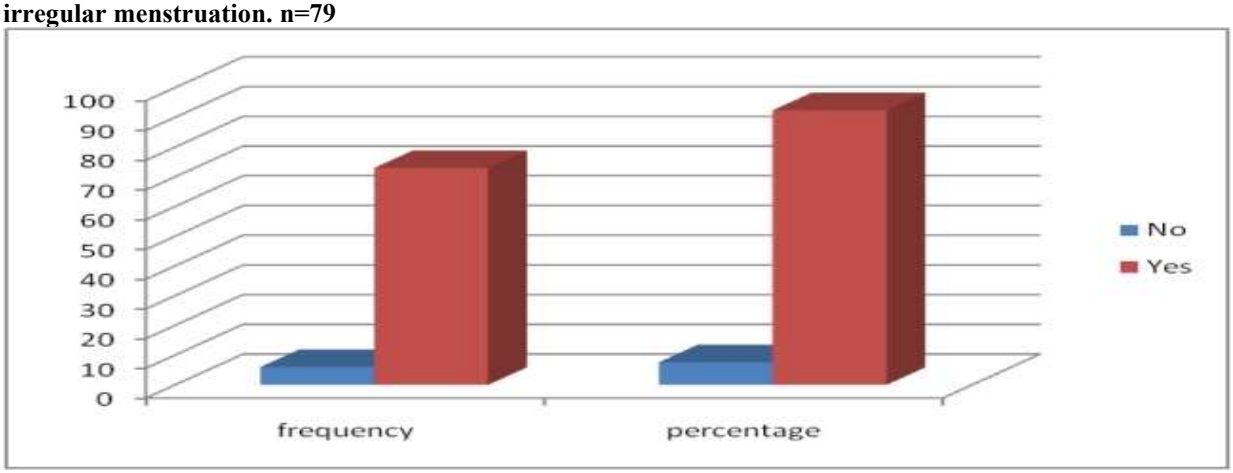


Figure 5, shows that significant majority of participants (92.4%) reported having regular menstruation, while only a small proportion (7.6%) experienced irregular menstrual cycles.

Figure 6: Frequency and percentage distribution of perimenopausal women according to menstrual problems. n=79

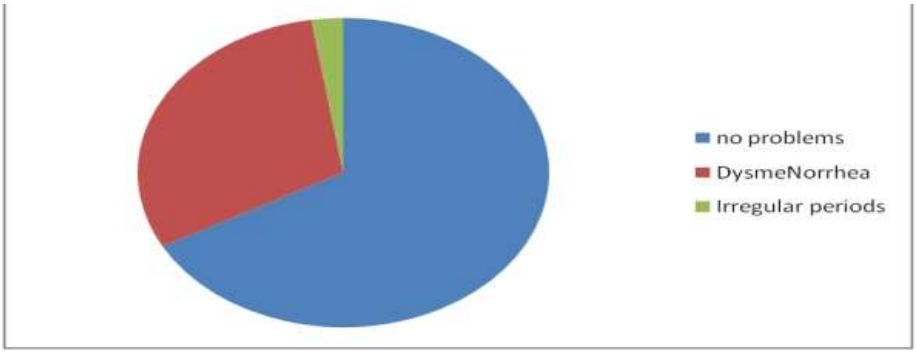


Figure 6, majority of participants (67.1%) reported no menstrual problems, 30.4% experienced dysmenorrhea, only a small fraction (2.5%) faced irregular periods.

Table 2: Frequency and percentage distribution of perimenopausal women according to duration of menstrual cycle. n=7

DURATION OF MENSTURAL CYCLE	FREQUENCY	PERCENTAGE
4-7 Days	60	75.9
Less than 3 Days	11	13.9
More than 7 days	8	10.1

Figure 7: Frequency and percentage distribution of perimenopausal women according to mode of delivery. n=79

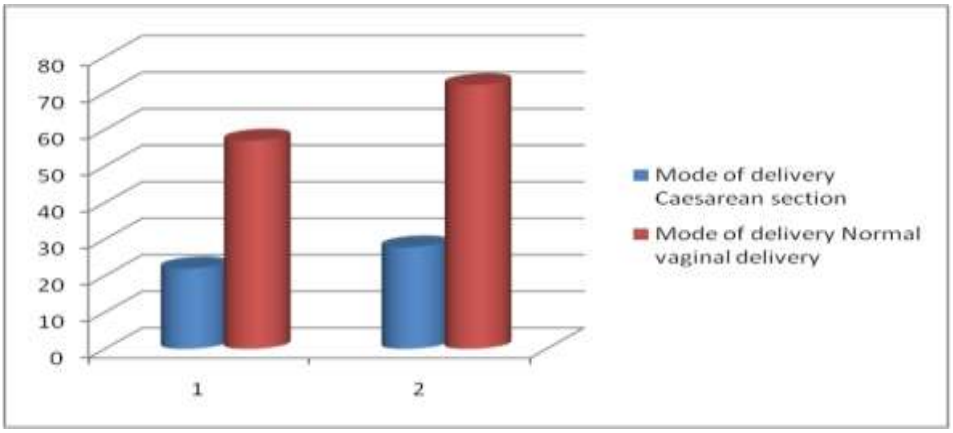


Figure 7, shows that majority of deliveries were conducted through normal vaginal delivery (72.2%) of the cases. Caesarean sections made up 27.8%, indicating a relatively lower reliance on surgical delivery methods in this group.

Figure 8: Frequency and percentage distribution of perimenopausal women according to history of bone fracture. n=79

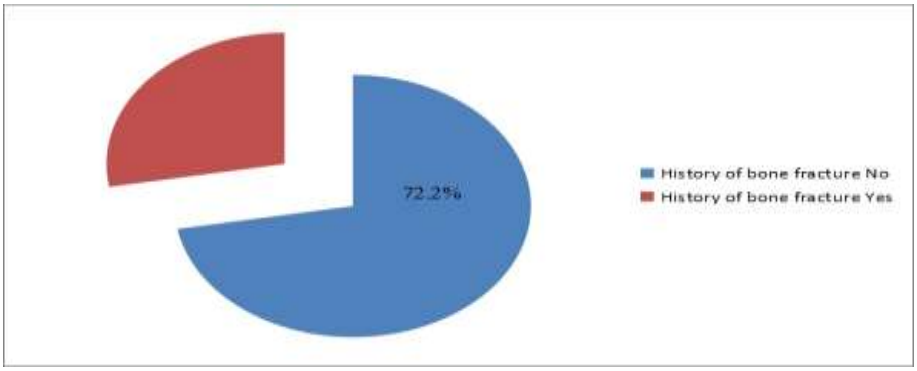


Figure 8, shows that majority has no history of bone fracture was reported by 72.2% of individuals, while 27.8% had such history.

Table 3: Frequency and percentage distribution of perimenopausal women according to family history of osteoporosis. n=79

FAMILY HISTORY OF OSTEOPOROSIS	FREQUENCY	PERCENTAGE
NO	58	73.4%
YES	21	26.6%

Table 3 shows that majority 73.4 % has no family history of osteoporosis and 26.6 % has history of osteoporosis.

Table 4: Frequency and percentage distribution of perimenopausal women according to exercise. n=79

EXERCISE	FREQUENCY	PERCENTAGE
NO	42	53.2%
YES	37	46.8%

Table 4 shows that vast majority (53.2%) involves in daily activities, 46.8% does not involve in daily activities.

Figure 9: Frequency and percentage distribution of perimenopausal women according to smoking (in family). n=79

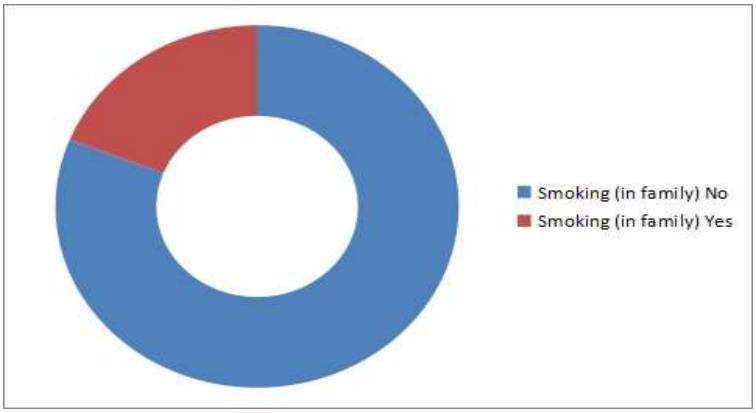


Figure 9, shows that majority of the family 81.0% has no history of smoking while, 19.0 % has history of smoking.

Figure 10: Frequency and percentage distribution of perimenopausal women according to alcoholism (in family). n=79

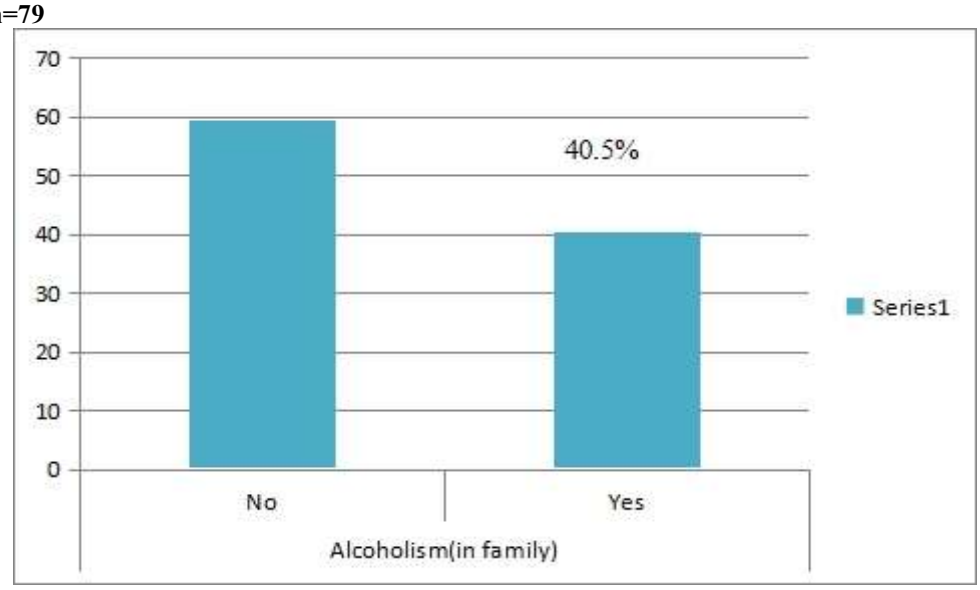


Figure 10, shows that 59.5% of the family consume alcohol while, 40.5% does not consume alcohol.

Figure 11: Frequency and percentage distribution of perimenopausal women according to salt consumption. n=79

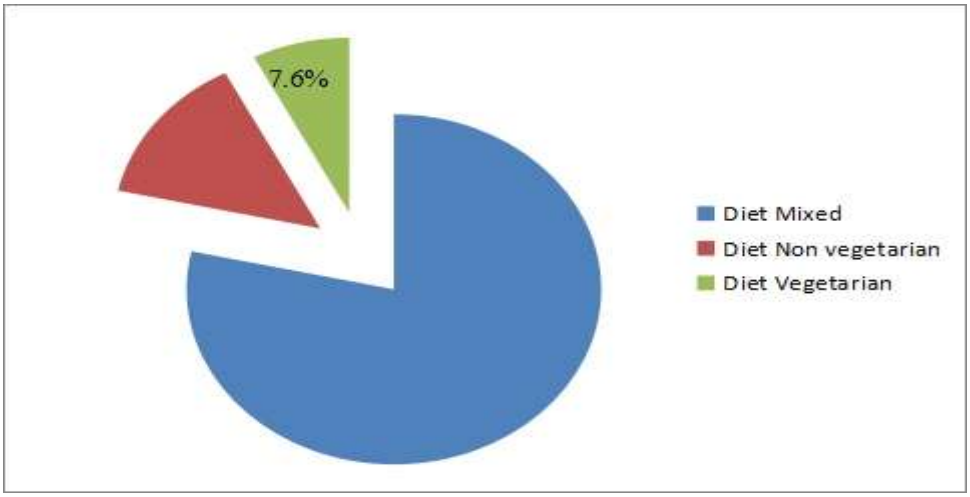


Figure 11, shows that majority (78.5 %) of subjects consume mixed diet, 13.9% consume non vegetarian and 7.6 % are vegetarians.

Table 5: Frequency and percentage distribution of perimenopausal women according to salt consumption. n=79

SALT CONSUMPTION	FREQUENCY	PERCENTAGE
NO	59	74.7%
YES	20	25.3%

Table 5 shows that majority of the subject (74.7%) does not consume salt while ,25.3% consumes salt.

Table 6: Frequency and percentage distribution of perimenopausal women according to consumption of dairy products. n=79

CONSUMPTION OF DAIRY PRODUCTS	FREQUENCY	PERCENTAGE
NO	32	40.5%
YES	47	59.5%

Table 6 shows that majority (59.5%) consumes dairy products while,40.5% does not consume dairy products

Figure 12: Frequency and percentage distribution of perimenopausal women according to caffeine intake. n=79

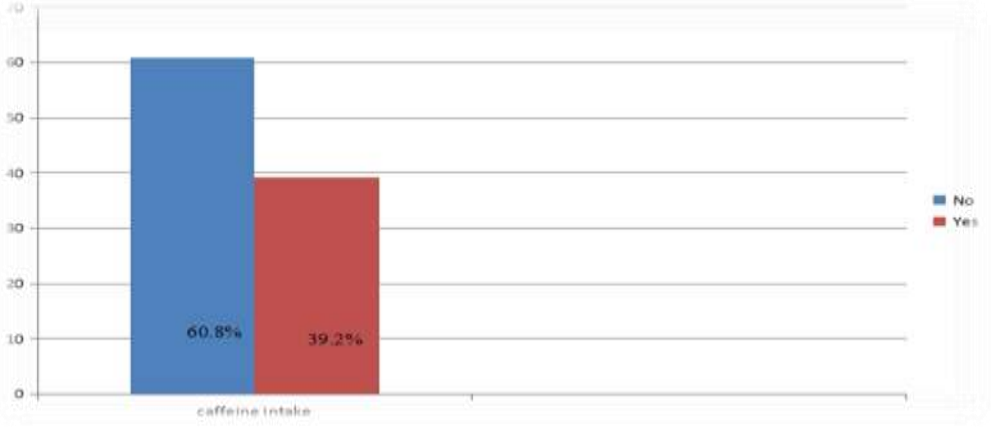


Figure 12, shows that majority (60.8%) of subjects does not consumes caffeine while, 39.2% consume caffeine.

SECTION B: OSTEOPOROSIS KNOWLEDGE AMONG PERIMENOPAUSAL WOMEN.

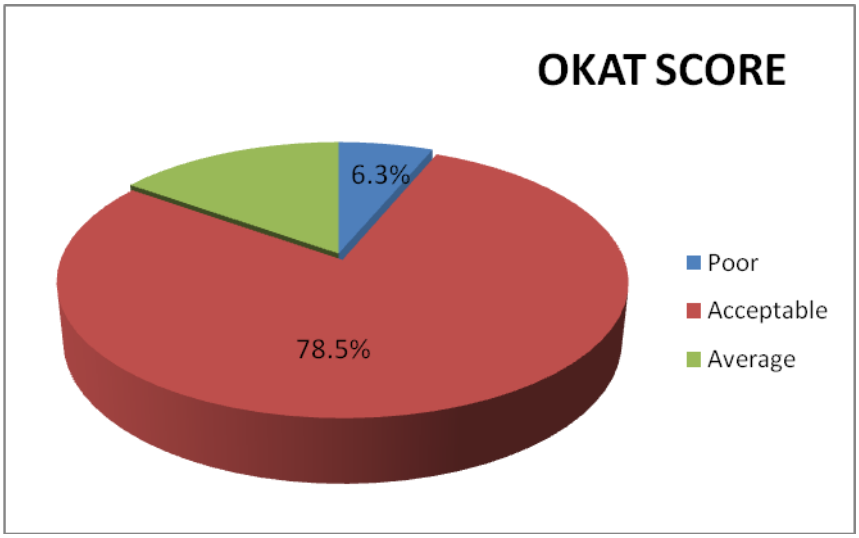
This section describes the osteoporosis knowledge among perimenopausal women, including understanding of osteoporosis, its causes, risk factors, symptoms, preventive strategies and treatment.

Table 7: Frequency and distribution of perimenopausal women based on osteoporosis knowledge. n=79

OKAT Score	Frequency	Percentage
Poor Knowledge	5	6.3
Acceptable Knowledge	62	78.5
Average Knowledge	12	15.2
Total	79	100.0

Table shows that the majority of participants (78.5%) had acceptable knowledge about osteoporosis, indicating a generally good awareness level. A smaller group (15.2%) demonstrated average knowledge, suggesting the need for further education to enhance their understanding. Only 6.3% of participants had poor knowledge, highlighting a minor but important gap that should be addressed through targeted awareness programs. Overall, the findings suggest that while most participants are well-informed, educational interventions are still needed for the remaining individuals to ensure comprehensive knowledge among all.

Figure 13: Frequency and distribution of perimenopausal women based on osteoporosis knowledge assessment tool. n=79

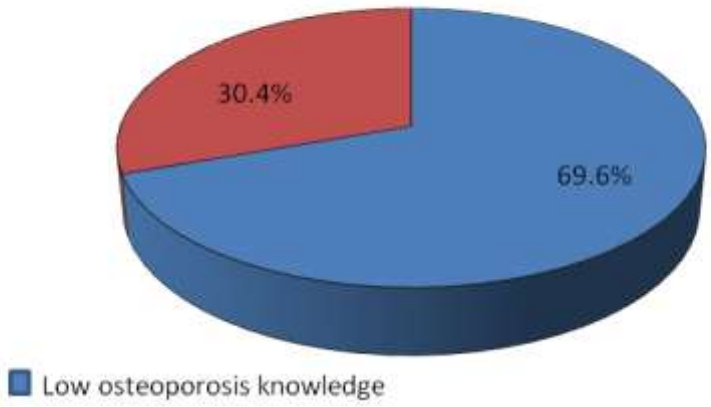


This figure 13, presents that the vast majority (78.5%) shows acceptable osteoporosis knowledge, where 15.2% of the subjects exhibit average knowledge, only a small majority (6.3%) have poor osteoporosis knowledge.

SECTION C: OSTEOPOROSIS PREVENTIVE BEHAVIOUR AMONG PERIMENOPAUSAL WOMEN.

This section describes the osteoporosis preventive behavior among perimenopausal women which measure the frequency and adherence to behaviors that help prevent osteoporosis, including nutrition, exercise, lifestyle habits, and health monitoring.

Figure 14: Frequency and distribution of perimenopausal women based on osteoporosis preventive behavior scale



The figure 14 shows that above half of the subject (69.6%) shows low osteoporosis knowledge, where 30.4% exhibit only high osteoporosis knowledge, highlighting a substantial educational gap.

SECTION D: ASSOCIATION BETWEEN LEVEL OF KNOWLEDGE AND PREVENTIVE BEHAVIOUR WITH SELECTED SOCIODEMOGRAPHIC VARIABLES.

Table 8: Frequency and distribution of perimenopausal women based on association of osteoporosis knowledge assessment scale.

		OKAT			Total	p value (fisher's exact test)
		Poor	Acceptable	Average		
Salt consumption	No	5(8.5%)	43(72.9%)	11(18.6%)	59	0.047*
	Yes	0(0%)	19(95%)	1(5%)	20	

The data show a statistically significant association (p = .047*) between salt consumption and osteoporosis-related behavior or knowledge.

Table 9: Frequency and distribution of perimenopausal women based on association of osteoporosis preventive behavior scale. n=79

		OPB		Total	p value (fisher's exact test)
		Low	High		
Age (in years)	≤45	9(100%)	0(0%)	9	**0.013***
	46-50	14(77.8%)	4(22.2%)	18	
	≥51	32(61.5%)	20(38.5%)	52	
Education	Diploma	18(90%)	2(10%)	20	**0.027***
	Illiterate	3(100%)	0(0%)	3	
	Primary education	21(58.3%)	15(41.7%)	36	
	UG	13(65%)	7(35%)	20	
History of bone fracture	No	45(78.9%)	12(21.1%)	57	**0.004***
	Yes	10(45.5%)	12(54.5%)	22	
Diet	Mixed	41(66.1%)	21(33.9%)	62	**0.009***
	Non vegetarian	11(100%)	0(0%)	11	
	Vegetarian	3(50%)	3(50%)	6	

There is a significant association between age and OPB (p = 0.013*), with older women (≥51 years) more likely to demonstrate high preventive behaviors

compared to younger age groups. Education level also shows a significant association (p = 0.027*), History of bone fracture (p= 0.004*) and diet (p=0.009*) has statistically significant association.

SECTION E: CORRELATION BETWEEN LEVEL OF KNOWLEDGE AND PREVENTIVE BEHAVIOUR WITH SELECTED SOCIODEMOGRAPHIC VARIABLES.

This section deals with the correlation between osteoporosis knowledge and preventive behavior among perimenopausal women.

Table 10: Correlation between level of knowledge and preventive behaviour

	Pearson Correlation coefficient (r)	P value
OKAT & OPB	0.085	0.456*

The table shows that the Pearson correlation coefficient between OKAT and OPB is 0.085, indicating a very weak positive linear relationship.

DISCUSSION

The findings are presented in the following sections.

Section A: Distribution of perimenopausal women according to sociodemographic variables

Socio-demographic variables

In this study the majority (65.8%) of the samples were in the age group above 51 years,22.8% were in the age group of 46-51 years, 11.4% belongs to age group of less than 45 years.

Considering the educational status, 45.6% of the subjects has completed primary education,25.3% has completed diploma, 25.3% were undergraduate and 11.4% were illiterate

Considering the occupation, nearly 42% are employed in the private sector, while only about 11.4 % hold government jobs. Meanwhile, the nearly one-quarter (25%) labeled “Nil”

Reviewing marital status, majority (84.8%) of the subjects were married, 13.9% were widow and 1.3% were divorced.

Considering menstrual history, nearly half of the subjects (46.8%) had menarche at the age between 13-14 years, where 30.4% above 15 years, rest of the samples had menarche at the age less than 12 years

Considering the regularity of menstrual cycle, majority of participants (92.4%) reported having regular menstruation, while only a small proportion (7.6%) experienced irregular menstrual cycles.

Considering menstrual problems, majority of participants (67.1%) reported no menstrual problems, 30.4% experienced dysmenorrhea, only a small fraction (2.5%) faced irregular periods.

Evaluating duration of menstrual cycle, majority of participants (75.9%) reported a menstrual cycle duration of 4–7 days, a smaller portion reported shorter durations (13.9%) of less than 3 days, and 10.1% experienced prolonged menstruation lasting more than seven days.

Considering the mode of delivery, majority of deliveries were conducted through normal vaginal delivery (72.2%) of the cases. Caesarean sections made up 27.8%, indicating a relatively lower reliance on surgical delivery methods in this group

Assessing history of bone fracture, majority has no history of bone fracture was reported by 72.2% of individuals, while 27.8% had such history.

Considering history of osteoporosis, majority 73.4 % has no family history of osteoporosis and 26.6 % has history of osteoporosis.

Considering daily activities, vast majority (53.2%) involves in daily activities, 46.8% does not involve in daily activities.

Considering smoking history, that majority of the family 81.0% has no history of smoking while,19.0 % has history of smoking.

Considering alcohol intake in family,59.5% of the family consume alcohol while, 40.5% does not consume alcohol.

Considering dietary pattern, 78.5% of subjects consume mixed diet, 13.9% consume non vegetarian and 7.6 % are vegetarians.
Assessing consumption pattern of salt in the family, majority of the subject (74.7%) does not consume salt while, 25.3% consumes salt
Considering dairy consumption pattern,59.5% consumes dairy products while,40.5% does not consume dairy products
Considering caffeine intake, majority (60.8%) of subjects does not consume caffeine while, 39.2% consume caffeine

Section B: Osteoporosis knowledge among perimenopausal women.
Majority (78.5%) shows acceptable osteoporosis knowledge, where 15.2% of the subjects exhibit average knowledge, only a small majority (6.3%) have poor osteoporosis knowledge

Section C: Osteoporosis preventive behavior among perimenopausal women.
Half of the subject (69.6%) shows low osteoporosis knowledge, where 30.4% exhibit only high osteoporosis knowledge, highlighting a substantial educational gap.

Section D: Association between level of knowledge and preventive behavior with selected sociodemographic variables.
The study result shows that there is a statistically significant association ($p = .047$) between salt consumption and osteoporosis-related behavior or knowledge.
There is a significant association between age and OPB ($p = 0.013$), with older women (≥51 years) more likely to demonstrate high preventive behaviors compared to younger age groups.
Education level also shows a significant association ($p = 0.027$), History of bone fracture ($p= 0.004$) and diet ($p=0.009$) has statistically significant association.

Section E: Correlation between level of knowledge and preventive behaviour with selected sociodemographic variables.
The Pearson correlation coefficient of 0.085 between OKAT and OPB suggests that there is a very weak positive linear relationship between the two variables—meaning as one slightly increases, the other tends to increase very slightly as well. However, because the p-value is 0.456, which is much higher than the typical significance level of 0.05, this result is not statistically significant. This implies that the observed weak relationship could easily be due to random chance rather than a true connection. Therefore, we cannot conclude that a meaningful or reliable relationship exists between OKAT and OPB based on this data.

CONCLUSION

Perimenopausal women are at increased risk of osteoporosis due to declining estrogen levels, which play a key role in maintaining bone density. As estrogen decreases during perimenopause, bone resorption (breakdown) outpaces bone formation, leading to weakened bones and a higher risk of fractures. Without proper prevention, such as calcium and vitamin D intake, weight-bearing exercises, and lifestyle modifications, osteoporosis can develop, making bones more fragile and prone to breaks, especially in postmenopausal years

Declaration by Authors
Ethical Approval: Approved
Acknowledgement: Yes
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

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