

*SUMMARY
AND
CONCLUSION*

CHAPTER-V

SUMMARY AND CONCLUSION

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CHAPTER-V

SUMMARY AND CONCLUSION

5.1 INTRODUCTORY STATEMENT

The word "Osteoporosis" literally means "Porous bones" and it occurs when bones begin to lose some of their essential elements. The most important element to reduce osteoporosis in post-menopausal women is calcium and deficiency of it will reduce the bone mass. As a result, bones lose their strength, become fragile, and break easily. In extreme cases, even a sneeze or sudden movement can be enough to break a bone. The WHO working group defines osteoporosis as bone mineral density T score standard deviation at (or) below 2.5 and below it give normal peak values for young adults. Established or severe osteoporosis is present, when there is at least one or small fragility fracture in conjunction with a T score < 2.5 . Osteopaenia refers to T score between 1.0 and 2.5 Normal bone density is present if the T score is greater than 1.0. One out of 8 males and one out of 3 females in India suffers from osteoporosis, making India as one of the largest affected countries in the world. Expert group peg the number of osteoporosis patients at approximately 26 million (2003 figures) with the numbers projected to an increase to 36 million by 2013. Osteoporosis is a significant risk factor for morbidity and mortality in older adults specially in post menopausal women. These condition are characterized by poor bone strength and associated with an increased risk of the fractures from even slightly traumatic events. Difference in race, nutritional status, physical activity, life style and living conditions all contributes to it variability. Several demographic factors may be considered as barriers to health prevention like high rate of illiteracy and low socioeconomic status. Other factors that may contribute are sunlight exposure, poverty levels, nutrition and body weight, exposure to sex hormone at puberty and level of physical activity. Menopausal is the period in a women's life when she stops menstruating. During this period she also stops producing the hormone estrogen. Estrogen

normally helps in preventing the resorption of bone. As levels of estrogen fall in a women's body, she is at greater risk for osteoporosis. In the twentieth century the proportion of older persons started to rise and is expected to continue throughout this century. The number of individuals aged 60 and above is projected to grow to almost 2 billion by 2050, of which fifty-four percent live in Asia and the vast majority of these people will be living in the developing world. Such accelerated global population aging will increase economic and social demands on all countries. The estimated lifetime risk of osteoporotic fracture is as high as 50 percent, especially in white and Asian women. At present in India Osteoporotic fractures usually occurs in 10 to 20 years earlier in men and women compared to same in the west. The attainment of a higher peak bone density has an important role in the prevention of osteoporosis later in life. Genetic factors and race ethnicity have a strong influence on peak bone density. Physiological, environmental and modifiable lifestyle factors can also play a significant role. Those factors include adequate nutrition and body weight, exposure to sex hormones at puberty and level of physical activity. These factors are not only important for the acquisition of maximal bone mass but also for its maintenance throughout life.

5.2 SCOPE OF THE STUDY

Menopause is the cessation of the monthly female menstrual cycle. Menopause is associated with a reduction of estrogen secretion in women, resulting in decreased bone density that can lead to severe osteoporosis. Osteoporosis is one of three major chronic disease found in the aged, including post menopausal women. Post menopausal women are more likely to develop osteoporosis, a condition characterized by weakened bones that fracture easily. The drop in estrogen level that occurs at menopause results in increased bone loss. Consequently, changes in appetite may occur due to menopausal factors such as gustatory changes as well as physiological and psychological changes such as depression, joint pain and inability to work. As a result, the nutritional status of post menopausal women may be impaired specifically with regard to micro nutrients. It is now widely recognized that the cause of osteoporosis are multifactorial in nature and that there are wide variation in incidence across different population. Osteoporosis is

associated not only with menopause, but also other factors such as ovariectomy, smoking, lack of exercise, tobacco, insufficient calcium intake, excess intake of caffeine, alcohol, aerated drinks.

Thus the aim of this study was to investigate the risk factor of osteoporosis in post menopausal elderly women. This may supply us some more important information and will help us in prevention of osteoporosis. In future, our finding can be helpful for curing or preventing osteoporosis problems.

5.3 METHODOLOGY

5.3.1 Aims and Objectives

The study was planned with following aims and objectives:

1. To study the demographic characteristics of osteoporotic and non osteoporotic post menopausal women.
2. To study the anthropometric measurements of osteoporotic and non-osteoporotic post menopausal women.
3. To study the food consumption pattern of osteoporotic and non-osteoporotic post menopausal women.
4. To study the life style pattern of osteoporotic and non osteoporotic post menopausal women.
5. To study the reproductive health history of osteoporotic and non- osteoporotic post menopausal women.
6. To study the health condition and medication of osteoporotic and non-osteoporotic post menopausal women.

5.3.2 Hypothesis

On the basis of above mentioned objectives following hypothesis have been formulated:

1. There shall be no difference in demographic characteristics of osteoporotic and non- osteoporotic post menopausal women.
2. There shall be no difference in anthropometric measurements of osteoporotic and non-osteoporotic post menopausal women.
3. There shall be no difference in food consumption pattern of osteoporotic and non-osteoporotic post menopausal women.

4. There shall be no difference in life style pattern of osteoporotic and non-osteoporotic post menopausal women.
5. There shall be no difference in reproductive health history of osteoporotic and non-osteoporotic post menopausal women.
6. There shall be no difference in health condition and medication of osteoporotic and non-osteoporotic post menopausal women.

5.3.3 Materials and methods

The study was preceded with the selection of post menopausal women with osteoporosis and without osteoporosis. The sample was chosen by purposive sampling method. 250 osteoporotic post menopausal women were selected from hospitals, health centres and through camps and 250 non osteoporotic post menopausal women were selected by purposive sampling method.

The sample was studied for:

1. Demographic characteristics-

Age, education, occupation, marital status, caste, income group were collected through questionnaire method.

2. Anthropometric measurements-

Height for age and weight were measured through standard method and BMI was calculated.

3. Bone mineral density-

Bone mineral density was estimated by ultrasound method.

4. Food consumption pattern-

(a) Food pattern and food preferences were collected through questionnaire method.

(b) Food group intake was found through food frequency table.

(c) Dietary intake of nutrients was calculated by taking food intake through 24 hours dietary recall method.

5. Life style pattern-

Physical activity, exercise, alcohol consumption, smoking, tobacco chewing and aerated drinks were collected through questionnaire method.

6. Reproductive health history-

Menarche age, Age of menopause, parity and abortions were collected through questionnaire.

7. Health condition-

Data regarding health problems after menopause, like B.P., arthritis, asthma, diabetes, heart disease, joint pain, and kidney disease, medication (hormone replacement therapy) and history of fracture were collected through questionnaire method.

5.3.4 Statistical Analysis:

Mean and standard deviation of the Data obtained on ordinal scale were found. Data obtained on nominal scale were classified in frequencies and in percentage. Significance of difference in frequency distribution of both groups have been found out using chi-square and difference in mean scores have been found out using 'z' test .

5.4. RESULTS:

5.4.1 Demographic characteristics

5.4.1(a) Age

Mean age of the osteoporotic and non osteoporotic post menopausal women was found 55.3 years and 55.3 years respectively.

Non-significant difference of mean (0.11) score of age was observed for Z - value between osteoporotic and non-osteoporotic post menopausal women.

5.4.1(b) Education

Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women as per education obtained 10.84, which is significant.

Level of education of respondents found in the osteoporotic post menopausal women were 8% upto 10th class, 16.4% upto 12th class, 50% upto graduate and 25.6% upto post graduate level respectively.

In non osteoporotic post menopausal women, level of education found was 4.4% upto 10th class, 20.8% upto 12th class, 65.2% upto graduate and 9.6% upto post-graduate level.

5.4.1(c) Occupation

Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women obtained was 16.03, which is significant.

82.8% respondents in the osteoporotic post menopausal women were found to be working while in the non-osteoporotic post menopausal women 56.8%.

17.2% respondents in the osteoporotic post menopausal women were found to be non-working and in the non-osteoporotic post menopausal women 43.2% were non-working.

5.4.1(d) Marital Status

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Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women was obtained 0.0, which is not significant.

100% respondents in the osteoporotic and non-osteoporotic post menopausal women were found married.

5.4.1(e) Caste

Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women as per caste was obtained 41.4, which is significant.

The maximum number of respondents in the osteoporotic post menopausal women was Bhardwaj (60.8%) and Gupta (21.7%) and minimum respondents of Jain (9.2%), Sikh (3.4%), and Muslim (0.4%).

In the non- osteoporotic post menopausal women maximum respondents of Bhardwaj (44.6%), Muslim (25.7%), Sikh (19.4%) and minimum respondents of Jain (2.6%) and Gupta (7.7%) were found respectively.

5.4.1(f) Income Group

Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women as per income group obtained was 10.86, which is significant.

The maximum number of respondents belonging from low income group was 54.4%, middle income group 24.8% and minimum respondents belonging from higher income group 20.8% in the osteoporotic post menopausal women. On the other hand in the non-osteoporotic post menopausal women, 20.4% low income group, 45.6% middle income group and 34% respondents were belonging to higher income group respectively.

5.4.2 Anthropometric Measurement

5.4.2(a) Height status

Mean height of the osteoporotic and non-osteoporotic post menopausal women was found 154.9 cms and 153.6 cms respectively.

Non- significant difference of mean (0.21) scores of height was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.2(b) Weight status

Mean weight of the osteoporotic and non-osteoporotic post menopausal women was found 55.9 kg and 56.2 kg respectively.

Non-significant difference of mean (0.49) scores of weight was observed for Z-value between osteoporotic and non-osteoporotic post menopausal women.

5.4.2(c) Body Mass Index

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Mean BMI of the osteoporotic and non-osteoporotic post menopausal women was found 22.5 and 22.8 respectively.

Non-significant difference of mean (1.88) scores of BMI was observed for Z-value between osteoporotic and non-osteoporotic post menopausal women.

5.4.2(d) Bone Mineral Density

Mean bone mineral density of the osteoporotic and non-osteoporotic post menopausal women was found -2.6 and 1.3 respectively.

Significant difference of mean (51.82) scores of bone mineral density was observed for Z-value between osteoporotic and non-osteoporotic post menopausal women.

5.4.3 Food pattern

Chi-value for the distribution of food belief was 72.64, number of meals 32.72, time gap between meals 14.16, food preference 30.93, eating time 4.84 respectively were significant.

The number of respondents in food belief was 99.2% vegetarian, 0.8% non-vegetarian and ova vegetarian in the osteoporotic post menopausal women.

In the non-osteoporotic post menopausal women 45.2% were vegetarian and 54.8% non-vegetarian and ova vegetarian.

Regarding number of meals osteoporotic post menopausal women have taken 3 meals/day 46.4%, 2 meals/day 28.8% 4 meals/day 24.8% and non-osteoporotic post menopausal women have taken 4 meals/day 53.2%, 3 meals/day 44.4% and 2 meals/day 2.4% respectively.

The time gap between meals in 57.6% osteoporotic post menopausal women was 4 hrs, followed by 29.2% and 13.2% in 6 hrs and 8 hrs respectively.

In the non-osteoporotic post menopausal women time gap between meals was found 4 hrs(65.2%), 6 hrs (34.8%) and none were found in 8hrs gap.

In food preferences, 49.2% osteoporotic post menopausal women have taken normal food, 26.4% fried food, and 24.4% spicy food.

51.6% non-osteoporotic post menopausal women have taken normal food and 48.4% fried food, no one was taking spicy food.

Regarding their eating time in the osteoporotic post menopausal women 47.3% were certain and 52.8% were uncertain while in the non-osteoporotic post menopausal women 66.8% were certain and 33.2% were uncertain.

5.4.4 Food group intake

5.4.4(a) Cereals and pulses group-

In cereals and pulses group, the Chi-value obtained for stuffed paratha was 31.6, upma 33.1, poha 26.3, moong dal 72.5, tuar dal 79.4, masoor dal 27.1, which is significant.

The osteoporotic post menopausal women have taken stuffed paratha 28.4% occasionally, 37.4% monthly, 31.6% weekly, 2.0% twice a week.

On the other hand non-osteoporotic post menopausal women have taken stuffed paratha 10.4% occasionally, 29.2% monthly, 33.2% weekly, 27.2% twice a week.

Further more; osteoporotic post menopausal women have taken upma 34.4% occasionally, 25.6% monthly, 34% weekly, 6% twice a week.

Non-osteoporotic post menopausal women have taken upma 13.2% occasionally, 16.8% monthly, 33.6% weekly and 36.4% twice a week.

The osteoporotic post menopausal women have taken poha 14.8% occasionally, 20% monthly, 33.2% weekly, 24.8% twice a week and 7.2% daily.

On the other hand non- osteoporotic post menopausal women have taken poha 3.6% occasionally, 7.6% monthly, 52% weekly, 36.4% twice a week and 0.4% twice a day.

Furthermore, osteoporotic post menopausal women have taken moong dal 32% occasionally, 21.2% monthly, 25.2% weekly, 14% twice a week and 7.6% daily.

On the other hand non-osteoporotic post menopausal women have taken moong dal 1.2% occasionally, 4% monthly, 48.8% weekly and 46% twice a week.

Osteoporotic post menopausal women have taken tuar dal 23.6% occasionally, 9.6% monthly, 24.4% weekly, 21.2% twice a week and 21.2% daily.

On the other hand non-osteoporotic post menopausal women have taken tuar dal 33.2% weekly, 66.8% twice a week none of them consumed daily.

Osteoporotic post menopausal women have taken masoor dal 68.8% occasionally, 21.6% monthly, 9.2% weekly and 0.4% twice a day. On the other hand non-osteoporotic post menopausal women have taken masoor dal 35.4% occasionally, 32.4% monthly, 26.8% weekly and 5.2% twice a week.

Chi-value obtained for missi chapatti was 5.54, bread 2.56, dosa 6.15, chole 5.15 and Rajmah 7.43, which is not significant.

Osteoporotic post menopausal women have taken missi chapati 60.0% occasionally, 28.4% monthly, 10.8% weekly, 0.4% twice a week whereas non-

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osteoporotic post menopausal women have taken missi chapati 52% occasionally, 42.4% monthly and 5.6% weekly respectively.

Osteoporotic post menopausal women have taken bread 32.8% occasionally, 24.4% monthly, 33.6% weekly and 9.27% twice a week.

On the other hand non- osteoporotic post menopausal women have taken bread 28.4% occasionally, 32.4% monthly and 5.2% twice a week.

Osteoporotic post menopausal women have taken dosa 53.2% occasionally, 32% monthly and 14.8% weekly while non- osteoporotic post menopausal women have taken dosa 47.6% occasionally, 46% monthly and 6.4% weekly respectively.

Intake of chole by osteoporotic post menopausal women was 39.6% occasionally, 47.2% monthly and 13.2% weekly and by non- osteoporotic post menopausal women it was found to be 30.8% occasionally, 44% monthly , 24.8% weekly and 0.4% twice a week.

Regarding rajmah, osteoporotic post menopausal women have taken 53.6% occasionally, 33.2% monthly, 11.6% weekly and 1.6% daily.

On the other hand non- Osteoporotic post menopausal women have taken rajmah 38% occasionally, 42.4% monthly and 19.6% weekly.

5.4.4(b) Vegetable group-

In the vegetable group, significant Chi-value obtained for Green vegetables was 28.1, root and tubers 21.3, mixed vegetables 16.3 and non-significant Chi-value obtained for other vegetables was 6.13.

Post menopausal women of osteoporotic & non-osteoporotic group have taken green vegetables 10% and 0.8% daily, 0% and 2% twice a day, 0.0 and 2.4% twice a week, 3.6 and 3.2% weekly, 28.4% and 11.6% monthly, 24.4% and 18.8% occasionally and 33.6% and 61.2% have not taken green vegetables respectively.

The intake of root and tubers in both groups were 18.8% and 14% daily, 3.2% and 1.2% weekly, 24% and 11.2% monthly, 24.8% and 17.2% occasionally and 29.2% and 46.8% have not taken root and tubers.

The intake of other vegetables in both groups were 2.4% and 2% daily, 2% and 5.6% weekly, 21.6% and 14% monthly, 30.8%, 24% occasionally 93.2% and 53.6 have not taken other vegetables respectively.

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The intake of mixed vegetables in both groups were 21.6% and 26.4% daily, 2% and 6.4% weekly, 16.8% and 8% monthly, 24.8% and 9.2% occasionally and 34.8% and 49.2% have not taken mixed vegetables.

5.4.4 (c) Meat, fish and Poultry group-

In the meat, fish and poultry, Chi-value obtained for egg was 67.0, fish 16.9, meat 42.6 and chicken 197.0, which is significant.

99.2% Osteoporotic post menopausal women have not taken egg and only 0.8 have taken occasionally.

On the other hand 50% non- Osteoporotic post menopausal women have not taken egg and 1.6% has taken monthly, 26% weekly, 10.4% twice a week, and 12% daily.

None of the (100%) osteoporotic post menopausal women have taken fish.

On the other hand 84.4% non- osteoporotic post menopausal women have not taken fish and only 0.4% has taken monthly, 14.4% weekly and 0.8% twice a week.

99.2% osteoporotic post menopausal women have not taken meat and only 0.8% has taken occasionally.

On the other hand 65.2% non-osteoporotic post menopausal women have not taken meat, and only 12.8% have taken monthly 20.4% weekly and 1.6% twice a week.

99.2% osteoporotic post menopausal women have not taken chicken and only 0.8% have taken occasionally.

10.4% non- osteoporotic post menopausal women have taken chicken occasionally, 24.4% monthly, 1.2% weekly, 0.8% twice a day and 63.2% daily.

5.4.4 (d) Milk and Milk products

In milk and milk products, Chi-value obtained for skimmed milk was 28.8, skimmed milk curd 15.2, butter milk 66.8, whole milk 34.8, whole milk curd 44.9, Paneer 53 , khoa 21.5, which is highly significant.

45.6% Osteoporotic post menopausal women have not taken skimmed milk. 51.2% have taken skimmed milk daily, 1.2% weekly, 2% twice a week; whereas 64% non-osteoporotic post menopausal women have not taken skimmed milk and 21.6% have taken 5.6% weekly, 8.8% twice a day and 21.6% daily.

80.8% Osteoporotic post menopausal women have not taken skimmed milk curd and only 1.2% have taken occasionally, 4% weekly, 4.4% twice a week and 9.6% daily.

On the other hand 84.4% non- Osteoporotic post menopausal women have not taken skimmed milk curd and 1.2% has taken monthly, 12% weekly and 2.4% daily.

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Furthermore, 41.6% Osteoporotic post menopausal women have not taken butter milk and 41.2% have taken occasionally, 4% monthly, 4.4% weekly and 6.4% daily.

On the other hand 13.6% non-Osteoporotic post menopausal women have not taken butter milk and 21.6% have taken occasionally, 30.4% monthly, 30.4% weekly, and 4% twice a week.

Regarding whole milk, 89.2% Osteoporotic post menopausal women have not included in their diet, 3.2% have taken occasionally, 91.2% twice a week, and 6.4% daily.

On the other hand 60.4% non-Osteoporotic post menopausal women have not taken whole milk and 0.4% have taken monthly, 24.4% weekly and 9.2% daily..

71.6% Osteoporotic post menopausal women have not taken whole milk curd .22.4% have taken occasionally and 3.2% daily.

On the other hand 64.4% non-Osteoporotic post menopausal women have not taken whole milk curd. 0.4% have taken monthly, 24.4% weekly and 9.2% daily.

21.6% Osteoporotic post menopausal women have not taken paneer and 51.6% have taken occasionally, 26.87 taken monthly.

On the other hand 2.4% non-Osteoporotic post menopausal women have not taken paneer and 27.6% have taken occasionally, 43.6% monthly, 26% weekly.

Furthermore, 66.4% Osteoporotic post menopausal women have taken Khoa occasionally, 23.2% monthly and 10.4% have not taken.

On the other hand 46.4% non-osteoporotic post menopausal women have taken khoa occasionally, 48% monthly and 2% have not taken.

5.4.4(d) Nuts & oil seeds

Regarding nut & oil seeds products, Chi-value obtained for almond was 62.2, cashew nut 49.8, dry coconut 46.3, sesame seeds 57.2 respectively, which is highly significant.

56% Osteoporotic post menopausal women have take almonds occasionally, 20% monthly, 4.8% weekly and 19.2% have not taken almonds.

12.4% non-osteoporotic post menopausal women have taken almonds occasionally, 14.8% monthly, 15.6% weekly, 25.2% daily and 32% have not taken almonds.

60% osteoporotic post menopausal women have taken cashew nut occasionally, 26.8% monthly, 4.8% weekly and 6.4% have not taken cashew nut.

24.8% non-osteoporotic post menopausal women have taken cashew nut occasionally, 17.6% monthly, 12.4% weekly, 10.4% daily and 34.8% have not taken cashew nut.

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56% osteoporotic post menopausal women have taken dry coconut occasionally, 7.6% monthly, 2.1% weekly and 34.4% have not taken coconut dry.

26.8% non osteoporotic post menopausal women have taken dry coconut occasionally, 22.8% monthly, 17.6% weekly, 12.4% twice a week and 20.4% have not taken coconut dry.

38.8% osteoporotic post menopausal women have taken sesame seeds occasionally and 61.2% have not taken sesame seeds.

23.2% non-osteoporotic post menopausal women have taken sesame seeds occasionally, 20% monthly, 13.2% weekly, 0.8% twice a week, 10.4% daily and 32.4% have not taken sesame seeds.

5.4.4 (e) Beverages

Significant Chi-value obtained for fruit juice was 150.9 and non significant for tea and coffee was 7.23.

0.4% osteoporotic post menopausal women have taken fruit juice daily, 0.4% twice a day, 10.4% weekly, 47.6% monthly, 36.4% occasionally and 4.8% have not taken fruit juice. On the other hand, 17.2% non-osteoporotic post menopausal women have taken fruit juice daily, 16.8% twice a week, 28.4% weekly, and 37.6% have not taken.

16% osteoporotic post menopausal women have taken tea once a day and 37.2% twice a day and coffee intake 9.2% once a day and 37.6 % have not taken tea. 27.2% non- osteoporotic post menopausal women have taken tea once a day, 25.6% twice a day, 10% have taken coffee once a day, 2% have taken coffee twice a day and 34.8% have not taken coffee.

5.4.4 (f) Soya products

Regarding Soya product, significant Chi-value obtained for soya milk was 33.6, soyabean dal 71.2 and soya badi 51.1.

100% Osteoporotic post menopausal women have not taken soya milk.

14.4% non-osteoporotic post menopausal women have taken monthly, 14.4% taken weekly and 71.2% have not taken soya milk.

20.8% Osteoporotic post menopausal women have take soyabean dal occasionally, 7.2% montly and 72% have not taken soyabean.

14.8% non-osteoporotic post menopausal women have taken soyabean dal occasionally, 17.6% monthly, 26.8% weekly 16% twice a week, and 24.8% have not taken soyabean.

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13.6% osteoporotic post menopausal women have taken soya badi occasionally and 86.4% have not taken soyabadi.

12% non-osteoporotic post menopausal women have taken occasionally, 24.4% monthly, 15.6% weekly and 48% have not taken soyabadi.

5.4.5 Nutrients Intake

5.4.5 (a) Energy intake

Mean energy intake of the osteoporotic and non osteoporotic post menopausal women was found 1907.9 kcal/day and 2226.4 kcal/day respectively.

Highly significant difference of mean (15.49) scores of energy intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.5(b) Carbohydrate intake

Mean Carbohydrate intake of the osteoporotic and non-osteoporotic post menopausal women were found 234.1gm/day and 252.2gm/day respectively.

Highly significant difference of mean (9.15) scores of carbohydrate intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.5(c) Protein intake

Mean protein intake of the osteoporotic and non-osteoporotic post menopausal women was found 40.3gm/day and 47.7gm/day respectively.

Highly significant difference of mean (11.34) scores of protein intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.5(d) Fat intake

Mean fat intake of the osteoporotic and non-osteoporotic post menopausal women was found 33.4gm/day and 44.9gm/day respectively.

Highly significant difference of mean (19.93) scores of fat intake was observed for Z-value between osteoporotic and non-osteoporotic post menopausal women.

5.4.5(e) Calcium intake

Mean calcium intake of the osteoporotic and non- osteoporotic post menopausal women was found 996.8mg/day and 1061.3mg/day respectively.

Highly significant difference of mean (5.73) scores of calcium intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.5(f) Magnesium intake

Mean magnesium intake of the osteoporotic and non- osteoporotic post menopausal women was found 258.7mg/day and 256.3mg/day respectively.

Non- significant difference of mean (1.57) scores of magnesium intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.5(g) Phosphorus intake

Mean phosphorus intake of the osteoporotic and non- osteoporotic post menopausal women was found 1110.7mg/day and 1128.2mg/day respectively.

Significant difference of mean (2.32) scores of phosphorus intake was observed for Z-value between osteoporotic and non- osteoporotic post menopausal women.

5.4.6 Life style pattern

In the life style pattern the significant Chi-value obtained for exercise was 29.6, type of exercise 29.6, consumption of aerated drinks 8.39 and non-significant Chi-value obtained for alcohol was 1.55, smoking 0.00, tobacco chewing 0.00, exposure to sunlight 0.85 and its duration 3.89.

In the exercise pattern only 15.6% osteoporotic post menopausal women have done exercise regularly, remaining 84.4% have not done exercise at all.

In the non- osteoporotic post menopausal women 52% have done exercise regularly, remaining 48% have not done exercise at all.

In the type of exercise 9.6% osteoporotic post menopausal women have gone for the walk and 6% have done yoga. 30% non-osteoporotic post menopausal women have gone for walk and 22% have done yoga. 1.2% osteoporotic post menopausal women have taken alcohol and 98.8% have not taken alcohol. 4% non-osteoporotic post menopausal women have taken alcohol and 96% have not taken. 100% have not taken smoking and tobacco chewing in both the post menopausal women groups. 55.6% osteoporotic post menopausal women have taken aerated drinks and 44.4% have not taken.

35.2% non- osteoporotic post menopausal women have taken aerated drinks and 64.8% have not taken. 44% osteoporotic post menopausal women have taken sunlight and 56% have not taken. 37.6% non-osteoporotic post menopausal women have taken sunlight and 62.4% have not taken.

5.4.7 Reproductive Health History

5.4.7(a) Menarche age

Z-value for the significant difference of mean scores of menarche age of the osteoporotic and non- osteoporotic post menopausal women obtained 0.43, which is not significant.

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Mean menarche age of the osteoporotic and non-osteoporotic post menopausal women was found 13.6 yrs. and 13.6 yrs. respectively.

5.4.7(b) Menopausal age

Z-value for the significant differences of mean scores of menopausal age of the osteoporotic and non-osteoporotic post menopausal women obtained 13.69, which is significant.

Mean menopausal age of the osteoporotic and non-osteoporotic post menopausal women was found 46.8 yrs. and 49.1 yrs. respectively.

5.4.7(c) Parity

Z-value for the significance difference of mean scores of parity of the osteoporotic and non-osteoporotic post menopausal women obtained was 1, which is not significant.

Mean parity of the osteoporotic and non-osteoporotic post menopausal women was found 2 and 2 respectively.

5.4.7(d) Abortion

The significant Chi-value was 6.82 with number of abortion in both the group. 75.6% osteoporotic post menopausal women had no abortion and only 24.4% had. 10.4% non-osteoporotic post menopausal women had abortion during their whole life time and remaining 89.6% had no abortion.

5.4.8 Health condition and medication

5.4.8 (a) Health problem after menopause

The highly significant Chi-value was 11.3 with health problem after menopause in both the group. 38% osteoporotic post menopausal women had health problem after menopause and 62% had no health problem. 16.8% non-osteoporotic post menopausal women had health problem after menopause and 83.2% had no health problem.

5.4.8 (b) Type of health problems

As par as type of health problem concern the highly significant Chi- value was 19.8. 15.2% osteoporotic post menopausal women had higher blood pressure, 1.2% arthritis, 2.8% asthma, 3.6% diabetes, 2.8% heart disease, 12.4% joint pain and rest 62% had no health problem.

3.2% non-osteoporotic post menopausal women had higher blood pressure, 4.8% arthritis, 0.8% asthma, 1.2% diabetes, 6.8% joint pain, and rest 83.2% had no health problem.

5.4.8(c) Medication

Effect of medication related to health problems like B.P., arthritis, asthma, diabetes, heart disease joint pain were not seen.

Non significant Chi-value was 0.00 with hormone replacement therapy in the both groups It was observed that hormone replacement therapy was not done in both osteoporotic and non- osteoporotic post menopausal women. Hence, the hormone replacement therapy was not having influence on the osteoporotic condition in them.

5.4.8(d) History of fracture

Chi-value for the distribution of the osteoporotic and non-osteoporotic post menopausal women as per fracture history obtained was 31.20, which is highly significant.

The maximum number of respondents suffering from fracture was 48.8 % in the osteoporotic post menopausal women. On the other hand only 12.4% non osteoporotic post menopausal women suffered from fracture.

5.5. Conclusion

On the basis of obtained results -

5.5.1 Hypothesis H₁ "There shall be no difference in demographic characteristics of osteoporotic and non osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₁ is accepted for age and marital status and not accepted for education, occupation, caste and income group.

5.5.2 Hypothesis H₂ "There shall be no difference in anthropometric measurements of osteoporotic and non-osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₂ is accepted for height, weight and body mass index.

5.5.3 Hypothesis H₃ "There shall be no difference in food consumption pattern of osteoporotic and non-osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₃ is accepted for intake of missi chapati, bread, dosa, chole, rajmah, other vegetable, tea and coffee and not accepted for food belief, number of meals, time gap between meals, food preference, eating time, intake of stuffed paratha, upma, poha, moong dal, tuar dal, masoor dal, egg, fish, meat, chicken, milk products, soya milk, soyabean dal, soya badi, nut & oil seeds, green vegetable, root & tuber, mixed vegetable, fruit juice.

Nutrient intake like Energy, carbohydrate, protein, fat, calcium and phosphorus is not accepted whereas magnesium is accepted.

5.5.4 Hypothesis H₄ "There shall be no difference in life style pattern of osteoporotic and non osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₄ is accepted for alcohol, smoking, tobacco chewing, exposure to sunlight and its duration. Not accepted for exercise, type of exercise and aerated drinks.

5.5.5 Hypothesis H₅ "There shall be no difference in reproductive health history of osteoporotic and non-osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₅ is accepted for menarche age, parity and not accepted for abortion and menopausal age.

5.5.6 Hypothesis H₆ "There shall be no difference in health condition and medication of osteoporotic and non- osteoporotic post menopausal women."

In the study, it was found that the hypothesis H₆ is not accepted for health problem after menopause, type of health problem like B.P., arthritis, asthma, diabetes, heart disease, joint pain, kidney disease, history of fracture and accepted for hormone replacement therapy.

5.6. Recommendations

To a significant extent, osteoporosis is a preventable disease, people can take a number of steps, starting early in life to build strong bones. By continuing those practices as they grow older, they can reduce the rate of bone loss. Diet can play an important role in bone health, to decrease the risk of osteoporosis, it is especially important to get enough calcium, protein, magnesium, Vitamin D and other nutrients healthy eating pattern in post menopausal stage promote optimal bone health, calcium absorption, prevent such as calcium deficiency, protein deficiency, osteopenia, osteoporosis, heart disease, other health related problems.

In present study, following recommendations are felt to be suggested with the light of results and observations obtained regarding food habits, nutrient intake and food group intake of the osteoporotic and non-osteoporotic post menopausal women.

The suggestions if found to be worthy and implemental will certainly bring betterment of those post menopausal women who are suffering from osteoporosis.

1. It is desirable that post menopausal osteoporotic women should be served more than four meals a day like evening snacks and bed time milk.

Summary And Conclusion

2. They should be encouraged to take protective foods especially rich in calcium like milk, curd, pulses, soyabean dal, fish, meat, chicken, soya milk, almonds, dry coconut, and sesame seeds. It is also important to take food in sufficient quantity. It is very well known that there is a significant difference in frequency of consumption of certain foods between osteoporotic and non-osteoporotic post menopausal women.
3. There are some factors which have affected more the dietetics of osteoporotic and non-osteoporotic post menopausal women, i.e, associated with the regular exercises and soft drinks consumption. Regular exercise builds strong bones.
4. They should be encouraged to increase dietary calcium in diet after the menopause, a post menopausal women can be certain of getting enough calcium by calcium rich food.
5. They should be encouraged to get enough vitamin D. Vitamin D helps the body absorb calcium. The consisted way to get vitamin D is from sunshine. Foods rich in vitamin D include liver, fish oil, milk and curd.
6. Impact of nutrient education can improve the bone mineral density in post menopausal women.

In the present study, we have concluded that osteoporosis in post menopausal women appears to be associated with several risk factors. There were significant differences found between osteoporotic and normal (non-osteoporotic) post menopausal women. It was observed that economic status plays an important role to prevent osteoporosis. Non osteoporotic post menopausal women from well to do families have better nutritional and health status. Better consumption of soya products, nuts and oil seeds such as almonds, sesame seeds, dry coconut, non-vegetarian food like egg, meat, less consumption of aerated drinks and regular exercise have shown protective role against osteoporosis. Incidence of osteoporosis was more amongst the subjects those who were suffering from other health problem (BP arthritis, diabetes, joint pain) after menopause.

5.6 LIMITATION OF THE STUDY:

- Financial aspects has limited the study to a single parameter called BMD and not able to observe the serum calcium level.
- Psychological studies could be done in post menopausal stage.
- Type and mode of treatment/ medication of the selected samples was not controlled and no alteration was suggested.

5.8 SUGGESTIONS FOR FUTURE STUDIES:

- Comparative study of post menopausal females and pre menopausal females can be conducted.
- The study should include biochemical assessment like serum calcium level.
- Further study can be conducted on post-menopausal women from different areas or locations to get detailed information about the osteoporosis risk factors.