EFFECT OF OSTEOPOROSIS PREVENTION EDUCATION ON KNOWLEDGE AND SELF CARE ACTIVITIES AMONG PERIMENOPAUSAL WOMEN AT KMCH, COIMBATORE.

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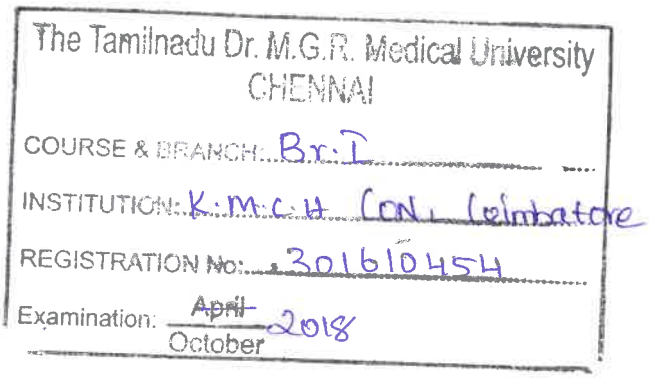

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITYCHENNAI, IN PARTIAL FULFILMENT OF REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

OCTOBER-2018

CERTFICATE

This is to certify that the dissertation entitled **"Effect of Osteoporosis Prevention Education on Knowledge and Self- Care Activities among Perimenopausal Women at KMCH Coimbatore"** is Submitted to the Faculty Of Nursing, **The Tamilnadu Dr. MGR Medical university, Chennai** by **Reg. No. 301610454** in partial fulfillment of requirement for the degree of master of science in nursing. It is the bonafide work done by her and the conclusions drawn by her own. It is further certified that this dissertation or any part these has not formed the basis for award of any degree, diploma or similar titles.

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E.	Requisition for Content Validity
F.	Content Validity
G.	List of Experts

LIST OF ABBREVIATIONS

S. NO	ABBREVIATION	ACRONYMS
1.	Body mass index	BMI
2.	Bone mineral density	BMD
3.	Dual energy X-ray absorptiometry	DEXA
4.	Expanded health belief model	EHBM
5.	Food frequency questionnaire	FFQ
6.	Follicle Stimulating Hormone (FSH)	FSH
7.	Health Promotion Model	HPM
8.	Indian Council of Medical Research	ICMR
9.	International Osteoporosis Foundation	IOF
10.	Luteinizing Hormone	LH
11.	National Institute of Health	NIH
12.	National Osteoporosis Foundation	NOF
13.	Outpatient department	OPD
14.	Osteoporosis Health Belief Scale	OHBS
15.	Osteoporosis Self-Efficacy Scale	OSES
16.	Osteoporosis knowledge test	OKT
17.	Osteoporosis prevention education	OPE
18.	Osteoporosis Prevention Exercise Protocol	OPEP
19.	Osteoporosis prevention programme	OPP
20.	Osteoporosis Society of India	OSI
21.	Quality adjusted life years	QALYS
22.	Quantitative ultra sound	QUS
23.	World Health Organization	WHO

CHAPTER-1
INTRODUCTION

“Maintain your mid age Enjoy your old age”

-Anonymous

Osteoporosis means “porous bones”. It is the thinning of bone material as the density of the bones gets less, making them brittle. Bone tissue is constantly being renewed, and new bone replaces old and damaged bone. In this way, the body maintains bone density and the integrity of its crystals and structure. Bone density peaks when a person is in their late 20s.The bones become weaker, increasing the risk of fractures, especially in the hip, wrist, and spinal vertebrae. After the age of 35 years, the bone become starts to weaker. As age advances the bone breaks down faster than it builds. If it happens excessively, osteoporosis occurs. (Morrison, Jan 2018).

Osteoporosis occurs when the bone density decreases and the body stops producing as much bone as it did before. Even though it affects both male and female population the severity is more for women after menopause due to sudden declining of Estrogen, the hormone which protects women against osteoporosis. Poor diet and smoking increases the risk of osteoporosis even before menopause. (Morrison, Jan 2018)

Osteoporosis is a major public health problem associated with substantial morbidity and socio economic burden. Osteoporosis affects the structure and strength of bones and makes fractures more likely, especially in the spine, hip, and wrists. An early detection can help in reducing the fracture rates and overall socioeconomic burden. (Agrawal, Maj, Brig 2013)

Osteoporosis is a major and growing public health problem in both the sexes, and particularly in women. Different dimensions are to be considered for the risk of osteoporosis such as poor nutrition, physical inactivity, poor self-control, inadequate social relationships, and stress. Changes in the lifestyle can protect individuals from osteoporosis. (WHO 2014)

Perimenopause, or menopause transition, is the stage of a woman's reproductive life that begins several years before menopause, when the ovaries gradually begin to produce less estrogen. Estrogen plays an important role in maintaining bone strength. When women reach menopause the estrogen level decreases and the rate of bone loss increases. (National osteoporosis foundation 2010)

Ovaries eventually stop releasing eggs, when a woman reaches menopause, her estrogen levels drop and can lead to bone loss. For some women, this bone loss is rapid and severe. Young women who have low bone density, often caused by low peak bone mass, are at an increased risk of getting osteoporosis later in life. (National osteoporosis foundation 2010)

Two major factors that affect your chance of getting osteoporosis arethe amount of bone mass when one reaches menopauseandhow fast one lose her bone after she reaches menopause. The greater the bone density the lesserthe risk of osteoporosis. For some women, bone loss happens faster than for others. In fact, a woman can lose up to 20% of her bone density during the five – seven years following menopause. If boneloss occurs quickly, the individual has greater risk of osteoporosis**.** (National Osteoporosis Foundation 2010)

This sign of approaching menopause varies from one to the other. The symptoms occur as a result of eventual atresia of almost all oocytes in the ovaries. This causes an increase in circulating Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH)levels.Periods may come more often or less often, be heavier or lighter, or last longer or shorter than before. Hot flashes can make women to feel warm or hot suddenly for no apparent reason. The skin may be flushed and becomes red;theheartrate increases and night sweats can vary a lot from woman to woman. They can last from 1 minute to 5 minutes. Waking up during the night or having trouble in getting sleep. Mood swing, irritability, stress, anxietyand depressionare the other signs of menopause.Some women gain weight during menopause and theirhair and skin become drier and thinner. (National Osteoporosis Foundation 2010)

Osteoporosis is termed as a silent disease as it produces no symptom until a fragility fracture occurs. The incidence of osteoporosis in the general population is

staggering. Many people think that osteoporosis is a natural part of aging and that it cannot be avoided. It could be prevented through education, **(**Osteoporosis: Facts and Statistics, 2015).

Bones act as storage for essential minerals. Bone health is important to the body for its mobility, support, and protection. 'Low bone mass and micro-architectural deterioration of bone tissue that leading to enhanced bone fragility and consequence of increase in fracture. Large number of females spend one third of their postmenopausal period usually associated with an estrogen hormone shortage (Kanis et al., 2013).

Establishment of healthy lifestyle behaviors must be started from early especially the young adult age because most of them become self-centered and are not concerned in healthy life and it is not easy to change their behavior and lifestyle (Franzén, 2011).Bones are living 'organs' that in itself are removed and replaced throughout the lifespan**,** (National Action Plan for Bone Health, 2015).

Bone is a living tissue that is constantly being renewed in a two-stage process (reabsorption and formation) that occurs throughout the life. In the reabsorption stage, old bone is broken down and removed by cells called osteoclasts. In the formation stage, cells called osteoblasts build new bone to replace the old. The bone remodeling process is completed in 4–6 months. It takes place mostly in a non-targeted manner to remove old bone and involves reabsorption of bone by peripheral blood-derived multinucleated osteoclasts, followed by bone formation by osteoblasts (Avina - Zubieta et al., 2010).

The current treatment for osteoporosis involves an individualized plan of care including calcium supplements, vitamin D supplements, weight-bearing exercise, and fall prevention. When adding increased calcium to the daily diet, 800 to 1,500 mg per day provides normal blood levels, (Clinical Study: Osteoporosis, 2015).

The National Institute of Health (NIH) recommends the following ranges: Adults: up to 1,500 mg/day, adolescents: 1,300 mg/day, and children: 800 mg/day. Vitamin D supplements needed are 800 to 1,000 international units per day**,** (Clinical Study: Osteoporosis, 2015).

Weight bearing exercises such as walking, running, jumping, dancing or using weight machines are good for osteoporosis prevention. The gravity-defying exercise can maintain and increase bone strength by increase bone mass or by slowing age related bone loss. Muscle strength is also increased with exercise. It is important for supporting the joints and preventing falls. People need exercise a minimum of 20 minutes daily at least three times a week. (Osteoporosis Australia, 2011)

Premenopausal bone mass is as important as bone loss in the postmenopausal period for prediction of fracture. Fragility fractures may lead to excess mortality, Morbidity, low quality of life, and chronic pain (Borgström2013).

NEED FOR THE STUDY:

Currently, osteoporosis is one of the topmost among five disorders leading to disability and prolonged hospital stay for post-menopausal females. Accordingly, osteoporosis is second only to cardiovascular disease as a global health care problem (WHO, 2012).

Two hundred million women worldwide affected by osteoporosis and it leads to approximately 8.9 million fractures every year (Watts et al., 2010). Osteoporosis and osteoporotic fractures cause large numbers of disabilities, deaths, and huge health care costs through hospital and rehabilitation expenses (Harvey, Dennison, & Cooper, 2010; Ioannidis, et al.,2009). National Osteoporosis Foundation, 2010 has estimated that two million fractures result from osteoporosis in 2005 and $19 billion in costs. By 2025, there will be three million osteoporotic fractures and $25.3 billion in costs each year.

Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds. Osteoporosis affects an estimated 75 million people in Europe, USA and Japan. The incidence of osteoporotic fractures is increasing globally at an alarming rate. In 2010, the annual mean incidence of non-traumatic fractures in people aged 50+ across North America, Europe, Australia, and Japan was found to be approximately 6700 per 100,000 people that is, 6.7% of older adults could be expected to experience a non-traumatic fracture in any given year. The true rates are likely to be higher, given it is estimated that up to one-third of vertebral fractures are missed on initial radiograph reading and thus go

undiagnosed. These fractures represent a heavy personal, social and economic burden. In New Zealand alone, the cost of treatment and management of osteoporosis is projected to be over $450M annually by the year 2020.(IOF 2010).

In USA Osteoporosis and low bone mass are currently estimated to be a major public health threat for almost 44 million U.S. women and men aged 50 and older. The 44 million people with either osteoporosis or low bone mass represent 55 percent of the people aged 50 and older in the United States. By the year 2010, it is estimated that more than 52 million women and men in this same age category will be affected and, if current trends continue, it will climb to more than 61 million by 2020.

In 2016 a group of stakeholders came together to develop a National Action Plan to establish osteoporosis as a National Health Priority in its own right, along with the necessary focus and funds to combat the growing epidemic of bone disease. The Osteoporosis National Action Plan points the way to broadening the awareness of the importance of bone health, improving the bone health of the Australian population and the outcomes for people with osteoporosis and to close the gap. The action plans were as follows: Increasing Awareness and Support,Improving Osteoporosis Prevention and its Treatmentand Finding a Cure for Osteoporosis.(National Action Plan 2016)

Bone mineral density measurement is underutilized in majority of European countries. Reasons include limited availability of densitometers, restrictions in personnel permitted to perform scans, low awareness of usefulness of BMD testing, limited or nonexistent reimbursement.

Based on WHO diagnostic criteria (T-score less than or equal to -2.5 SD) approximately 22 million women and 5.5 million men aged between 50-84 years of age are estimated to have osteoporosis in the Europe (IOF2010). Due to changes in population demography the number of men and women with osteoporosis in the Europe will rise from 27.5 million in 2010 to 33.9 million in 2025, corresponding to an increase of 23%.

The number of new fractures in 2010 in the Europe was estimated at 3.5 million, comprising that approximately 620,000 are hip fractures, then 520,000 are

vertebral fractures560,000 are forearm fractures and 1,800,000 other fractures. The annual number of fractures in the Europe will rise from 3.5 million in 2010 to 4.5 million in 2025, corresponding to an increase of 28%.

Osteoporosis affects approximately 1.4 million Canadians, mainly postmenopausal women and the elderly. Osteoporosis affects 1 in 4 women and more than 1 in 8 men over the age of 50 years, with 1 in 4 men and women having evidence of a vertebral fracture**.** Almost 30,000 hip fractures occur each year. By the year 2030, the number of hip fractures is expected to quadruple.

1 in 2 women and 1 in 5 men will suffer a fracture after the age of 50. In 2010 approximately 536,000 new fragility fractures each year; number of people aged 50+ with osteoporosis, approximately 3.21 million; economic burden of new and prior fractures £ 3,496 (€ 5,408) million each year; by 2025 burden will increase by 24 % to £ 5,465 (€ 6,723) million.

10 million people, approximately one person in every 17, have osteoporosis. The lifetime prevalence of fractures has been found to be 37.5% among men and 21% among women with proportions among white, mixed and black participantsat about 29%, 31% and 22%, respectively. It is estimated that just 1 in 3 patients with hip fractures are diagnosed as having osteoporosis and of those, only 1 in 5 receive any kind of treat me. The economic burden of osteoporosis hip fractures to private health plan companies in Brazil is estimated in the region of $6 million.

In India the Number of osteoporosis patients at approximately 26 million with the numbers projected to increase to 36 million by 2013. A study done at Chennai revealed that 58.6% of the postmenopausal women were osteoporotic and any woman above the age of 50 years has the risk for vertebral (32%), lower arm (16%), hip (15%) fractures (Booklet –Cipla initiative).

Bone loss starts from the age of 30–40 years in both men and women. In women, it has been postulated that menopause is followed by an immediate decrease in bone mass and density within a year. This increased rate of bone loss reaches equilibrium approximately 10 years after menopause and then merges into a continuous age-related loss. While type 1 or postmenopausal osteoporosis generally occurs before the age of 65 years and affects women, Type 2 osteoporosis is universal

after peak bone mass has been attained and is found in both men and women. While women experience marked increase in bone loss during perimenopause and postmenopause, in men, a small longitudinal bone loss is observed throughout life. Thus, women in addition to age-related bone loss also experience menopausal bone loss. (Kadam, Chiplonger and Khadhilkar 2018).

The number of women with osteoporosis, ie, with reduced bone mass and the disruption of bone architecture, is increasing in India. While data on prevalence of osteoporosis among women in India come from studies conducted in small groups spread across the country, estimates suggest that of the 230 million Indians expected to be over the age of 50 years in 2015, 20%, ie, ~46 million, are women with osteoporosis. Thus, osteoporosis is a major public health problem in Indian women. Low calcium intakes with extensive prevalence of vitamin D deficiency, increasing longevity, sex inequality, early menopause, genetic predisposition, lack of diagnostic facilities, and poor knowledge of bone health have contributed toward the high prevalence of osteoporosis.(Anuradha V Khadilkar, Rubina M Mandlik, 2013)

The prevalence of Osteoporosis is alarming. We could see many numbers of women suffering from this silent disease. The reason for increasing number of osteoporosis can be because of the lack of awareness in various components like nutrition and physical activity.

STATEMENT OF THE PROBLEM:

"Effect of Osteoporosis Prevention Education on Knowledge and Self-care Activities among Peri Menopausal Women at KMCH, Coimbatore."

OBJECTIVES:

The objectives of the study were to:

- Determine the knowledge and self-care activities among peri Menopausal women.
- Evaluate the effect of osteoporosis prevention education on knowledge and self-care activities
- Associate the knowledge and self-care activities with selected demographic variables.

OPERATIONAL DEFINITION:

Osteoporosis Prevention education:

It is a teaching process offered to the study group that consists of 30 to 40 minutes each for five consecutive days. The session includes lecture cum discussion on osteoporosis - its definition, causes, riskfactors, disease process, investigations, management and prevention which focuses on dietary calcium, exercises and walking program by using the handout on ‘ Mindful Healthy Bone’ followed by telephonic reinforcement on the 7th day after intervention before the posttest.

Self -care activities:

Self- care activities include two components

1. Participation in Walking program and
2. Nutritional intake of calcium

Participation in walking program was measured through exercise diary and Nutritional intake of calcium was done through 24 hours dietary recall.

.

HYPOTHESIS:

There is a significant difference between pretest and posttest knowledge among perimenopausal women

ASSUMPTIONS:

1. Awareness of health risk promotes desirable behavior
2. Motivation enhances adherence to life style modification

CONCEPTUAL FRAMEWORK

INTRODUCTION

Nola J. Pender developed the Health Promotion Model. Health promotion seeks to increase a client's level of wellbeing. The model focuses on the client's individual characteristics, cognitive perceptual factors, modifying factors and participation in health- promoting behaviours. It identifies factors that enhance or decrease health promotion activities.

The model was constructed from expectancy-value theory and social cognitive theory using a nursing perspective. The model has been modified twice since its original publication, once in the 1980's and in 1996 (McEwen & Wills, 2011).

Health promotion enables people to increase control over their own health. It covers a wide range of social and environmental interventions that are designed to benefit and protect individual people's health and quality of life by addressing and preventing the root causes of ill health, not just focusing on treatment and cure. (WHO 2016)

The concepts of this model were modified and utilized for the current study. It is conceptualized and implemented in this study "Effect of osteoporosis prevention education on knowledge and self -care activities among perimenopausal women KMCH, Coimbatore".

a. INDIVIDUAL CHARACTERISTICS AND EXPERIENCES

It includes the health behavior of the individual in the past, personal factors (biological, psychological, socio cultural), general characteristics of the individual that influence health behavior such as age, personality structure, race, ethnicity, and socioeconomic status.

These are personal characteristics of the study participants which included the variables that comprises of demographic variables. The demographic variables are age, education, occupation, marital status, type of family, monthly income, dietary pattern, and family history of osteoporosis, practice of exercise and body mass index.

b. BEHAVIOR- SPECIFIC COGNITIONS AND AFFECT

According to Pender, the Health Promotion Model (HPM) makes four assumptions which are as follows: 1. Individuals strive to control their own behavior, 2. Individuals work to improve themselves and their environment. 3. Health professionals, such as nurses and doctors, comprise the interpersonal environment, which influences individual behaviors. 4. Self-initiated change of personal and, environmental characteristics are essential to changing behavior.

(i) Perceived benefits to action -perceptions of the positive or reinforcing consequences to undertake a health behavior.

In this study the risk factors of osteoporosis were believed to influence the perimenopausal women to perceive the health behavior

(ii) P**erceived barriers to action -**perceptions of the blocks, hurdles, and personal costs of undertaking a health behavior

The barriers included were knowledge on osteoporosis and self- care activities, lack of confidence in carrying out the osteoporosis preventive behaviors. The other barriers which included lack of time, work load, lack of social support and the dietary modification.

(ii) P**erceived self-efficacy**-Judgment of personal capability to organize and execute a particular health behavior; self confidence in performing the health behavior successfully.

In this study the perceived self-efficacy was the individual's perception to implement the osteoporosis prevention education

(iv) Activity - related affect - subjective feelings or emotions occurring prior, during and following a specific health behavior

Desired health behavior was inculcated to perimenopausal women with computer assisted teaching for 30 minutes on osteoporosis prevention which included identification of osteoporosis risk factors, walking program and dietary calcium intake. A booklet was given to each participants on '*mindful bone heath"* which contain information on osteoporosis and its preventive measures

(v) Interpersonal influences - norms, social support, role models – perceptions concerning the behaviors, beliefs, or attitudes of significant others in regard to engaging in a specific health behavior

The teaching process that includes lecture cum discussion on Osteoporosis & its preventive measures as part of Osteoporosis prevention education and interaction between the investigator and the study participants are considered.

(ii) Situational factors - perceptions of the compatibility of life context or the environment which engage in a specific health behavior

Active Participation in the study, issuing of booklets and reinforcements were considered to be the influential factors for the desired behavioral changes among the perimenopausal women.

C. IMMEDIATE COMPETING DEMANDS AND PREFERENCES

Alternative behaviors that intrude into consciousness as possible courses of action just prior to the intended occurrence of a planned health behavior.

The immediate competing demands in this study were inadequate participation of the participantsin performing 24 hours dietary recall, and walking schedule on daily basis.

D. EXPECTED OUTCOME - HEALTH PROMOTING BEHAVIOR OUTCOME

The desired behavioral end point or outcome of health decision-making and preparation for action.

Outcome is expected following an intervention. Here it refereed to the validation of the health-promoting behavior in terms of improvement or no improvement in knowledge on osteoporosis risk factors, dietary calcium intake, and adhering with walking program.

E. COMMITMENT TO A PLAN OF ACTION

Intention to carry out a particular health behavior including identification of specific strategies to do so successfully.

In the present study this referred to the study participant's osteoporosis preventive measures among perimenopausal women also the reinforcements in person by the investigator can serve as a motivation to carry out the healthy behavior. Apart from that, the other factors that may or may not be present include mass media, news paper, magazines, peer influences and medical consultation. These cues may promote commitment to implement osteoporosis prevention behaviors.

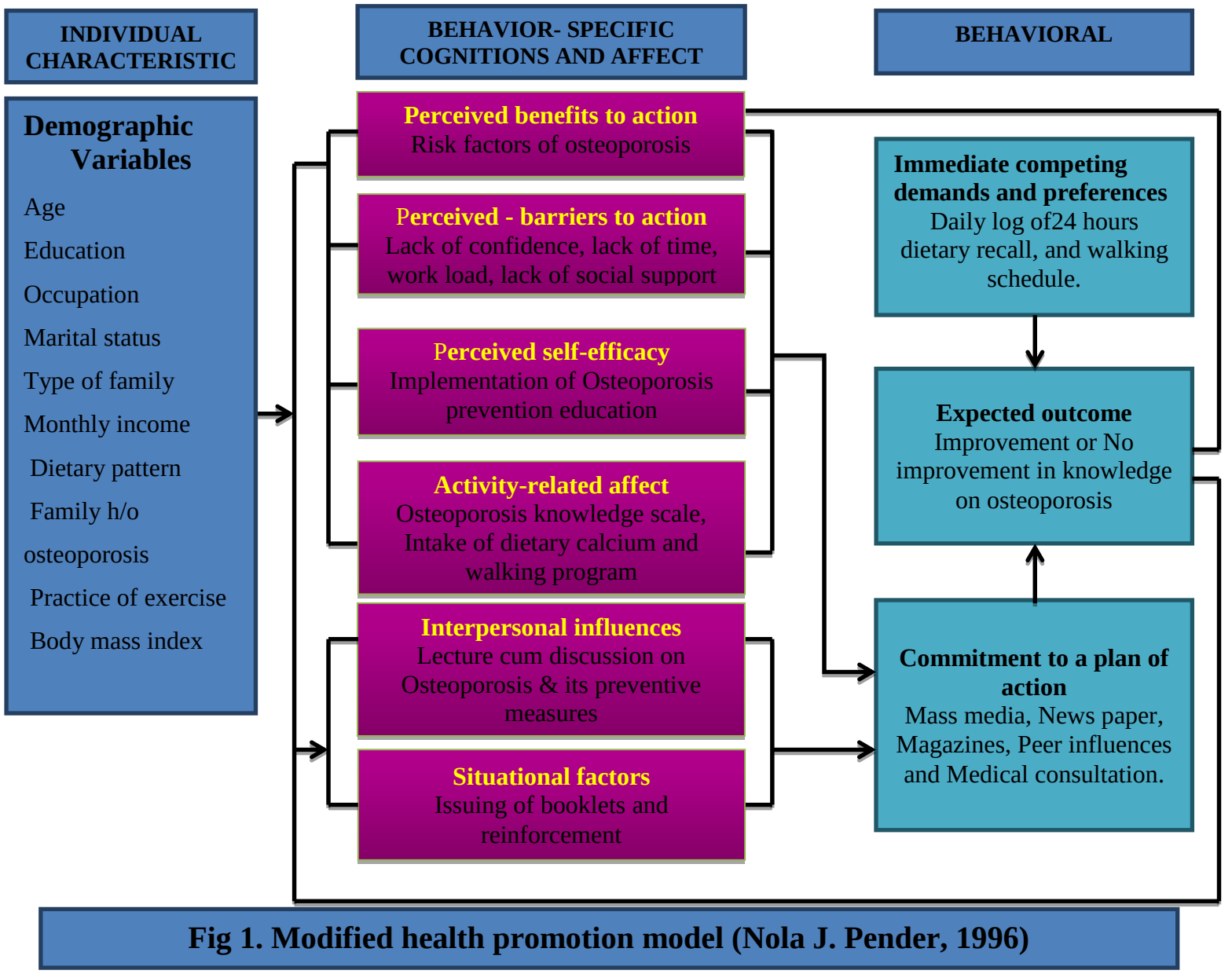


Fig 1. Modified health promotion model (Nola J. Pender, 1996)

CHAPTER -II
REVIEW OF LITERATURE

This chapter deals with the information gathered from various research articles and evident based studies, related to the present study. An extensive review was made to strengthen the present study in order to lay down the foundation. It familiarizes the investigator with previous investigation related to ones field of interest and various methods and procedures can be pursued.

RELATED LITERATURE OF THE STUDY

The related literature review is

1. Risk of osteoporosis
2. knowledge of osteoporosis
3. Prevention of osteoporosis

1. Risk of osteoporosis

Abirami P, M Nithya, K Priyanka, G Hemalatha,(2017) conducted a study to assess the prevalence of osteoporosis among Middle Aged Women in Mamandur with130 middle aged women who fulfilled the inclusion criteria. Samples were chosen by using non-probability purposive sampling technique. The data were analyzed and interpreted as follows. Among 130 sample, 28 (22%) had normal T-score (< - 1.0); 66(51%) had osteopenia (- 1.0 to - 2.5) ; 36 (28%) patients were affected by osteoporosis (- 2.6 to - 4.0) and there was a statistical significant found on the prevalence of osteoporosis among middle aged women with their demographic variables like age and type of family with T – score levels at 95% ($P < 0.05$).

Veig Silva A.C, Rosa M.I, Fernandes.B, Lumertz .S, et,al.,(2015),conducted a cross-sectional study with 1871 women to assess thefactors associated with osteopenia and osteoporosis among women undergoing bone mineral density test.The aim of this study was to determine the prevalence of osteopenia and osteoporosis in a female population**.** The average age was 59.2 ± 10.5 years, mean weight was 68.7 ± 12.8 and the height was found to be 1.57 ± 0.06. The mean BMI was 27.7 ± 5.0. 65.1% had a BMI > 25. The prevalence of fractures at any site was of 5.5%; fracture of the forearm and ribs were being the most prevalent sites of fracture. It was found that 31.9% of women were taking calcium, and 22.1% were on thyroid medication, 24.9% underwent hysterectomy and 18.1%underwent oophorectomy in the past.

Haris S, Jahan F, Afreen A, Ahmed H, Ahmed Z (2014)conducted a studyto determine the prevalence of osteoporosis, and to establish the risk factors associated with it in Pakistan. The Cross sectional study was conducted in the primary care settingin different areas of Karachi. Bone mineral density assessment was done by the speed of sound using the quantitative ultrasound technique at the right Calcaneus. A structured questionnaire was used, to evaluate the risk factors associated with osteoporosis. Out of 500 participants 21.6% were male and 78.4% were female. The overall prevalence of osteoporosis was 30.7% (24% male and 32.6% female). The prevalence of osteopenia was 44.5% (51% being male and 42.6% being female). The prevalence of osteoporosis was high among the adult female population.

Svejme O, Ahlborg HG, Nilsson J-A, Karlsson MK**,**(2012) did a prospective observational study to assess early menopause and risk of osteoporosis, fracture and mortality among 390 women. The results of the study showed that the women with early menopause had a risk ratio of osteoporosis, fragility fracture and increased mortality rate

Etemadifar M. R, Nourian .S.M, Esfahani.M.F,Shemshaki. H, et.,al,(2013), conducted a cross sectional study to assess the possible relationships of knowledge and related factors with educational level and osteoporosis-related life habits. 268 women (≥ 35 years old) selected for this study. The samples were taken from three university hospitals in Isfahan and Iran. The mean level of knowledge about awareness of osteoporosis, its risk factors and preventive factors were 56, 55 and 22, respectively. The relationship of education level and awareness of osteoporosis, its risk factors and preventive factors were significant, with R = 0.76, R = 0.73 and R = 0.83, respectively ($P< 0.001$). The relationship of education level and osteoporosis-related life habit was not significant The relationship of osteoporosis-related life habits and awareness of osteoporosis and its risk factors was significant, with R = 16%, $P = 0.006$ and R = 16%, $P = 0.008$, respectively. Iranian women with a higher education level have significantly better knowledge about osteoporosis than women with a lower educational level.

2.Knowledge of Osteoporosis

Mansour S.E, El-Sayed H, El-Sayed.M, Ibrahim A-A W (2017)had done a study utilizing health belief model to enhance the preventive health behavior about Osteoporosis among young-adult Females. A quasi-experimental pre and post design was used. Purposive sampling was applied to 60 young-adult females. Osteoporosis Knowledge Test (OKT), Osteoporosis Health Belief Scale (OHBS) and Osteoporosis Self-Efficacy Scale (OSES) were used to assess the knowledge. The total knowledge score of the studied sample about osteoporosis were improved significantly from pre-intervention (9.47±3.14) to post-intervention (15.22±2.56) with highly significant differences (p=0.000). The average scores of susceptibility to osteoporosis, seriousness, benefits of exercise, benefits of Calcium (Ca) intake and health motivation were significantly increased in post-intervention ($p<0.05$). A low level of perceived barriers of exercise and barriers to Calcium intake also were improved in post intervention and was significant with barriers of Calcium intake. There was a significant improvement in osteoporosis self-efficacy scale whereas the total average score was 23.55± 8.50 in the pre-intervention group when compared to 41.62±7.97 in post-intervention with a highly statistical significant difference. (p=0.000).

Janiszewska M, Firlej E, Kieliszek D Z, Dziedzic M, (2061),conducted a study on Knowledge about osteoporosis prevention among women screened by bone densitometry. The study participant were292 women aged 51-83. The osteoporosis knowledge test (OKT, revised 2011) by Phyllis Gendler was used as a tool. The descriptive and statistical analysis was used. Tukey test,t-Student test and variance analysis (ANOVA) were all applied. A statistical significance level was set at $\alpha = 0.05$.Results and conclusions: Respondents presented the basic exercise knowledge ($M = 9.97$) and low knowledge concerning risk factors, screening, and treatment of osteoporosis ($M = 7.87$). The calcium knowledge remained at an average level ($M = 14.03$). Better educated women, city inhabitants as well as women having verygood or good social and welfare conditions showed a significantly higher level of knowledge about osteoporosis prevention.

Mohamed G,Shahbo A E M, El-Rahman M A, El-Mowafy R, (2016)conducted a study to evaluate the Knowledge and Self-Efficacy about

Osteoporosis Perception among Females in the Faculty of Nursing in Port-Said, Egypt. One-group quasi-experimental design with repeated measurement was conducted. The sample consisted of 133 female who work and study in the faculty of Nursing. Data were collected by a Demographic Questionnaire, Osteoporosis Knowledge Test and Osteoporosis Self- Efficacy Scale. The majority (n= 54, 40.60%) ranged in the age group from 26 to 32 years. Participants had low levels of osteoporosis knowledge (15.20±3.70) and osteoporosis self-efficacy perception mean scores (1425.54±36.11). It has been determined the osteoporosis self-efficacy and osteoporosis knowledge increases. The findings indicated that women did not have adequate knowledge about osteoporosis and their self-efficacy of osteoporosis was low. Educational interventions can be undertaken to improve women knowledge and strength self-efficacy.

El-TawabS S, Saba E K A, Mohmoud H, Elweshahi T, et al., (2016)had conducted a study on Knowledge of osteoporosis among women in Alexandria (Egypt). It was a community-based survey. The mean age of studied women was 49.92 ± 7.75 years. The majority of them (95.1%) reported that they were familiar with OP and 77.1% perceived it as a serious disease and mass media was the main source of information regarding OP (54.2%) among them. The mean total score of the FOOQ was 11.3 ± 3.6. It was significantly associated with the level of education and employment status (P = 0.001 and 0.021 respectively). Regarding the total knowledge score, nearly one-half of studied females (51.5%) had the score ranging from 50% to less than 75% and 18.8% of them obtained a score of 75% or higher.

Sayed Hossein YE(2014) conducted a study to assess Osteoporosis knowledge among female adolescents in Egypt with cross-sectional survey. Self-administered questionnaire consisted of 58 items were used to assess the knowledge regarding osteoporosis. The tool was administered to 112 female adolescents aged from 15–18 years in one secondary school. The mean age of participants was 17.2 ± 0.7 years and the majority of them (91.9 %) were between 17 and 18 years. Regarding their residence more than three-quarters of the sample were from rural area (76.8%) and most of them (98.2 %) were single and travelling to the school by bus/car (90.2%). In regards to participant's history of osteoporosis, majority of the participants (90.2%) had no family history of the disease. More than three quarters of the sample (78.6%)

had no inflammation in the joints and34.8 % had difficulty in walking. More than half of the studied sample had no low back pain or weakness in their muscles (52.7% and 72.3% respectively).

Varghese N M, Kumari V, Madanlal M(2013), conducted a study to Evaluate the Effectiveness of an Information Booklet on Prevention of Osteoporosis in terms of Knowledge, Attitude and Expressed Practices of Working Women. Quasi-experimental control non- equivalent group pretest-posttest design was used. The findings of the study indicated that the mean post-test knowledge, attitude and expressed practice score of working women in the experimental group was significantly higher than the mean post-test knowledge, attitude and expressed practice score in the comparison group. Positive significant relationship (r=0.59) was found between post-test knowledge and attitude of working women in the experimental group. A significant association was found between level of post-test knowledge with religion (t=7.55), post-test attitude with religion (t=10.04) and source of knowledge (t=5.25) in the experimental group. The information booklet was an effective strategy in enhancing knowledge, developing the favorable attitude, and improving practices of working women regarding prevention of osteoporosis.

Mohapatra G, Jena D, Tripathy RM, Panda A, Mohapatra, et.al,(2017) conducted a study of the knowledge on prevention of osteoporosis among women between 40 and 60 years of age. The mean knowledge score among women in this study showed that the highest mean score in the area of a preventive aspect of osteoporosis was 2.21±1.42 followed by knowledge on signs and symptoms score (1.43±1.05). It was found that 74% of women had poor knowledge which ranged from 0-10. 7% of women had good knowledge score of 21-32, only 19% were found to have an average knowledge. Level of knowledge about osteoporosis had a significant association with age and occupation. ($p < 0.05$).

Rafraf Ma, Bazyun Bb, and Afsharnia,(2009)conducted a study of 399 women of childbearing age. Information was collected through face to face interviews with subjects. Results of the study showed that the mean daily calcium intake was 689.08±393.15 mg. Majority of participantshad low or moderate physical activity levels. Only 8% of women reported a high physical activity level. Knowledge about osteoporosis in the majority of participants(63.2%) was at the moderate level.

Educational status of participantswas positively correlated with calcium intake. There was no significant statistical relationship found between calcium intake and physical activity with other studied variables.

3. Prevention of Osteoporosis

Ahn S and Jiwon Oh, (2018)**,**assessed the general characteristics osteoporosis among women. The study participants demonstrated highest risk for osteoporosis and falls. Overall, the levels of knowledge about osteoporosis and falls, their self-efficacy, and their preventive behaviors were average or slightly above. The relationships between the study variables showed that self-efficacy and healthy behavior, such as doing osteoporosis exercise, eating an osteoporosis diet, and avoiding falls, were related (r=38, p<.001; r=.33, p<.05; r=.26, p<.05). In addition, there was statistically significant relationships between thefall prevention and osteoporosis knowledge (r=.37~.46, p<.001), self-efficacy (r=.50~.53, p<.001), and preventive behaviors (r=.50, p<.001).

Hiremath MRN,Yadav LC A.K , Ghodke MS , Yadav J, et al.,(2018) assessed the prevalence of osteoporosis among women between 35 and 60 years. Among the study participants 8.5% (5.2–13%) had osteopenia. There was no significant association of osteoporosis and osteopenia with income, physical activity, and dietary patterns on univariate analysis. There was no statistical significant difference between mean age and BMI of participant among normal, osteoporosis, and osteopenia participant (p value >0.5). Multivariate logistic regression analysis showed that 20% increased chances of risk with five years increase in age. This study showed that significant number of women had osteopenia/osteoporosis within 35–40 years age group.

Sharifi N, Majlessi F, Montazeri A, Shojaeizadeh D, et., al (2017) conducted a study on prevention of osteoporosis in female students based on the Orem self-care model. Data were collected by random stratified sampling. A validated questionnaire developed by the researcher was used to assess the risk of osteoporosis As revealed, mean scores for self-care agency, self-care demand, self-care operation structures and total self-care in the intervention group were significantly different before and after the intervention (p=0.014, p<0.001, p=0.002, and p<0.001, respectively). Accordingly, educational intervention seems to be effective in promoting self-care for

the prevention of osteoporosis. While the control group, showed no significant difference in any of the above-mentioned aspects before and after intervention (p=0.90, p=0.53, p=0.51, and p= 0.97, respectively).

Al-Muraikhi H, Mohamad A. Chehab, Said Het al., (2017) conducted a study to assess health beliefs about osteoporosis among women attending primary health care centers in Qatar. The majority of the study participant showed lower perceived susceptibility to osteoporosis (71.7%) but higher perceived benefits of preventive practices (91.7%). Despite lower perception of susceptibility to osteoporosis, women were highly motivated to take care of their health and believed in the benefits of a calcium rich diet and regular exercise. The integration of osteoporosis prevention into women's health program at the primary health care level, as well as physical activity and nutritional programs, were recommended.

Kalkım A, Ghan AD, (2017) did a study on theory-based Osteoporosis Prevention Education and Counseling Program for Women. After the education and counseling program, a significant increase in knowledge score was seen in intervention group when compared with the control group in the mean scores of the Osteoporosis Knowledge Test and its subscales ($p < .001$), on the Osteoporosis Health Belief Scale and its subscales ($p < .001$), on the Osteoporosis Self-efficacy Scale and its subscales ($p < .001$), and in their daily calcium intake ($p < .001$) and duration of weekly exercise ($p < .001$).

Naz1 MSG, Ozgoli G, Aghdashi M A Salmani F (2016) **,**conducted a study to assess the Prevalence and Risk Factors of Osteoporosis among Women. This cross-sectional study was performed on 360 non-pregnant women over the age of 15referred to the Bone Densitometry Academic Center in Urmia, Iran. The factors such as level of education, history of bone fracture, disease history (rheumatoid arthritis, diabetes, high blood pressure), gravidity and parity values, duration of lactation ($p<0.001$), nutrition dimension of lifestyle (p=0.03), and green tea consumption (p=002) showed a statistically significant association with the bone mineral density. According to the regression model, age (OR=1.081), history of bone fracture (OR=2.75), and gravidity (OR=1.14) were identified as significant risk factors for osteoporosis, while the body mass index (OR=0.94) was identified as a protector against osteoporosis.

Soomro1 RR, Ahmed SI,Khan M, Ali S S(2015)conducted a study on comparing the effects of Osteoporosis Prevention Exercise Protocol (OPEP) versus walking in preventing osteoporosis among females. One hundred young female volunteers aged 20-30 were selected from IPM&R Dow University of Health Sciences. It was a comparative study in which 64 females participants were randomly assigned into two groups (32 in OPEP exercise group and 32 in walking group). After twelve weeks of intervention BMD was found to be statistically insignificant at hip, femur, lumbar spine and wrist ($p > 0.05$) comparing the post results in the OPEP and exercise group. Moreover BMD at hip, femur, lumbar spine and wrist was unaltered in both groups comparing the results of pre and post intervention. Though significant changes were observed in BMI in the OPEP exercise group (p value =0.010) mean ± standard deviation pre and post found to be 20.2578 ± 3.11123 and 21.0942 ± 3.64203 but no variations in anthropometrics in walking.

Jeihooni A K, Hidarnia A, Kaveh M H,Hajizadeh E, et.,al (2015), conducted a study on Effects of an Osteoporosis Prevention Program Based on Health Belief Model Among Females, quasi-experimental study was conducted on 120 patients in Iran found in the intervention group's health beliefs, nutrition, and walking performances to prevent osteoporosis. Six months after the intervention, lumbar spine BMD T-score increased to 0.127 ± 0.061 in the intervention group but reduced to -0.043 ± 0.059 in the control group. Also, hip BMD T-score increased to 0.125 ± 0.088 in the intervention group, but decreased to -0.028 ± 0.052 in control group.

Khorsandi M,Hasanzadeh L, GhobadzadehMc. (2012),assessed the knowledge and self-efficacy on osteoporosis prevention with Osteoporosis Health Prevention belief Scale. The mean age was 15.67 years. Knowledge of osteoporosis and self-efficacy were low. The mean knowledge scores and self-efficacy were 33.1615(SD=12.74046) and 26.1393(SD=4.69580) respectively. Majority of participants (75.4%) received their information from friends and family and the school role in providing information was negligible.

Aggarwal N, Raveendran A, Khandelwal N,Sen R K,ThakurJ. S., (2011)conducted a study to assess the prevalence and related risk factors of osteoporosis among peri- and postmenopausal Indian women. This study included

200 peri- and postmenopausal women. The mean age in group I was found to be 50.56 ± 5.74 years as compared to 52.50 ± 5.94 years in group II with low BMD, which was statistically significant (*P*=0.02). The average age at menopause was 50.12 ± 4.60 years in group I and 51.23 ± 4.82 years in group II. The average period since menopause was 5.6 ± 4.1 years in group I and 5.06 ± 3.8 years in group II. The two groups were similar with respect to parity, education, and socioeconomic status, family history of osteoporosis, hormone replacement therapy, and thyroid disorders. None had previous history of bone fractures. Mean age at menarche was 14.3 ± 1.6 years and 14.5 ± 1.2 years in group I and group II, respectively 46.8% of women in group I and 33% of women in group II had low physical activity and there was no statistically significant difference in sunlight exposure between the groups.

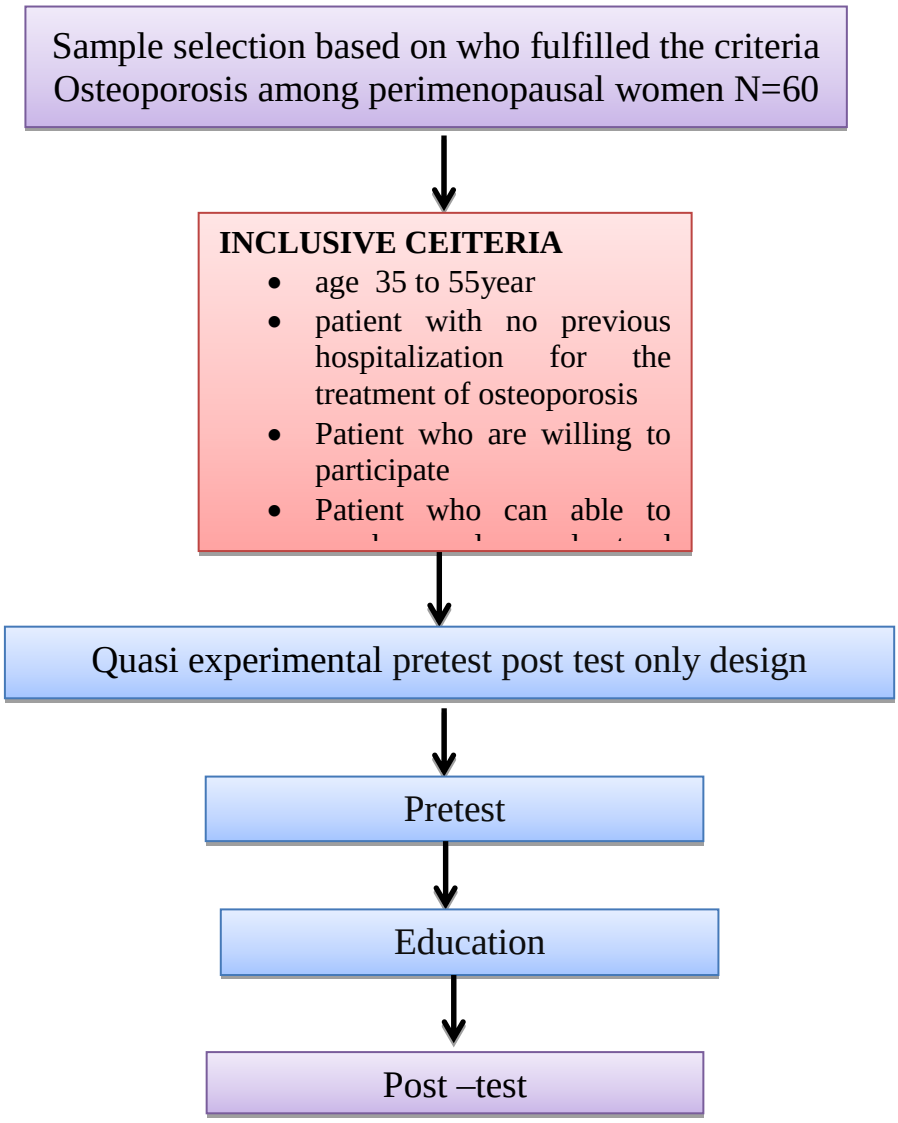
Yeap SS, Goh EM & Das Gupta E (2010), had done a study to determine the depth and sources of knowledge about osteoporosis (OP) among the public in Malaysia. Self-administered questionnaire was distributed to participant.Total of 87.1% of the attendees had heard of OP. Of these, 89.5% were concerned about getting OP. Significantly more women than men (P = .015), those with more than 10 years of schooling (P < .001), and those earning more than $US285 per month (P = .022) had heard of OP. Knowledge of OP risk factors was good, 97.1% identified with low calcium intake, 87.8% had lack of exercise, 80.0% had family history of OP, and 75.8% had postmenopausal status. A total of 38.7% of the attendees thought that OP was more serious than cancer and 35.1% more serious than heart disease; 55.7% obtained information about OP from newspapers and 46.4% from magazines. In this self-selected population, women, the better educated, and those earning higher incomes were more aware of OP.

CHAPTER - III

METHODOLOGY

The study was designed to determine the effect of osteoporosis prevention education on knowledge and self-care activities among perimenopausal women at orthopedics OPD, KMCH, Coimbatore. This chapter deals with the research design, setting of the study, population, sample, sample size, sampling technique, sample selection criteria, validity, reliability of the tools, pilot study, data collection procedure and plan for data analysis.

METHODS AND MATERIALS



RESEARCH DESIGN

Quasi experimental pretest post test only design, was adopted for this study

Table .1 Schematic representation of the research design

Group	Pre -test	Intervention	Post -test
Study	O1(1st day of visit in OPD)	X (prevention education computer assisted teaching)	O2 (after one month of follow up)

Key

O1- pre–test assessment of baseline variable Assessment of knowledge on osteoporosis (risk factors, exercises & calcium intake)

X – INTERVENTION

In this study was implementation of Osteoporosis Prevention Programme to the study group.

Group teaching method was adopted with 10 to 12 members in a group. Computer assisted one to one interactive teaching for 30minutes. This included lecture cum discussion on osteoporosis and its preventive measures. The teaching module prepared by the investigator. The content included osteoporosis definition, causes, risk factors, disease process, investigations, management and prevention which focuses on intake of dietary calcium and walking programme. A booklet '*mindful bone heath* which contain information on osteoporosis and its preventive measures will be given to the study group following the teaching programme. Reinforcement was carried out as part of Osteoporosis prevention education on the 15thday after intervention.

O2 –posttest assessment of knowledge on osteoporosis (risk factors, exercises & calcium intake) and self-care activities (24 hours intake of dietary calcium and walking program)conducted at the end of one month following the interventions.

VARIABLES OF THE STUDY

a) Independent Variable

The independent variable in this study is osteoporosis prevention education.

b) Dependent Variable

The dependent variables in this study were knowledge (knowledge on osteoporosis risk factors, knowledge on exercises & knowledge on calcium intake), and self-care activities (24 hours intake of dietary calcium and walking programme).

SETTING OF THE STUDY

The study was conducted in the orthopedic OPD at KMCH. Kovai Medical Centre and Hospital is an 850 bedded hospital with all modern technology. It has an 34 various outpatient department. And five orthopedic OPD, Every day 30 patients come to visit orthopedic OPD.

POPULATION

Patients in the age group of 35-55 years,perimenopausal women diagnosed at risk for osteoporosis

SAMPLE

Patients who is visiting to KMCH for orthopedic OPD, who met the inclusion criteria during the period of study.

SAMPLE SIZE

The sample size of the study is 60

SAMPLING TECHNIQUE

Non probability purposive sampling technique

CRITERIA FOR SAMPLE SELECTION

INCLUSIVE CEITERIA

- age 35 to 55year
- patient with no previous hospitalization for the treatment of osteoporosis
- Patient who are willing to participate
- Patient who can able to speak and understand English/ Tamil

EXCLUSION CRITERIA

- Patients with known history of osteoporosis on regular or irregular treatment
- Any co-morbid conditions like renal failure, heart disease, thyroid disorder and rheumatoid arthritis
- In post-menopausal period
- On calcium supplements

DESCRIPTION OF THE TOOL

The tool consists of 3 sections

SECTION-A: Demographic Variables

This included age, education, occupation, marital status, monthly income, religion, types of family, dietary pattern, family history of osteoporosis, practice of exercise, and body mass index.

SECTION–B: Osteoporosis Knowledge Test (OKT)

It is a 24 item scale developed by Katherine Kim, Mary Horan and PhyllisGendler (1991). It has two knowledge subscales: Exercise scale (16items) that measures the knowledge on exercise and Calcium intake scale (17items) which measures the knowledge on calcium intake. The two sub scales have 9 items in common that measures the knowledge on osteoporosis risk factors. The questions under the self-administer OKT are of multiple choice types. Out of the four choices only one is with the correct answer.

Score Interpretation

The correct responses will be coded as 1 and incorrect as 0. For items 1-9, the Neutral and Don't Know responses will be considered as incorrect. The Exercise subscale includes items OKT1 - OKT16.Thus, the total score of exercise is16. The Calcium intake subscale includes items OKT 1 - OKT 9and OKT 17 - OKT 24, thus, the total score is 17 and the osteoporosis risk factor scale includes items OKT 1 – OKT 9 and the score is 9.

Reliability

As the tool in standardized it has already established validity of 0.82

Section-C: Osteoporosis Prevention Programme

Part-1:24hours Dietary Recall

This tool has three items: time, type of food, and amount of food. The participantsasked to recollect the dietary intake of the previous day and the investigator enter the data. The amount of food consumed was expressed using the nutritional measurement cups (¼ or ½ or ¾ or 1 cup; where 1 cup =200g).

Score Interpretation

The amount of calcium present in the food item was estimated in milligrams using the Nutritive value of Indian foods chart- Gopalan, C., et al, ICMR (2010). The obtained value was compared with the recommended daily calcium intake for an Indian woman by the ICMR expert group (2010).The value of less than 600 mg/day was considered as inadequate and 600 mg and more as adequate.

Reliability

The reliability of the tool was established as 0.93 by inter- rater method. 24 hours dietary recall method is a gold standard method and known for its preciseness. Hence, this method was used in addition to FFQ method to assess the dietary calcium intake.

Part:2 Walking Program

The patient was instructed to gradually progress their walking using the walking schedule (table 2) and instructed to maintain a daily log on walking and bring it during the follow up visit.

The posttest was conducted at the end of 4^{th} week following the intervention to assess the knowledge (osteoporosis risk factors, exercises &calcium intake) and self-care activities(adherence to intake of dietary calcium, walking program).

PILOT STUDY

In order to find out the feasibility of the study, pilot study was conducted. The sample size was 10 patients from the orthopaedic OPD in KMCH Coimbatore.

DATA COLLECTION PROCEDURE

Person who are fulfilling the inclusion criteria has been selected and formal consent has been taken.The data collection was done for a period of 6 weeks. A formal permission was obtained from the Chairman, KMCH to conduct the study. The same information was communicated to the orthopaedic OPD doctor, supervisors and incharges. The demographic and personal characteristics of the patient was collected at the time of data collection.

After self-introduction the investigator was explained about the study to the perimenopausal women diagnosed at risk for osteoporosis who fulfilled the inclusion criteria and signed in the informed written consent. Data was collected during the OPD hours. The identity of the participants and the name of the participants was kept confidential.

Pretest measurement was carried out which include assessment of knowledge (osteoporosis risk factors, exercises & calcium intake) and 24 hours recall on intake of dietary calcium, and practice of intake of dietary calcium). The Osteoporosis knowledge test developed by Kim, Horan and Gendler will be used to obtain the data related to knowledge on osteoporosis risk factors, exercises and calcium intake. The adherence on walking program, and perception on intake of dietary calcium will be assessed with the use of Osteoporosis adherence scale. The practice of intake of dietary calcium will be assessed using the FFQ and 24- hours dietary recall method. The participants was asked to recollect the type and amount of food consumed for the last 24 hours. The amount of food was approximated with the help of various sizes of nutritional measurement cups (¼ or ½ or ¾ or 1 cup; where 1cup= 200g) was shown to them. The amount of calcium in each food item was estimated using 'Nutritive values for Indian foods Chart'- Gopalan C., et al., ICMR (2010).

Following pretest, Osteoporosis Prevention Programmewas comprised of lap top assisted one to one interactive teaching for 30-40 minutes to the study group using lecture, demonstration and discussion methods on osteoporosis and its preventive measures, and walking program.

The patient was instructed to gradually progress their walking using the walking schedule (table 2) and instructed to maintain a daily log on walking and bring it during the follow up visit.

A booklet '*mindful bone heath* which contain information on osteoporosis and its preventive measures was given to the study group following the teaching programme. The booklet had 8 pages, easy to use and was printed in colour. Illustrations were used to improve clarity and understanding and its preventive measures will be given to the study group following the teaching programme.

The posttest was conducted at the end of 4th week following the intervention to assess the knowledge (osteoporosis risk factors, exercises &calcium intake) and adherence to intake of dietary calcium, walking program.

TABLE 2. Walking Program Schedule

Week	Days	Duration of walk each time	Total duration /wk	Times /day
I	7days	10mts	70mts	1
II	7days	10mts	70mts	1
III	7days	10mts	140mts	2
IV	7days	10mts	140mts	2

**Developed as per global recommendations on physical activity for health (WHO,2010)*

STATISTICAL ANALYSIS

The Statistical Package for the Social Sciences (SPSS), both version 22 for both descriptive and inferential statistics was used.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data collected from the participants to assess the effect of osteoporosis prevention education on knowledge and self-care activities among perimenopausal women at KMCH, Coimbatore. The collected data were tabulated and analyzed by using descriptive and inferential statistics.

SECTION A :	Description of demographic variables
SECTION B :	Description of knowledge score, self-care activities and exercise pattern of perimenopausl women
SECTION C :	Effectiveness of osteoporosis prevention education
SECTION E :	Association of knowledge and self-care activities with selected demographic variables

Table 3. Description of participants according to demographic variables

(N= 60)

	Variables	Frequency	Percentage
1.	Age		
	a. 35-40 Years	20	34
	b. 41-45 Years	14	23
	c. 46-50 Years	18	30
	d. 51-55 Years	8	13
2	Education		
	a. Primary Education	24	40
	b. Higher Education	22	37
	c. Degree	14	23
3	Occupation		
	a. Agriculture	11	18
	b. Professional	15	25
	c. Unemployed	34	57
4	Marital status		
	a. Married	60	100
	b. Single	0	0
5	Monthly income		
	a. Less than 10000	32	53
	b. Rs.10000 – 20000	14	23
	c. Rs.20000 - 30000	14	24
6	Religion		
	a. Hindu	28	47
	b. Christian	32	53
	c. Muslim	0	0
	d. Others	0	0
7	Type of family		
	a. Joint	31	52
	b. Nuclear	29	48
8	Dietarypattern		
	c. Vegetarian	1	2
	a. Mixed	59	98

9	Family history of osteoporosis b. Yes	0	0
	a. No	60	100
10	Practices of exercise(walking) b. Yes	0	0
	a. No	60	100
11	Body mass index b. Normal (18.5 - 23kg/m2	38	63
	a. Overweight (23.1 - 25kg/m2)	22	37

Table 3 shows that the majority of participants were between 35 and 40 (20%) and 46 and 50 years (46%) respectively. Predominantly Hindu by religion and all participants (100 %)were married. 40, 23 and 37% of participants studied up to primary education, higher studied and degree respectively. Majorities were unemployed (57%) and found monthly income of < 10000 per month (53%). Many of them were living in joint family. In relation to the dietary pattern of participants98% were non vegetarian. None of them had family history of osteoporosis. No one had practice of doing exercises. 63% of females had normal BMI.

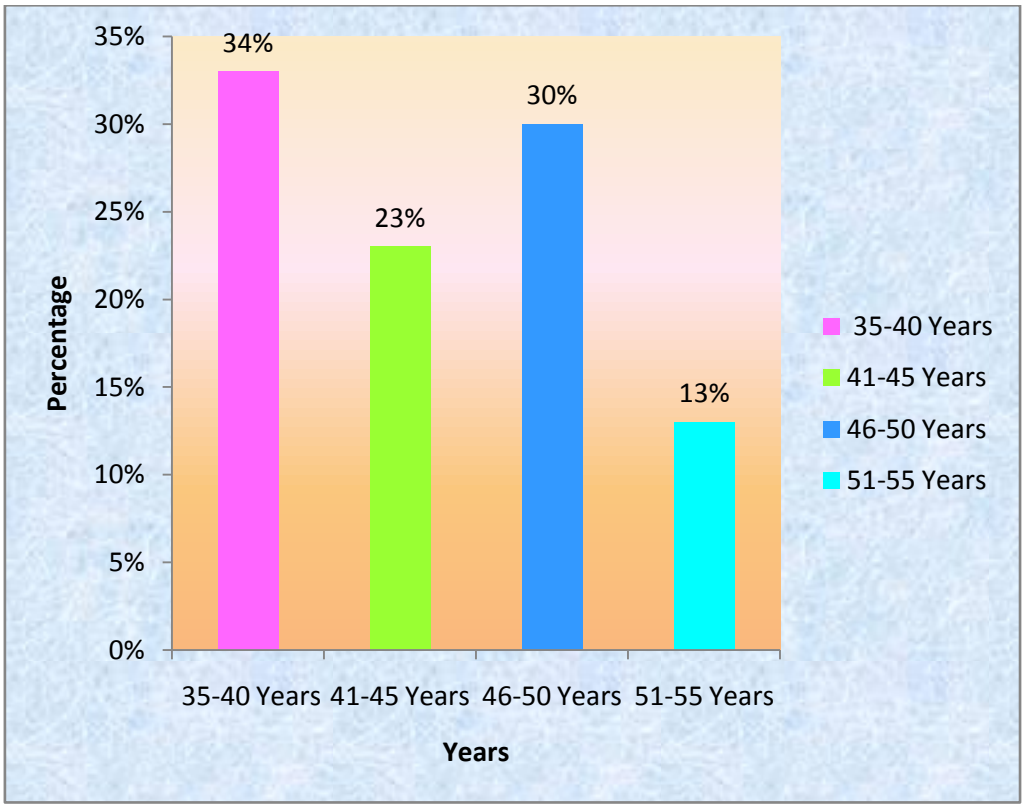


Fig. 1 Distribution of Participants based on age

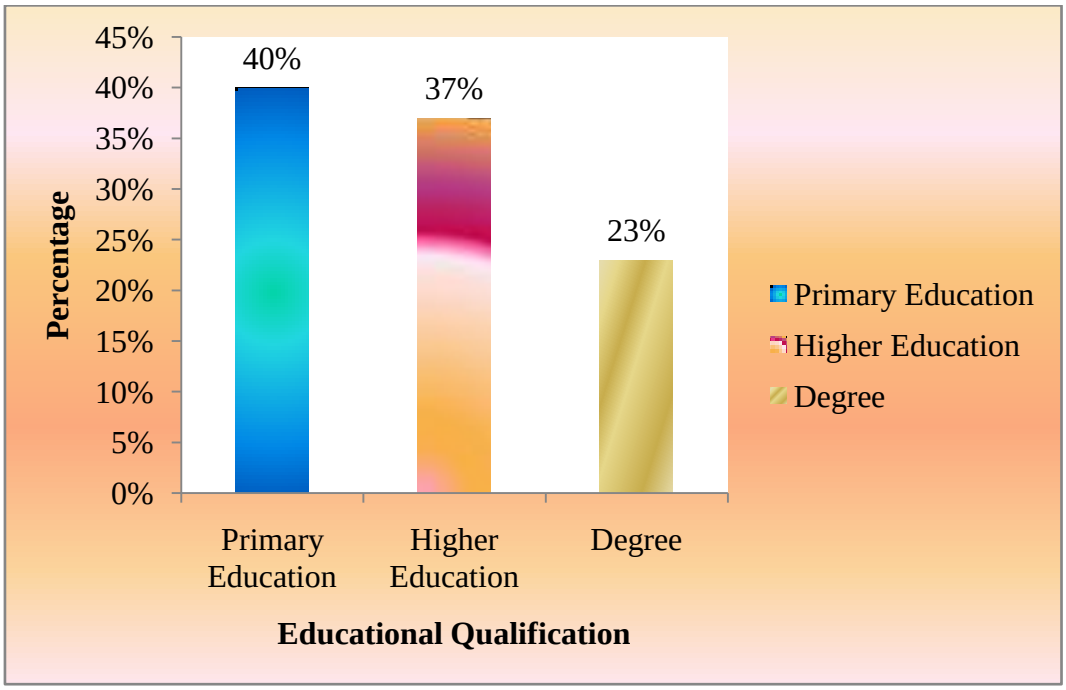


Fig.2 Distribution ofParticipants based onEducational Qualification

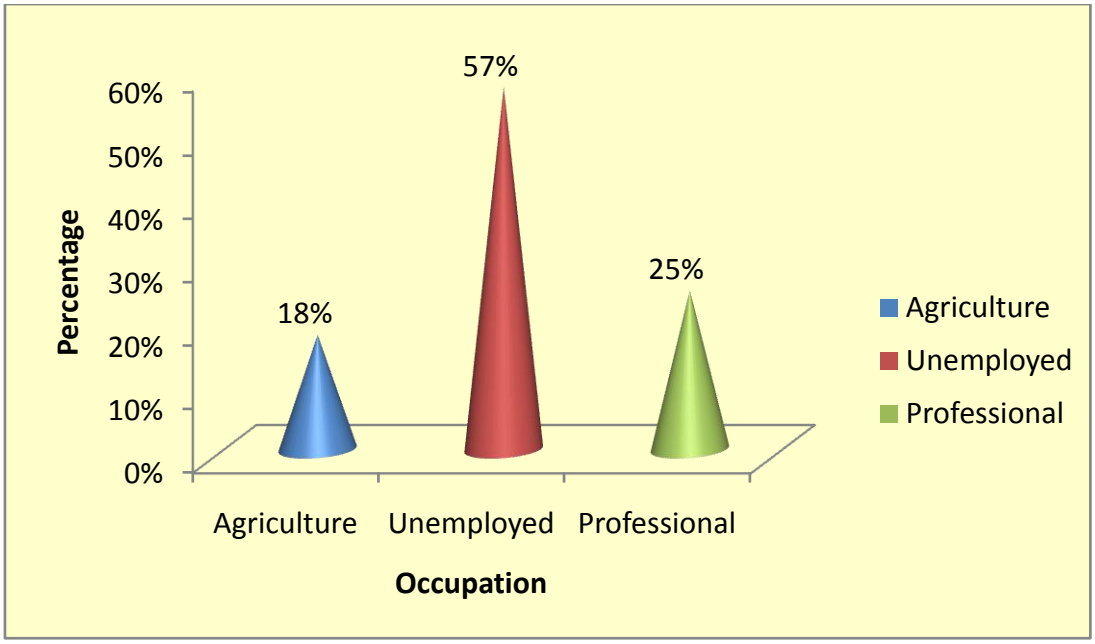


Fig. 3 Distribution of Participants based on Occupational Status

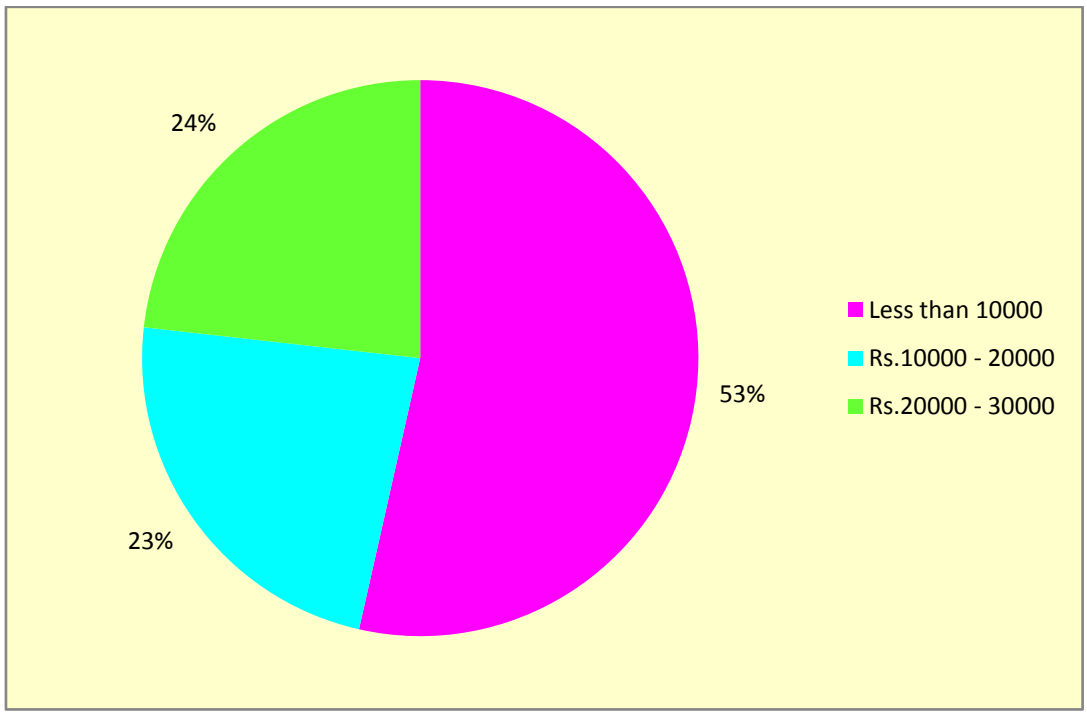


Fig. 4 Distribution of Participants based on Monthly Income

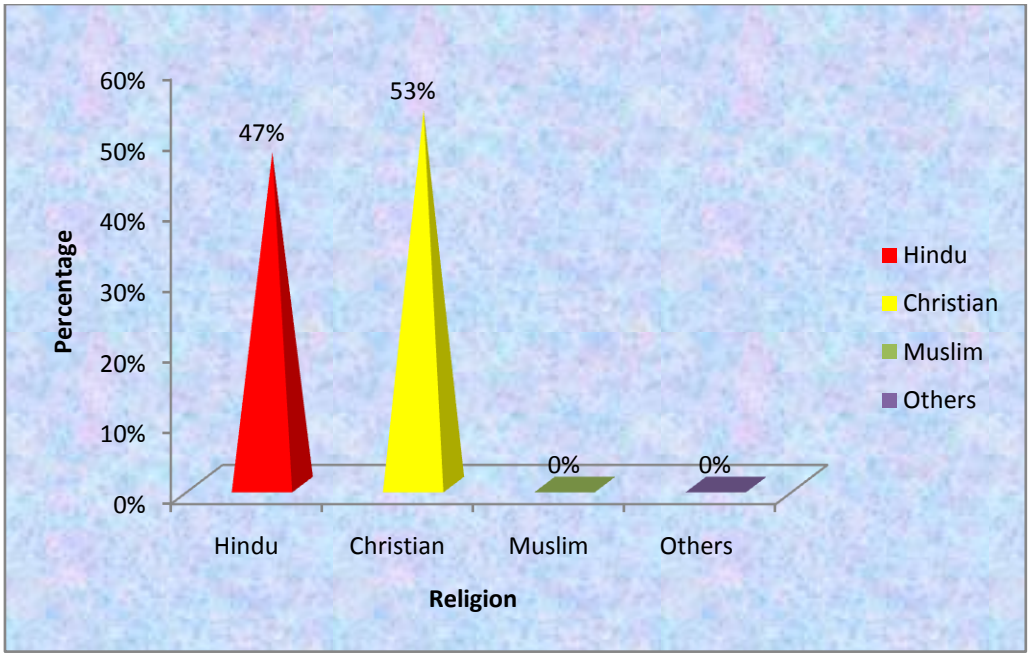


Fig.5 Distribution of Participants based on Religion

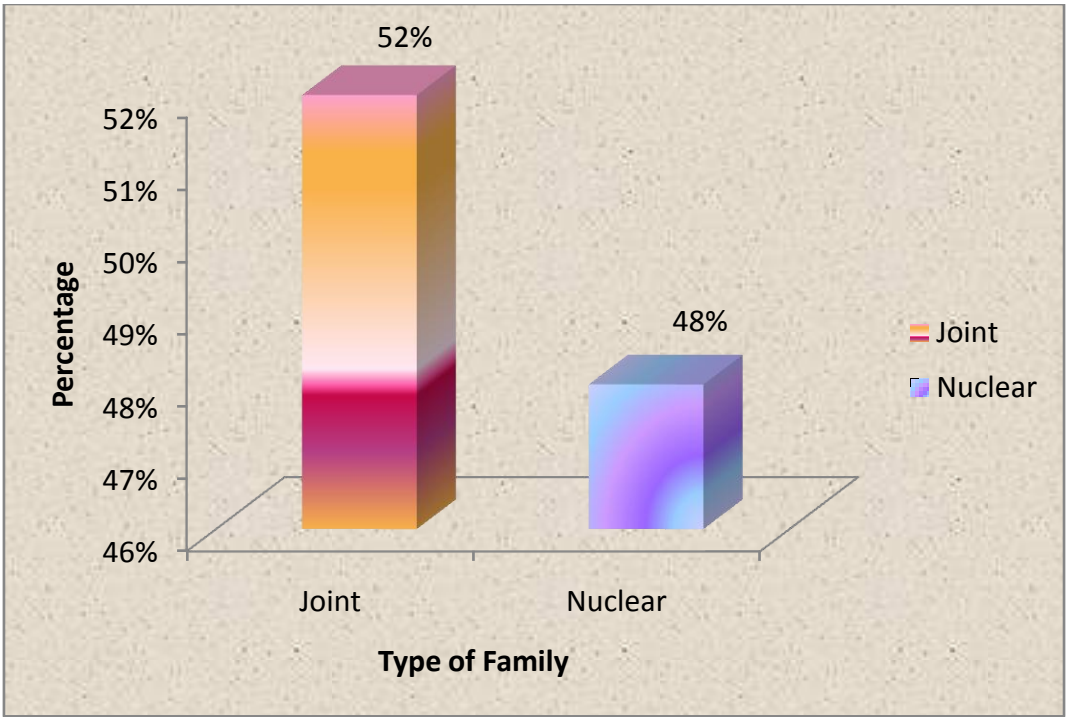


Fig.6 Distribution of Participants based on Type of family

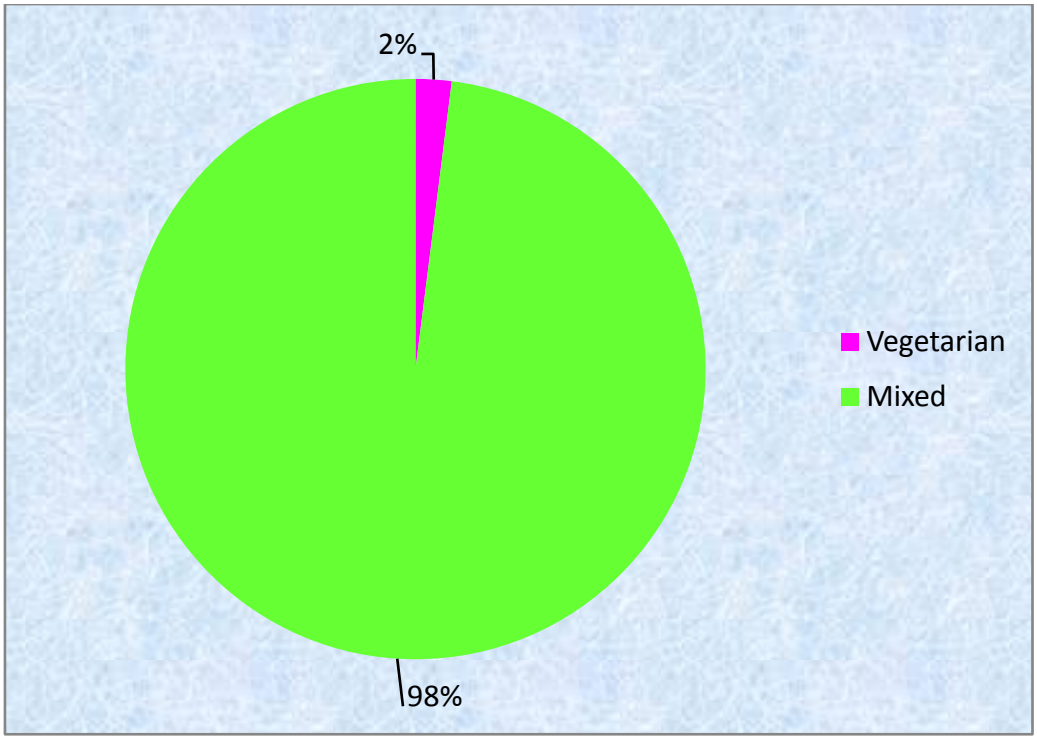


Fig. 7 Distribution of Participants based on Dietary pattern

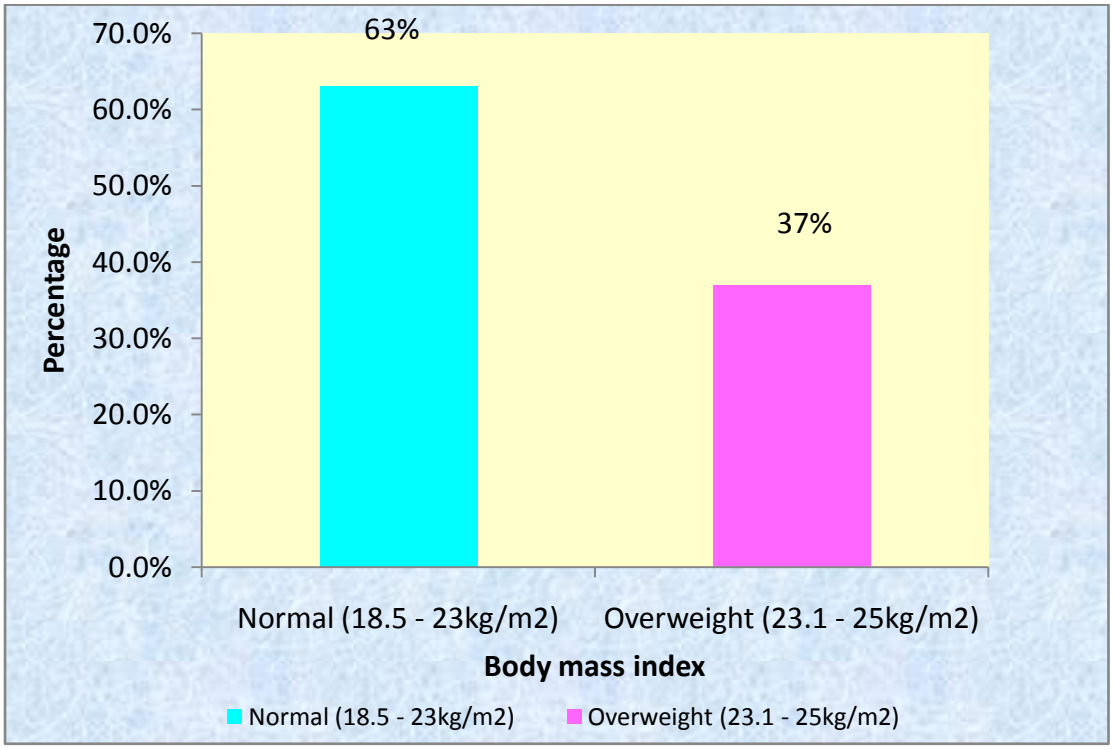


Fig.8 Distribution of Participants based on Body Mass Index

Table:4 Description of participantsbased on the knowledge scores

Knowledge	Poor(0 -8)		Good (9 -16)		Very good (17 - 24)		Range
	Frequency	%	Frequency	%	Frequency	%	
Pre Test	33	55	18	30	9	15	15.00
Post test	3	5	26	43	31	52	15.00

Table 4 depicts the knowledge score of participants. It was found that 55% of participantshad poor knowledge in the pre test where as it was only 5% in the post tests. 30% and 43% of participantshad good knowledge in pre and post tests respectively. 15% and 52% of participantshad very good knowledge in pre and post tests respectively.

Table 5 Comparison of pre and posttest knowledge score

Knowledge scale					
Variable	Pre Test		Post Test		paired 't' test p-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Knowledge	9.8000	4.16116	15.8833	5.06932	12.381 .000 ***

***p<0.001**

Table 5 reveals the comparison of knowledge scores both in pre and posttests which confirmed the existence of a statistically significant difference between the pre and posttest knowledge scores.

Table 6 Description of participantsbased on pre test dietary intake of calcium

Food	Once in a day		not taken		Mean + SD
	F	%	F	%	
Dairy Products Cow's milk	15	25	45	75	1.2±.56
Buffalo's milk	-	-	100	100	
Curds from Cow's	9	15	51	85	1.0 ±.0
Milk: Auvin milk	3	5	47	75	1.26 ±.764
Skimmed milk Powder (Cow's milk)	-	-	100	100	
Whole milk Powder (Cow's milk)	-	-	100	100	2.60±1.758
Butter milk	9	15	51	85	1.1 ± .33
Meat, Fish and Eggs Chicken	2	3	58	97	1.5 ±.789
Mutton (Muscle)	1	2	59	98	2.52±1.761
Egg (Hen)	1	2	59	98	1.00 ± .000
Nuts: Almond	3	5	57	95	1.00 ± .000
Ground nut	-	-	100	100	
Cashew nut	-	-	100	100	1.82±1.255
Cereals and Pulses					
Ragi	5	8	55	92	1.90±1.311
Wheat flour (Whole)	1	2	59	98	1.00 ± .000
Wheat flour (refined)	-	-	100	100	
Rice (Parboiled)	41	68	19	32	1.41±.49
Green gram dhal	2	3	58	97	1.00 ± .000
Black gram dhal	4	7	56	93	1.00± .000
Bengal gram dhal	1	2	59	98	1.00 ±0.00
Vegetables and Fruits: Cauliflower	2	3	48	97	1.00 ± 0.00
Ladies Fingers	11	18	49	82	1.09 ± .301
Beet root	14	23	46	77	1.00±.930
Cabbage	5	8	55	92	1.00± .000
Grapes (Black)		-	100	100	

Dates (Khajoor)	5	8	55	92	1.00 ± 0.00
Oranges	7	12	53	88	1.00± .002
Raisins (Kismis)	-	-	100	100	
Pineapple	-	-	100	100	
Apples	5	8	55	92	1.00 ± 00
Bananas	12	20	48	80	1.07± .001
Guava	4	7	56	93	2.00±1.402
Papayas	2	3	58	97	1 ± 0.0
Carrot	16	27	44	73	1.06 ±.25
Tomato	12	20	48	80	1.25 ± 1.0

Table 6 identifies the pretest dietary intake calcium among the participants. It was found that majority of participants(68%) were taking rice once daily for their dietary calcium. Next to rice milk was the preferred intake (27%)of dietary calcium. Dietary intake of calcium through pine apple, grapes, ground nut, cashew nut etc was not taken by any of the subjects. None of the participantswere found to take calcium more than once daily in their diet.

Table 7 Description of participantsbased on post test dietary intake of calcium

Food	Once in a day		Twice in a day		Thrice in a day		More than Three times a day		not taken		Mean + SD
	F	%	F	%	F	%	F	%	F	%	
Dairy Products Cow's milk	20	33.3	20	33.3	-	-	-	-	20	33.3	2.67±1.714
Buffalo's milk	-	-			-	-	-	-	100	100	-
Curds from Cow's	28	46.7	15	25.0	1	1.7	-	-	16	26.7	2.35±1.676
Milk: Auvin milk	32	53.3	20	33.3	1	1.7	-	-	7	11.7	1.83±1.264
Skimmed milk Powder (Cow's milk)	26	43.3	14	23.3	-	-	-	-	20	33.3	2.57±1.779
Whole milk Powder (Cow's milk)	24	40.0	16	26.7	-	-	-	-	20	33.3	2.60±1.758
Butter milk	30	50.0	3	5.0	-	-	-	-	27	45.0	2.85±1.973
Meat, Fish and Eggs Chicken	30	50.0	11	18.3	-	-	-	-	19	31.7	2.45±1.789
Mutton (Muscle)	27	45.0	13	21.7	1	1.7	-	-	19	31.7	2.52±1.761
Egg (Hen)	29	48.3	23	38.3	-	-	-	--	8	13.3	1.92±1.306
Nuts: Almond	31	57.7	14	23.3	-	-	-	-	15	25.0	2.23±1.661
Ground nut	27	45.0	12	20.0	-	-	-	-	21	35.0	2.60±1.815
Cashew nut	32	53.3	21	35.0	-	-	--	-	7	11.7	1.82±1.255
Cereals and Pulses											
Ragi	30	50.0	22	36.7	-	-	-	-	8	13.3	1.90±1.311
Wheat flour (Whole)	27	45.0	23	38.3	-	-	1	1.7	9	15.0	2.03±1.377
Wheat flour (refined)	30	50.0	19	31.7	1	1.7	-	-	10	16.7	2.02±1.432
Rice (Parboiled)	27	45.0	14	23.3	-	-	-	--	19	31.7	2.50±1.761
Green gram dhal	34	56.7	15	25	-	-	--	-	11	18.3	1.98±1.501
Black gram dhal	30	50.0	19	31.7	-	-	-	-	11	18.3	2.05±1.478
Bengal gram dhal	36	60.0	14	23.3	-	-	--	-	10	16.7	1.90±1.458
Vegetables and Fruits:	32	53.3	20	33.3	-	-	-	-	8	13.3	1.87±1.321

Cauliflower											
Ladies Fingers	37	61.7	19	31.7	-	-	--	-	4	6.7	1.58±1.030
Beet root	29	48.3	27	45.0	1	1.37	-	-	3	5.0	1.68±.930
Cabbage	32	53.3	18	30.0	-	-	-	-	10	16.7	1.97±1.438
Grapes (Black)	28	46.7	21	35.0	-	-	-	-	11	18.3	2.08±1.465
Dates (Khajoor)	30	50.0	18	30.0	2	3.3	3	5.0	7	11.7	1.98±1.347
Oranges	27	45.0	22	36.7	2	3.3	2	3.3	7	11.7	2.00±1.302
Raisins (Kismis)	29	48.3	19	31.7	6	10.0	-	-	6	10.0	1.92±1.225
Pineapple	26	43.3	22	36.7	4	6.7	-	-	8	13.3	2.03±1.314
Apples	30	50.0	19	31.7	1	0.8	2	3.3	8	13.3	1.98±1.372
Bananas	27	45.0	22	36.7	9	15.0	2	3.3	-	-	1.77±.831
Guava	30	50.0	19	31.7	1	1.7	1	1.7	9	15.0	2.00±1.402
Papayas	28	46.7	21	35.0	3	5.0	-	-	8	13.3	1.98±1.321
Carrot	30	50.0	20	33.3	7	11.7	3	5.0	-	-	1.72±.865
Tomato	30	50.0	22	36.7	2	3.3	-	-	6	10	1.83±1.196

Table 7 shows the post test dietary intake calcium among the participants. It was found that the dietary intake of calcium was improved for pretest to post test. Majority of participantswere taking dietary calcium at least twice daily through milk products, cereals and pulses and though fruits and vegetables. Very few participantswere taking dietary calcium more than twice in the form of fruits and vegetables. None of the participantswere found to take calcium more than thrice daily in their diet.

Table: 8 Distribution of participantsbased on 24 hours dietary recall of calcium intake

Group	Not Adequate		Adequate	
	<600 Mg/day		≥600 Mg/day	
	No	%	No	%
Pretest	59	98	1	2
Post test	5	5	55	95

Table 8 states the 24 hours dietary recall of on calcium intake. It was found that in pretest 98% of participantsdietary intake of calcium was inadequate. Where as in post test 95% participantsdietary intake of calcium was adequate.

Table 9 Distribution of participantsbased on the walking program of perimenopausal women

Weeks	Walking			
	Non Adherence		Adherence	
1st week 10 mts (once in a day)	F	%	No	%
	16	73	44	73
2st week 10 mts once in a day	10	17	50	83
3rd week 10 mts 2 time per day	6	10	54	90
4th week 10 mts 2 times per day	5	8	55	92

Table 9 demonstrates walking practice of participantsfor 10 mts. It showed that 73% of participantsadhered to walking practice once daily on the 1st week, 83% had the same on the 2nd week, 90% adhered twice a day on 3rd week and 92% of participantswere adhered to daily walking twice a day on the 4th week.

Table : 10 Association of pre test knowledge with selected demographic variables

	Variables	no	Pre knowledge			Chi square p value
			Poor	Good	Very good	
1	**Age**					
	35-40 Years	20	10	6	4	
	41-45 Years	14	8	4	2	.881
	46-50 Years	18	10	6	2	.990(NS)
	51-55 Years	8	5	2	1	
2	**Education**					
	Primary Education	24	11	9	4	
	Higher Education	22	14	4	4	1.52
	Degree	14	8	5	1	.822(NS)
3	**Occupation**					
	Agriculture	11	5	4	2	
	Unemployed	34	19	9	6	1.29
	Professional	15	9	5	1	1.52(NS)
4	**Monthly income**					
	Less than 10000	32	16	10	6	1.29
	Rs.10000 - 20000	14	8	4	2	
	Rs.20000 – 30000	14	9	4	1	.863(NS)
5	**Religion**					
	Hindu	28	16	9	3	
	Christian	32	17	9	6	.769
	Muslim	0	0	0	0	.681(NS)
	Others	0	0	0	0	
6	**Type of family**					
	Joint	31	18	10	3	1.430
	Nuclear	29	15	8	6	.489(NS)

7	**Dietary pattern** Vegetarian Mixed	1 59	1 32	0 18	0 9	.832 .660(NS)
8	**Body mass index** Normal (18.5 - 23kg/m2 Overweight(23.1 -25kg/m2)	38 22	19 14	13 5	6 3	1.127 .569(NS)

Table 10 shows the association of pretest knowledge with selected demographic variables and found no significance difference in association of pretest knowledge score with age, education, occupation, marital status, monthly income, dietary pattern and body mass index

Table : 11 Association of post test knowledge with selected demographic variables

	Variables	no	Post knowledge			Chi square p value
			Poor	Good	Very good	
1	**Age**					
	35-40 Years	20	2	7	11	3.081
	41-45 Years	14	1	6	7	.799(NS
	46-50 Years	18	0	9	9	
	51-55 Years	8	0	4	4	
2	**Education**					
	Primary Education	24	0	10	1 4	3.274
	Higher Education	22	2	11	9	.513(NS)
	Degree	14	1	5	8	
3	**Occupation**					
	Agriculture	11	0	5	6	.785
	Unemployed	34	2	15	17	.940(NS)
	Professional	15	1	6	8	
4	**Monthly income**					
	Less than 10000	32	2	13	17	1.155
	Rs.10000 - 20000	14	0	7	7	.885(NS)
	Rs.20000 – 30000	14	1	6	7	
5	**Religion**					
	Hindu	28	1	13	14	0.358
	Christian	32	2	13	17	.836(NS)
	Muslim	0	0	0	0	
	Others	0	0	0	0	
6	**Type of family**					
	Joint	31	2	14	15	.453
	Nuclear	29	1	12	16	.797(NS)

7	**Dietary pattern** Vegetarian Mixed	1 59	1 2	0 26	0 31	19.322 .000(S)
8	**Body mass index** Normal (18.5 - 23kg/m2 Overweight(23.1 -25kg/m2)	38 22	2 1	16 10	20 11	.069 .966(NS)

Table 11 shows the association of posttest knowledge with selected demographic variables and found to be significant in the dietary pattern. No significant difference found in other demographic variables such as age, education, occupation, marital status and monthly income.

Table :12 Association of self-care activities with selected demographic variables

	Variables	no	Self care activities		Chi square p value
			Not adequate	Very good	
1	**Age**				
	35-40 Years	20	6	14	3.458
	41-45 Years	14	4	10	.326 (NS
	46-50 Years	18	6	12	
	51-55 Years	8	0	8	
2	**Education**				
	Primary Education	24	4	20	2.112
	Higher Education	22	7	15	.348(NS)
	Degree	14	5	9	
3	**Occupation**				
	Agriculture	11	0	11	5.495
	Unemployed	34	10	24	.064(NS)
	Professional	15	6	9	
5	**Religion**				
	Hindu	28	-	14	0.58
	Christian	32	-	17	.809(NS)
	Muslim	0			
	Others	0			
6	**Type of family**				
	Joint	31	10	18	2.198
	Nuclear	29	6	26	.138(NS)
7	**Dietary pattern**				
	Vegetarian	1	0	1	.370
	Mixed	59	16	43	.543(NS)
8	**Body mass index**				
	Normal (18.5 - 23kg/m2	38	12	26	1.279
	Overweight (23.1 -25kg/m2)	22	4	18	.258(NS)

Table 12 shows the association of self-care activities with selected demographic variables and found no significant difference in demographic variables such as age, education, occupation, marital status, monthly income, dietary pattern and BMI.

CHAPTER V
DISCUSSION

Osteoporosis is a public health problem currently threatening the health of millions of women around the world. (Stetzer, 2011). In Iran, as a result of the demographic transition and the increasing age of the population, osteoporosis has become an important public health issue (Meybodi et al., 2008). Vitamin D is also an essential factor for this silent diseases prevention; Unfortunately, the prevalence of vitamin D deficiency in Iran is high (Heshmat et al., 2008).

Mahdaviroshan et al. (2014) found that osteoporotic patients did not have good nutrition habits in their life (Mahdaviroshan & Ebrahimimameghani, 2014). The nutrition habits played a key role in the prevention and treatment of osteoporosis. Improving the lifestyle of women, especially their nutrition dimension of lifestyle, would reduce the economic and health costs of osteoporosis. The study results were analyzed and discussed in detail in relation to the objectives, need for the study, related similar studies and conceptual framework. (Rafraf & Bazyun, 2011).

Demographic characteristics of the sample

Out of 60 subjects, 33% of the selected participantswere under the age group of 35-40 years. Based on education, 40% had primary education and 23% had their education up to degree. 57 % were unemployed and 100% were married. 53% were earning less than 10000 as their monthly income.53% of participantswere Christian. 52% lived in a joint family. 98%dietary pattern was non vegetarian.100% of them had no family history of osteoporosis and 100% of them had no practices of exercise. 63% had normal body mass index.

Statistical analysis showed that the study participantsdid not differ significantly in terms of age, educational status, occupational status, marital status, monthly income, religion, type of family, dietary pattern, family history of osteoporosis, practices of exercises, and body mass index.

The first objective was to determine the knowledge and self-care activities among peri Menopausal women.

Description of knowledge scores

It was found that 55% of participantshad poor knowledge in the pre test where as it was only 5% in the post tests. 30% and 43% of participantshad good knowledge in pre and post tests respectively. 15% and 52% of participantshad very good knowledge in pre and post tests respectively.

Comparison of knowledge score

Comparison of knowledge scores both in pre and post tests confirmed the existence of a statistically significant difference between the pre and posttest knowledge scores.

These findings are consistent with the results of another study conducted by SamerHammoudeh et al.(2015).Knowledge score were categorized into three groups using an arbitrary cutoff score (very good knowledge (>85% correct answers), good knowledge (75–85% correct answers), and moderate/low knowledge (< 75% correct answers) and were compared with different factors. Significance was based on a two-sided p-value of < 0.05.

A study was conducted by to assess Eman M. mortada1 et,al, in (2017) the effectiveness of educational intervention on improving awareness about osteoporosis, the results showed that there was a significant improvement in the level of knowledge in the posttest. ($p \leq .001$).

The improvement was assessed under three aspects of knowledge (knowledge on osteoporosis risk factors, knowledge on exercise and knowledge on calcium intake)and the existence of statistically significant differences between the pretest and post test knowledge was found among perimenopausal women. There was a significant difference in knowledge among perimenopausal women who participate in the Osteoporosis Prevention education pre and post test.

The second objective was to find out the evaluate the effect of osteoporosis prevention education on knowledge and self-care activities

Description of participantsbased on pretest dietary intake of calcium

The pretest dietary intake calcium among the participants. It was found that majority of participants(68%) were taking rice once daily for their dietary calcium. Next to rice milk was the preferred intake (27%)of dietary calcium. Dietary intake of calcium through pine apple, grapes, ground nut, cashew nut etc was not taken by any of the subjects. None of the participantswere found to take calcium more than once daily in their diet.

Description of participantsbased on post test dietary intake of calcium

The post test dietary intake calcium among the participants. It was found that the dietary intake of calcium was improved for pretest to post test. Majority of participantswere taking dietary calcium at least twice daily through milk products, cereals and pulses and though fruits and vegetables. Very few participantswere taking dietary calcium more than twice in the form of fruits and vegetables. None of the participantswere found to take calcium more than thrice daily in their diet.

Distribution of participantsbased on 24 hours dietary recall of calcium intake

24 hours dietary recall of on calcium intake. It was found that in pretest 98% of participantsdietary intake of calcium was inadequate. Where as in post test 95% participantsdietary intake of calcium was adequate.

The ICMR expert group (2010) recommended 600 mg of dietary calcium intake per day for an adult Indian woman, whereas the recommendation by WHO was 1000mg/day for an adult woman. Such a paradoxical situation mandates calcium balance studies of different physiological states residing in different geographical regions of the world.

A study conducted by Young-Suk Lim (2015) assessed the percentage of each nutrient and food intake frequency from 12 food groups. Higher intake frequency showed preventive effect from osteoporosis compared to lower intake frequency in such food group as dairy products (ORs 0.40, CI 0.21-0.75), beans (ORs 0.49, CI 0.29-0.83), seaweeds (ORs 0.55, CI 0.32-0.94), fish (ORs 0.56, CI 0.32-0.98), and fruits (ORs 0.42, CI 0.23-0.79) after adjusting for age.

AslıKalkımet.al., (2017) Did a Theory-based Osteoporosis Prevention Education and Counseling Program for perimenopause women. After the education and counseling program, a significant increase was seen in comparison with the control group in the mean scores of the intervention group on the Osteoporosis Knowledge Test and its subscales ($p < .001$), on the Osteoporosis Health Belief Scale and its subscales ($p < .001$), on the Osteoporosis Self-efficacy Scale and its subscales ($p < .001$), and in their daily calcium intake ($p < .001$) and duration of weekly exercise ($p < .001$).

The current study findings related to the aspects of self- care activities clearly indicated the desirable influence of osteoporosis Prevention education on intake of dietary calcium. There was a significant difference found in pre intervention and post intervention intake of dietary calcium among perimenopausal women.

Distribution of participants based on the walking program of perimenopausal women

This study showed that 73% of participantsadhered to walking practice once daily on the 1st week, 83% had the same on the 2nd week, 90% adhered twice a day on 3rd week and 92% of participantswere adhered to daily walking twice a day on the 4th week.

RisniErandieEdiriweera de Silvaet., al ,2014 assessed the dietary calcium intake among perimenopausal women. The mean calcium intake was 528 mg/day. Only 18.8% (n=35) of the participants achieved the Recommended Daily Allowances (RDA) for Calcium. Exercise was grossly inadequate in the majority and only 13.6% (n=23) engaged in the recommended exercises. Only 3.8% (n=7) of the participants currently engaged in specific behaviors to improve bone health while 10.8% (n=20) had thought of routinely engaging in such behaviors.

The third objective was association of knowledge and self-care activities with selected demographic variables

Association of pretest knowledge with selected demographic variables

The association of pretest knowledge with selected demographic variables and found no significance difference in association of pretest knowledge score with age, education, occupation, marital status, monthly income, dietary pattern and body mass index

Association of posttest knowledge with selected demographic variables

The association of posttest knowledge with selected demographic variables and found to be significant in the dietary pattern. No significant difference found in other demographic variables such as age, education, occupation, marital status and monthly income.

Association of self-care activities with selected demographic variables

The association of self-care activities with selected demographic variables and found no significant difference in demographic variables such as age, education, occupation, marital status, monthly income, dietary pattern and BMI.

Renée D. Endicott**.,**2013, Knowledge, Health Beliefs, and Self-Efficacy of Osteoporosis in Perimenopausal Women, and found no differences were noted in knowledge of osteoporosis among women with and without a family history of osteoporosis, although women with a family history perceived a greater susceptibility for developing osteoporosis than women without the family history. Findings indicate that both groups increased in knowledge of osteoporosis ($p<.001$). Benefits of calcium increased in the women without a family history of osteoporosis ($p<.001$) and benefits of exercise increase in women with a family history of osteoporosis ($p = .007$). There were no significant statistical findings regarding self-efficacy between the two groups of women.

MAJOR FINDINGS AND CONCLUSION

SUMMARY

The present study was conducted to identify the effect of Osteoporosis Prevention education on knowledge and self - care activities among perimenopausal

women at KMCH, Coimbatore. The study included 60 participants aged from 35 to 55 years. Computer assisted Osteoporosis Prevention Education given to the participants which included teaching on osteoporosis & its preventive measures.

OBJECTIVES:

The objectives of the study were to:

- Determine the knowledge and self-care activities among peri Menopausal women.
- Evaluate the effect of osteoporosis prevention education on knowledge and self-care activities
- Associate the knowledge and self-care activities with selected demographic variables

The formulated study hypotheses were:

There is a significant difference in knowledge on osteoporosis among perimenopausal women.

Review of literature and related studies enhanced the investigator to gather relevant information to support the study, utilize a conceptual framework and in the development of the tools. The related literatures were gathered and grouped under the following headings:

1. Risk factors of osteoporosis.
2. Knowledge of osteoporosis
3. Prevention of osteoporosis

The conceptual framework adopted for the study was based on Nola J. Pender's Health Promotion Model. The concepts of this model were modified and utilized for the present study.

The research approach was evaluative in nature. Quasi experimental one group pretest and posttest only design was adopted to conduct the study in the orthopedic OPD at KMCH, Coimbatore. The study included 60 perimenopausal women the age group of 35 - 55 who fulfilled the inclusion criteria. Osteoporosis Prevention Education (OPE) was implemented to the participant. The OPE included teaching on osteoporosis & its preventive measures, issuing of booklets '*Mindful bone health*'The

data were analyzed using appropriate descriptive and inferential statistics. The results are discussed in light of the hypotheses.

STUDY FINDINGS

Demographic and personal variables

The demographic variables of the participantsin the study were found to be homogenous in nature as there were no statistically significant differences between the pre and post test Knowledge.

Knowledge on Osteoporosis

Comparison of knowledge scores both in pre and post tests confirmed the existence of a statistically significant difference between the pre and posttest knowledge scores.

24 hours dietary recall of calcium intake

24 hours dietary recall of on calcium intake. It was found that in pretest 98% of participantsdietary intake of calcium was inadequate. Where as in post test 95% participantsdietary intake of calcium was adequate.

Walking program

This study showed that 73% of participantsadhered to walking practice once daily on the 1st week, 83% had the same on the 2nd week, 90% adhered twice a day on 3rd week and 92% of participantswere adhered to daily walking twice a day on the 4th week.

CONCLUSION

This study generated information on the knowledge on osteoporosis and its prevention education among perimenopausal women before and after the intervention. The women who improved their knowledge, practice of dietary calcium intake calcium intake and regular adherence to walking

RECOMMENDATIONS

- A comparative study can be conducted among pre and post-menopausal women to evaluate the effectiveness of OPE on peak bone mass.
- This study can be replicated on a larger sample size in another settings

- A similar study with inclusion of other bio -physiological parameters like serum calcium, vitamin-D, BMD can be conducted.
- Follow up study could be done for sustaining the benefits.
- Another study can be done among postmenopausal women quality of life

IMPLICATIONS

NURSING PRACTICE

- This study helps the Nurses to teach the members of the society about the prevention of osteoporosis with the education module.
- The booklet can be utilized in patient teachings and health education sessions
- Nurses could involve family members to enhance their knowledge on prevention of osteoporosis.
- Nurses must update and implement the recommendations of IOF,NOF.

NURSING EDUCATION

- Nurse educators can educate the student nurses and staff nurses about the prevention of osteoporosis.
- Booklet information can be used by students

NURSING ADMINISTRATION

- Frequent Osteoporosis screening camps can be organized by the administrators for women in the postmenopausal age.
- Osteoporosis prevention education can be organized for the risk group

NURSING RESEARCH

- Osteoporosis registry can be maintained the health care delivery.
- The data from similar research studies could be collected to submit the report to the government
- Can be formulate policies on osteoporosis prevention and management at primary health levels
- The government educational authorities can develop courses in all high schools to help the children to attain peak bone mass.

ABSTRACT

A study entitled "Effect of Osteoporosis Prevention Education on Knowledge and Self -care Activities amongPerimenopausal Women at KMCH, Coimbatore''. **Objective:** Theobjectives of the study were to Determine the knowledge and self-care activities among perimenopausal women, Evaluate the effect of osteoporosis prevention education on knowledge and self-care activities, Associate the knowledge and self-care activities with selected demographic variables. **Design:**Quasi experimental pretest posttest only design. **Setting:** Orthopaedicoutpatient department of Kovai Medical Center and Hospital, Coimbatore. **Sample size:**60 participantsperimenopausal women 35 – 55 age group. **Conceptual Framework:** Nola J. Pender Health Promotion Model 1996. **Data collection procedure**: After getting the verbal consent, the demographic data assessed **Osteoporosis Knowledge Test** 24 item scale developed by Katherine Kim, Mary Horan and Phyllis Gendler (1991).**24hours dietary recall, walking program. Results:The knowledge score of subjects**: It was found that 55% of participantshad poor knowledge in the pretest where as it was only 5% in the post tests. 30% and 43% of participantshad good knowledge in pre and posttests respectively. 15% and 52% of participantshad very good knowledge in pre and posttests respectively. Comparison of knowledge scores both in pre and post tests confirmed theexistence of a statistically significant difference between the pre and posttestknowledge scores.**24 hours dietary recall of on calcium intake**: It was found that in pretest 98% of participantsdietary intake of calcium was inadequate. Where as in posttest 95% participantsdietary intake of calcium was adequate. **Walking program:** This study showed that 73% of participantsadhered to walking practice once daily on the 1st week, 83% had the same on the 2nd week, 90% adhered twice a day on 3rd week and 92% of participantswere adhered to daily walking twice a day on the 4th week. **Conclusion:**This study generated information on the knowledge on osteoporosis and its prevention education among perimenopausal women before and after the intervention. The women who improved their knowledge, practice of dietary calcium intakeand regular adherence to walking.

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APPENDIX - A

SECTION : A
Demographic data :

1.Age:

a. 31-35

b. 36-40

c. 41-45

d. 46-50

2.Education:

a)Illiterate

b)Primary education

c)Higher education

d)Degree

3.Occupation:

a)Agriculture

b) Unemployed

c)Professional

d)Business

4. Marital status:

a)Single

b)Married

5.Monthly income:

a)less than 10000

b)10000 – 20000

c)20000 – 30000

d)Above 30000

6. Religion:

a)Hindu

b)Muslim

c)Christian

d)Others

7. Types of family:

a)Joint

b)Nuclear

8. Dietary pattern

a)Vegetarian

b) Mixed

9. Family history of osteoporosis

a. No

b. Yes

10.practice of exercise (If yes, specify)

Walking

a. Yes

b. No

11. Body mass index

a.Under weight (<18.5kg/m2)

b. Normal (18.5-23kg/m2)

c. Overweight(23.1-25kg/m2)

d. Obesity (>25kg/m2)

SECTION: B

OSTEOPOROSIS KNOWLEDGE TEST

a. OSTEOPOROSIS RISK FACTORS

* After you read each statement, think about if the person is:
* MORE LIKELY TO GET OSTEOPOROSIS, or
* LESS LIKELY TO GET OSTEOPOROSIS, or
* IT HAS NOTHING TO DO WITH (NEUTRAL) GETTING OSTEOPOROSIS, or
* YOU DON'T KNOW.
* When you read each statement, circle one of the 4 choices for you answer.
* **ML**= MORE LIKELY
* **LL** = LESS LIKELY
* **NT** = NEUTRAL
* **DK** = DON'T KNOW

1) Eating a diet LOW in milkProducts

A)ML B) LL C)NT D)DK

2) Being menopausal:'change of life'

A)ML B) LL C)NT D)DK

3) Having big bones

A)ML B)LL C)NT D)DK

4) Eating a diet high in dark greenleafy vegetables

A)ML B)LL C)NT D)DK

5)Having a mother or grandmother who has osteoporosis

A)ML B)LL C)NT D)DK

6) Being a white women with fair skin

A)ML B)LL C)NT D)DK

7) Do osteoporosis occurs suddenly

A)ML B)LL C)NT D)DK

8) Having ovaries surgically removed

A)ML B)LL C)NT D)DK

9) Taking cortisone (steroids e.g.Prednisone) for long time

A)ML B)LL C)NT D)DK

10) Exercising on a regular basis

A)ML B)LL C)NT D)DK

b. EXERCISE KNOWLEDGE SCALE

For the next group of questions, choose one answer from the 4 choices. Be sure to choose only one answer

11. Which of the following exercises is the best way to reduce a person's chance of getting osteoporosis?

A. Swimming D. Don't Know

B. Walking briskly

C. Doing kitchen chores, such as washing dishes or cooking

12. Which of the following exercise is the best way to reduce a person's chance of getting osteoporosis?

A. Bicycling C. House cleaning

B. Yoga D. Don't Know

13.How many days a week do you think a person should exercise to strengthenthe bones?

A. 1day a week C. 4 or more days a week

B. 2 days week D. Don't Know

14. What is the LEAST AMOUNT OF TIME a person should exercise on eachoccasion to strengthen the bones?

A. Less than 15 minutes C. More than 40 minutes

B. 20 to 30 minutes D. Don't know

15. Exercise makes bones strong, but it must be hard enough to make breathing.

A. Just a little faster C. Much faster, but talking is possible

B. So fast that talking is not possible D. Don't Know

16. Which of the following exercises is the best way to reduce a person's chanceof getting osteoporosis?

A. Jogging or running for exercise C. Gardening

B. Golfing using golf cart D. Don't Know

17. Which of the following exercises in the best way to reduce a person's chanceof getting osteoporosis?

A. Bicycling C. Aerobic dancing

B. Doing laundry D. Don't Know

C. CALCIUM INTAKE KNOWLEDGE SCALE

18. Which of these is a good source of calcium?

A. Apple C. Cucumber

B. Cheese D. Don't Know

19. Which of these is a good source of calcium?

A. Watermelon C. Sardines fish

B. Corn D. Don't Know

20.which of the following is a good source of calcium?

A. Carrot C. Guava

B. Tomato D. Pineapple

21. Which of these is a good source of calcium?

A. Yogurt C. Cabbage

B. Strawberries. D. Don't Know

22. Which of these is a good source of calcium?

A. Ice cream C. Radishes

B. Grape fruit D. Don't Know

23. Which of the following is the recommended amount of calcium intake for an adult?

A. 100 mg – 300 mg daily C. 600 mg or more daily

B. 400 mg – 600 mg daily D. Don't Know

24. How much milk must an adult drink to meet the recommended amount of calcium?

A. 1/2 glass daily C. 2 or more glasses daily

B. 1 glass D. Don't Know

25. Which of the following is the best reason for taking a calcium supplement?

A. If a person skips breakfast C. If a person is over 45 years old

B. If a person does not get enough calcium from diet

D. Don't Know

C) 24 HOUR DIETARY RECALL

Food	Amount Calcium mg/100g	Once in a day	Twice in a day	Thrice in a day	Morethan Three times a day
Dairy Products Cow's milk	120				
Buffalo's milk	210				
Curds from Cow's	120				
Milk Auvin milk	129				
Skimmed milk Powder (Cow's milk)	1370				
Whole milk Powder (Cow's milk)	910				
Butter milk	350				
Meat, Fish and Eggs Chicken	30				
Mutton (Muscle)	150				
Pork (muscle)	30				
Crab (muscle)	1370				
Prawn	320				
Egg (Hen)	60				
Nuts Almond	230				
Ground nut	50				
Pistachio	140				
Cashew nut	38				
Cereals and Pulses Bajra	50				
Ragi	330				
Wheat flour (Whole)	50				
Wheat flour (refined)	20				
Rice (Parboiled)	10				
Rice (Raw)	20				

Green gram dhal	170				
Black gram dhal	200				
Bengal gram dhal	53				
Vegetables and Fruits Cauliflower	140				
Fenugreek (Methi)	470				
Spinach (Palak)	60				
Ladies Fingers	90				
Beet root	200				
Cabbage	80				
Figs (Anjeer)	60				
Grapes (Black)	70				
Dates (Khajoor)	50				
Oranges	100				
Raisins (Kismis)	10				
Pineapple	13				
Apples	10				
Bananas	10				
Guava	20				
Papayas	10				
Carrot	37				
Tomato	100				

NUTRITIONAL MEASUREMENT CUPS

D. WALKING PROGRAM ADHERENCE SCALE

WEEK	DAY	YES	NO
1ST WEEK 10 mts (one time a day)	1		
	2		
	3		
	4		
	5		
	6		
	7		

WEEK	DAY	YES	NO
2nd WEEK 10 mts (one time a day)	1		
	2		
	3		
	4		
	5		
	6		
	7		

WEEK	DATE	YES	NO
3rd WEEK 10 mts (2 times per day)	1		
	2		
	3		
	4		
	5		
	6		
	7		

WEEK	DAY	YES	NO
4th WEEK 10 mts (2 times a day)	1		
	2		
	3		
	4		
	5		
	6		
	7		

APPENDIX - B

TEACHING MODULE

Topic : Osteoporosis prevention Education

Group **:** Perimenopausal women

Place of teaching : KMCH orthopaedic OPD

Time : 30 - 40 mts (for one session)

Size : 10-12

Method of teaching : Lecture Cum discussion

Teaching aid : Teaching module

Components **:** Knowledge on osteoporosis and its preventive measures

General Objectives:

Help the subjects to acquire adequate knowledge on osteoporosis and its preventive measures with desirable attitude.

Specific Objectives:

The study participant will be able to:

1. define osteoporosis.
2. list out the risk factors of osteoporosis.
3. detail the types of osteoporosis.
4. explain the underlying mechanism of osteoporosis development.
5. enlist the clinical features of osteoporosis.
6. enumerate the diagnostic measurements of osteoporosis.
7. explain the management of osteoporosis.
8. explain the recommended calcium requirement for various age groups.
9. list out the calcium rich foods.
10. explain the walking program that improves bone density.
11. adhere to the preventive measures of osteoporosis.

S. No	Specific Objectives	Content	Researcher's Activity	Participant's Activity
1	Define osteoporosis	**INTRODUCTION** Osteoporosis is a silent disease of the bones that makes them weaker and prone to fracture. The disease is "silent" because there are no symptoms when you have osteoporosis and the condition may come to attention only after the break of a bone. A thorough knowledge on osteoporosis and its preventive measures help you to prevent such complications.		
2	List out the risk factors of osteoporosis	**DEFINITION** Osteoporosis : Osteo = bone Porosis = containing holes Osteoporosis is the thinning and weakening of the bones that leads to their breaking even with minimum force. Osteoporosis is defined as a systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fractures.	Defining the topic Explaining	Listening Listening
3	detail the types of osteoporosis	**RISK FACTORS** • Advanced age - Bone loss occurs in adulthood, beginning in middle age and accelerating during menopause • Female gender - Women have less bone mass than men • Early menopause - Estrogen helps bones keeps strong. The younger a women experiences menopause, the more rapidly she loses the benefits of estrogen • Corticosteroid use- People who need to take medications such as prednisone, prednisolone or dexamethasone regularly are prone to accelerated bone loss • Smoking / tobacco use - Tobacco use accelerates loss of bone • Alcohoism - overuse of alcohol increases the chance of developing osteoporosis • Low body weight - Underweight women often have lower bone mass than heavier women at similar ages • Inadequate intake of calcium and vitamin D - Both are necessary to allow bones to remodel properly • Lack of physical activity - Exercises maintain bone health Family history of osteoporosis and fractures • Mental depression- Not taking diet properly Prolonged use of anticonvulsant,	Explaining Explaining	Listening Listening

		proton pump inhibitors • Soft drinks - many of which contain phosphoric acid that increases the risk of osteoporosis **TYPES OF OSTEOPOROSIS** Osteoporosis is basically of two types Primary osteoporosis and Secondary osteoporosis **1. Primary osteoporosis** It occurs as a result of normal physiological process of ageing. The two most important categories of primary osteoporosis are post - menopausal and senile and idiopathic (rare)		
4	Explain the underlying mechanism of osteoporosis development	**a) Post - menopausal osteoporosis** The primary change in glandular function that occurs in the menopausal period is loss of secretion of estrogen and progesterone hormones from the ovaries. These changes are gradual, beginning well before the overt cessation of bleeding (menopause) estrogen facilitates uptake of calcium hence, loss of estrogen secretion leads to reduction in bone mass. **b) Senile (or old age) osteoporosis :** It is due to age-related decrease in the function of osteoblasts (bone forming cells). Bone break down overcomes bone building. Calcium deficiency could also be due to decreased absorption of calcium from the intestines or from poor intake.		
5	enlist the clinical features of osteoporosis	2) **Secondary osteoporosis** In this condition, an other disease or drug is responsible for osteoporosis. It may be due to : • Endocrine: Cushing's syndrome, thyrotoxicosis, hyperparathyroidism • Drugs : Glucocorticoids, heparin, anticonvulsants, immunosuppresants • Chronic Diseases: Renal impairment, liver cirrhosis, post gastrectomy, • Others : Nutritional, multiple myeloma		
6	enumerate the diagnostic measurements of osteoporosis	**MECHANISM OF OSTEOPOROSIS DEVELOPMENT**: Bone contains living cells, including some that nourish the tissue and others that control the process known as bone remodeling. Throughout life, our bones are constantly being renewed by means of this remodeling process, in which old bone is removed (bone resorption) and replaced by new bone (bone formation) Bone remodeling is carried out through the coordinated actions of bone - removing cells called osteoclasts and bone-forming cells called osteoblasts.		
	explain the management of			

7	osteoporosis	Duning childhood and teenage years, new bone tissue is added to the skeleton faster than old bone tissue is removed. As a result the bones grow in both size and strength increasing its mass. The peak bone mass is achieved between 18-25 years of age. After this period, the bone mass remains stable or decrease very gradually for a period of years depending on a variety of life style factors such as diet & physical activity. The three main mechanisms by which osteoporosis develop are an inadequate peak bone mass, excessive bone resorption and inadequate formation of new bone during remodeling.		
8	adhere to the preventive measures of osteoporos	**CLINICAL FEATURES** • Back pain or any other joint pain or tenderness • Loss in height • Change in Posture • Imbalanced gait • Fractures of the wrists or hips (usually the first sign)		
9	explain the recommended calcium requirement for various age groups	**DIAGNOSIS OF OSTEOPOROSIS** • Age, sex, body mass index (low), family history, past history of fracture • Blood tests to rule out the level of calcium, phosphates, vitamin-D, bllod count, erythrocyte sedimentation rate (ESR), albumin. • Renal function • Plain X-rays : lateral thoracolumbar spine or hip • Magnetic resonance imaging • Bone turnovermarkers(BTM) • DEXA, QCT- to assess the bone mineral density(BMD) (Spine,hip) • Ultra sound – to measure BMD (heel, finger, leg bones) **MANAGEMENT** • Appropriate lifestyle programs, nutrition and physical exercise are essential for all ages • Osteoporosis is not an inevitable part of the ageing process. It can be prevented. • Increase bone mass by exercises, nutrition during adolescence to achieve peak bone mass and also at any age to maintain bone mass. • Pharmacological measures such as bisphosphonates, calcitonin, hormone replacement therapy • Non pharmacological measures such as dietary calcium and physical exercises are		

highly emphasized. These measures prevent osteoporosis and also promote bone health & maintain bone mass even in osteoporotic individuals.

10 list out the calcium rich foods.

PREVENTIVE MEASURES

- Follow a diet that provides proper amount of calcium, vitamin D, phosphorus and protein

1.CALCIUM

- Calcium is an essential nutrient for bone health.
- The total calcium intake in the diet has to be assessed.
- The required recommended dietary allowance of calcium for Indian women (ICMR)600mg/day
- WHO recommends 1000mg/day for a woman. Hence, the calcium intake should be more than 600/day.

<table>
<tr><th rowspan="2">Age</th><th colspan="2">Calcium requirement mg / day</th></tr>
<tr><th>WHO</th><th>ICMR</th></tr>
<tr><td>0 - 6 months
Breast milk
Cow’s milk</td><td>
300
400</td><td rowspan="4">500</td></tr>
<tr><td>7 – 12 months</td><td>400</td></tr>
<tr><td>1 – 3 yrs</td><td>500</td></tr>
<tr><td>4 – 6 yrs</td><td>600</td><td rowspan="2">600</td></tr>
<tr><td>7 – 9 yrs</td><td>700</td></tr>
<tr><td>10 – 12yrs
Boys
Girls</td><td rowspan="3">1300</td><td>
600
700</td></tr>
<tr><td>13-15yrs
Boys
Girls</td><td>
800
700</td></tr>
<tr><td>16-18yrs
Boys
Girls</td><td>
600
600</td></tr>
<tr><td>Premenopausal women and men < 65 yrs

Menopausal women and men > 65 yrs</td><td>1000

1300</td><td rowspan="2">600</td></tr>
<tr><td>Lactation</td><td>1000</td></tr>
</table>

12	explain the walking program that improves bone density.	**Calcium requirement for various age groups:** **Good sources** Ragi, milk and milk products, dark green, leafy vegetables, nuts, fish and marine foods. **Calcium sources**			

Food	Calcium(mg/100 g)
Dairy Products Cows Milk	120
Buffalo's Milk Curds from Cow's	210 120
Cheese	790
Milk Cow's Milk	120
Aavin milk	129
Skimmed Milk Powder (Cow's Milk)	1370
Whole Milk Powder (Cow's Milk)	910
Butter Milk	350
Meat, Fish and Eggs Chicken	30
Mutton (muscle)	150
Pork (muscle)	30
Crab (muscle) Prawn Egg (Hen)	1370 320 60
Nuts Almond	230
Ground nut	50
Pistachio	140
Cashew nut	38
Cereals and Pulses Bajra	50
Ragi	350
Wheat flour (Whole)	50
Wheat flour (refined)	20
Rice (Parboiled)	10
Rice (Raw)	20
Green gram dhal	170
Black gram dhal	200
Bengal gram dhal	53
Soya	240
Vegetables and Fruits Cauliflower	140
Fenugreek (Methi)	470
Spinach (Palak)	60
Ladies Fingers	90

Beet root	200
Cabbage	80
Figs (Anjeer)	60
Grapes (Black)	70
Dates (Khajoor)	50
Oranges	100
Raisins (Kismis)	10
Pineapple	13
Apples	10
Bananas	10
Guava	20
Papayas	10
Carrot	37
Tomato	100

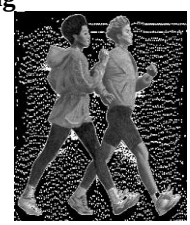
Points to remember

- Vitamin D increases the intestinal absorption of calcium. A good source is sunlight and can be obtained by exposing 20% of thebody surface with out sunscreen for 30mts.
- The daily calcium intake should not exceed 2500mg
- Eat foods with calcium several times throughout the day; your body uses calcium best when it can absorb it in small doses
- Phosphorus is also required for bone formation and it is present in the dietary elements like fish, meat, cereals, pulses and nuts

EXERCISE

One of the best ways to strengthen your bones and prevent osteoporosis
is by getting regular exercise. Even if you already have osteoporosis,
exercising can help maintain the bone mass you have. Exercise helps to
keep the bones strong by causing the muscles and tendons to pull on the bones, which in turn stimulates bone cells to produce more bone.
Exercise improves balance and protects the individual from falls and
fractures.

Walking



WALKING PROGRAMME

Week	Days	Duration of walk each time	Total duration /wk	Times /day
I	7days	10 mts	70 mts	1
II	7 days	10 mts	70 mts	1
III	7 days	10 mts	140 mts	2
IV	7 days	10 mts	140 mts	2

Brisk walking for at least 7 days in a week for 70 minutes then gradually increase after 3rdweek is recommended to maintain the bone health. Walking in the sun either early morning or in the evening is more preferable as sunlight helps to synthesis vitamin –D.

Conclusion

Adherence to the osteoporosis preventive measures which include intake of dietary calcium and exercises prevent bone loss and maintain bone health. Maintain your midage enjoy your old age!

APPENDIX - C

COPY OF LETTER SEEKING PERMISSION

KMCH COLLEGE OF NURSING
(Approved by the Government of Tamil Nadu & The Tamil Nadu Nurses & Midwives Council, Chennai.
Recognized by the Indian Nursing Council, New Delhi and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)
KMCH Campus, Avinashi Road, Coimbatore – 641 014. INDIA
Ph: (0422) 4323740, 2369321 Telefax : (0422) 2627525 Website: kmchcon.ac.in E-mail: nursing@kmch.ac.in

Prof. DR. S. Madhavi, M.Sc(N).,Ph.D.,
Principal

08th March, 2018

Ref : KMCT/6226/03/18
To
Dr. Thennavan A.S,MBBS., FRCS (ED)., FRCS (TR & ORTHO).,
Consultant Orthopeadic Surgeon,
Kovai Medical Center and Hospital,
Coimbatore – 14.

Dear Sir,

Greetings to you from KMCH College of Nursing.

I submit that one of our M.Sc(N) II Year student by name Mrs. Jospin Nisha specializing in Medical Surgical Nursing in our college desires to conduct a study titled " Effect on Osteoporosis Prevention Education on knowledge and self care activities among Peri Menopausal Women at Kovai Medical Center and Hospital, Coimbatore." as a part of her M.Sc(N) curriculum.

As she is in need of Medical Expert to complete the study, I request you to guide the student.

Thanking you.

Yours truly

PRINCIPAL

The Principal
K.M.C.H. College of Nursing
P.B. No. : 3209, Avanashi Road,
Coimbatore - 641 014.

KMCH COLLEGE OF NURSING * COIMBATORE * TAMIL NADU

Dr. A.S. Thennavan
M.B.B.S., FRCS., FRCS (TRAUMA & Ortho)
Consultant Orthopaedic Surgeon
Reg. No : 56566
Kovai Medical Center & Hospital
Coimbatore - 641 014
Tamil Nadu. India

Administrative Office :
Kovai Medical Center Research and Educational Trust
No.940/1A&B, Kovai Estate, Kalapatti Road, Coimbatore - 641 048. INDIA
Ph : (0422) 2369321 E-mail : info@kmch.ac.in

APPENDIX – D

COPY OF LETTER FROM ETHICAL COMMITTEE

KMCH ETHICS COMMITTEE
KOVAI MEDICAL CENTER AND HOSPITAL LIMITED
Excellence in Healthcare
99, Avanashi Road, Coimbatore - 641 014. INDIA
✆ (0422) 4323800, 4323619 | Fax : (0422) 4270805 | E-mail : ethics@kmchhospitals.com
EC Reg. No : ECR / 112 / Inst / TN / 2013

Ref: EC/AP/610/04/2018
23.04.2018

APPROVED

To

Mrs. V. C. Jayalakshmi, M.Sc (N),
Associate Professor – Department of Medical Surgical Nursing,
KMCH College of Nursing,
Coimbatore – 641 014

Dear V. C. Jayalakshmi,

The proposal entitled **"Effect of osteoporosis prevention education on knowledge and selfcare activities among perimenopausal women at KMCH, Coimbatore"**, submitted by **Mrs. L. Jospin Nisha,** under your supervision was reviewed by the Ethics Committee in its meeting held on **21.04.2018** and grants ethical clearance for the study .

Regards,
Yours Sincerely,

09/8/18

Dr.M.S. Thamizharasi,
Chairperson,
KMCH Ethics Committee.

Dr. M.S.Thamizharasi
M.D.,D.G.O.,PG Dip (Psych)
Chairperson
Ethics Committee
Kovai Medical Center and Hospital
Coimbatore - 641 014

Copy to Clinical Guide:

Dr. Thennavan.A.S., FRCS (ED), FRCS (TR & ORTHO)
Consultant – Orthopedic Surgeon,
Kovai Medical Center and Hospital,
Coimbatore-641 014.

ETHICS COMMITTEE KMCH

APPENDIX-E

REQUISITION FOR CONTENT VALIDITY

From

II year M.Sc. Nursing,

KMCH College Of Nursing,

Coimbatore.

To

Through the proper channel

The Principal,

KMCH College Of Nursing,

Coimbatore.

Respected Madam,

Sub: Seeking Expert Opinion and Content Validity Regarding

I am the student of KMCH college of Nursing. As a part of partial fulfilment of my post graduate programme, I wish to undertake a study titled **"Effect of osteoporosis prevention education on knowledge and self-care activities among perimenopausal women."** It will be of immense help to me if you could peruse the proposal and the research tool. Here with I am enclosing the copy to the same. Kindly do the needful.

Thanking You,

Date:

Place: Yours faithfully,

301610454

APPENDIX – F

CONTENT VALIDITY

CERTIFICATE OF CONTENT VALIDITY

This is to certify that I have perused that Research proposal submitted by **Register No: 301610454 "Effect of Osteoporosis Prevention Education on Knowledge and Self- care Activities among Perimenopausal women at KMCH, Coimbatore".**

I found that the methodology of the content and tool are appropriate.

DATE:

7/8/18

SIGNATURE AND SEAL

Dr. S. THANGAMANIKANDAN, Ph.D.
Assistant Professor
Department of Tamil
Dr. NGP Arts & Science College
Coimbatore - 641 048

CERTIFICATE OF CONTENT VALIDITY

This is to certify that I have perused that Research proposal submitted by **Register No: 301610454 "Effect of Osteoporosis Prevention Education on Knowledge and Self- care Activities among Perimenopausal women at KMCH, Coimbatore".**

I found that the methodology of the content and tool are appropriate.

DATE:

P. Kuyathi

SIGNATURE AND SEAL

CERTIFICATE OF CONTENT VALIDITY

This is to certify that I have perused that Research proposal submitted by **Register No: 301610454 "Effect of Osteoporosis Prevention Education on Knowledge and Self- care Activities among Perimenopausal women at KMCH, Coimbatore".**

I found that the methodology of the content and tool are appropriate.

DATE:

SIGNATURE AND SEAL

APPENDIX – G

LIST OF EXPERTS

1. Prof. DR. S. Madhavi, M.Sc. (N), Ph.D.,
   Principal
   Department of Medical and Surgical Nursing,
   KMCH College of Nursing,
   Coimbatore – 641014
2. Dr. Thennavan A.S, FRCS(ED)., FRCS(TR& ORTHO)
   Consultant Orthopedic Surgeon,
   Kovai Medical Center and Hospital,
   Coimbatore – 641014.
3. Associate. Prof. V.C. Jayalakshmi,
   Department of Medical and Surgical Nursing,
   KMCH College of Nursing,
   Coimbatore – 641014
4. Prof. P. Kuzahanthaivel, M.Sc (N).,
   Department of Medical and Surgical nursing,
   KMCH College of Nursing,
   Coimbatore – 641014
5. Prof. DR. P. Viji, M.Sc (N), Ph.D.,
   Department of Medical and Surgical nursing,
   KMCH College of Nursing,
   Coimbatore – 641014
6. Prof. DR. Balasubramani, M.Sc (N), Ph.D.,
   Department of Medical and Surgical nursing,
   KMCH College of Nursing,
   Coimbatore – 641014