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Dietary habits, a major determining role in early onset of post menopausal osteoporosis

Marmath Meenakshi Mayanger

Dept. of Zoology, Govt. College, Kota.

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Abstract : More the development of society and nation more will be geriatric population. More the geriatric population more will be geriatric health problems – the most important and the most universal being OSTEOPOROSIS. Bone density in females is related to the hormonal status. Incidence of osteoporosis is more in post-menopausal women due to lack of the hormone estrogen, as lack of estrogen in the body increases the activity of osteoclasts. Since everybody, especially females after a certain age start losing bone and developing osteoporosis. Proper balanced diet is very essential for the development of bones. A balanced diet including sufficient amount of proteins, minerals and vitamins should be taken and it is immaterial whether the diet is vegetarian or non-vegetarian. This can prevent osteoporosis from its early onset.

Keywords: Estrogen, Osteoporosis, Diet, Osteoclast

INTRODUCTION

Osteoporosis is a condition characterized by reduced bone mass which leads to diminished physical strength of the skeleton and an increased susceptibility to fractures, thus the bones are no longer hard and tough. It's an excessive but proportional reduction in the amount of both the mineral and the matrix phase of the bone, unaccompanied by any abnormality in the structure of the residual bone. The reduction in skeletal mass involves both the cortical bone and the trabecular bone.

Osteoporosis may be viewed in the context that bone loss is almost inevitable, beginning in women at about 45 years of age and in men between 50 and 60 years of age. The dominant group consists of post- menopausal women in whom the condition is referred to as post- menopausal osteoporosis. The second group to be commonly affected is the elderly of both sexes with a condition called senile osteoporosis. Much less is encountered in those under

the age of 40 and is referred to as idiopathic osteoporosis. When the disorder appears in children or adolescents it is called juvenile osteoporosis.

The internationally agreed definition of osteoporosis, as decided by the Consensus Development Conference on Diagnosis, Prophylaxis and Treatment of Osteoporosis held at Geneva in 1993 is – “Osteoporosis is a progressive systemic skeletal disease characterised by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture”.

Aging is the natural sequel of living. All living things age, decline and degenerate. Bone, the constituent of skeleton of vertebrates is no exception. Though hard and solid, living bone is not static, it is dynamic, ever changing and ever responding to the needs of the organisms.

The WHO study group (1994) for assessment of fracture risk and its application to screening for post-menopausal women has defined osteoporosis using T-scores. T-score describes the bone mass of the patient compared to the mean peak bone mass of the normal young adult reference population using standard deviation. The absolute risk of developing osteoporosis depends upon

*Corresponding author :

Phone: 0

E-mail :

the individual's attainment of peak bone mass between the ages of 25-35. Bone mass then begins to decline at about 0.3-0.5% every year. In women however there is an additional accelerated bone loss following menopause for the next 5-10 years. Lifetime losses may reach to 30% to 40%. This may be upto ten-fold higher than the pre-menopausal rate of bone loss.

Different ethnic groups and racial isolates have quite different values for peak bone mass indicating a strong relationship between bone mass and genetic traits. Africans exhibits higher bone mass values than Caucasians and Asians of comparable weight at all ages from birth onwards. Many Asian ethnic groups tend to have low bone mass values throughout life. The other aspect certainly well recognized is that the Japanese nutritional policy following World War II resulted in a striking increase in the stature of their young people demonstrating that not all of what we observe in such population is genetically determined.

R.P.Heaney and V.Matkovik(1992)¹ observed that bone is a composite of protein and mineral. Many nutritional factors influence how effectively the body can lay down and sustain the full genetic complement of bone. These include energy, protein, vitamins and minerals. Deficiencies of any of these nutrients will restrict either bone size or bone massiveness or both and hence will limit the peak bone mass, an individual is able to achieve.

They further state that in the generally well nourished populations of developed nations; calcium is the nutrient that is most commonly limiting due to lower calcium intake, lower intestinal absorption and renal conversion of calcium or due to vitamin-D deficiency. The gap between calcium intake and calcium retention is larger than generally appreciated. Absorption efficiency is low and obligatory losses are high.

They explained that inadequate calcium intake results in a bone with a thinner cortex and fewer thinner trabeculae. Elevating the calcium intake in adolescent and young women will assure higher peak bone mass and as a result will reduce to some extent the future problem of bone loss at menopause.

MATERIAL AND METHODS

The study was conducted in Kota City with the help of Department of Orthopaedics, Govt. Medical College Kota. The study conducted was a cross-sectional type of

study.

Criteria for selection of cases:-

- (i) All cases considered were females of 40 years of age and above.
- (ii) Out of all approaching patients of different ages and both sex, we selected 510 cases (which were females of age 40 and above).
- (iii) All cases were screened by :-
 - (a) Detailed clinical history
 - (b) Physical examinations.
 - (c) BMD test.
- (iv) All the records were maintained in the form of a proforma which gives information about the general health and activity level of the person whose bone mineral density (BMD) is being studied.

In our study the site tested was calcaneum bone of the heel of the foot of the non-dominant leg. Calcaneum was chosen because it is a cancellous, sub-cutaneous weight bearing bone. (In osteoporosis cancellous i.e. trabecular bone loss is earlier and rapid as compared to cortical bone loss). The measurements were done by the same technician for all the cases. The ultrasound bone densitometer measures the speed of sound, ultrasound velocity through bone and the broad band ultrasound attenuation. Computer controlled rectilinear scans are obtained and the computer software gives results based on T-score and Z-score. Patients with history of recent or old fracture of calcaneum or any pathology in the form of tumor, polio or osteomyelitis of calcaneum which could affect local BMD were excluded from this study.

The BMD of the patient is compared with values for age-matched control subjects (Z-score) and to normal healthy young control subjects at peak bone mass (T-score). Since the T-score is a comparison of "best – ever" BMD it represents an absolute risk of osteoporosis. The Z-score is a comparison within different age ranges and represents a relative risk of fracture. Although Z-score analysis is important in evaluating the younger patient to determine the presence of osteopenia, T-score is evaluated in older population. If Z-score alone were used in the study group a person might appear relatively normal when compared with their peers and the incidence of osteoporosis would not rise with increasing age despite decreasing bone mass and an increased incidence of fractures. The study group was classified into Normal, Osteopenic and Osteoporotic

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using T-scores as per WHO criteria, which are acceptable, even in absence of a confirmatory bone biopsy.

Normal: A value of BMD that is below 1.0 S.D. of the young adult reference mean.

Osteopenia: A value of BMD that is more than 1.0 SD below the young adult mean but less than 2.5 SD below this value.

Osteoporosis: A value of BMD that is 2.5 SD or more below the young adult mean.

OBSERVATION AND RESULTS

The study group was divided into two categories of vegetarian and non-vegetarian on the basis of food habits and it's association with diagnosis was studied. (In Indian scenario people generally do not take non-vegetarian food as a staple diet i.e. at least one non-vegetarian meal per day. So our non-vegetarian group is **occasional non-vegetarian food consumer**. In the whole study group of 510 females, 399 subjects were vegetarian and 111 were non-vegetarian.

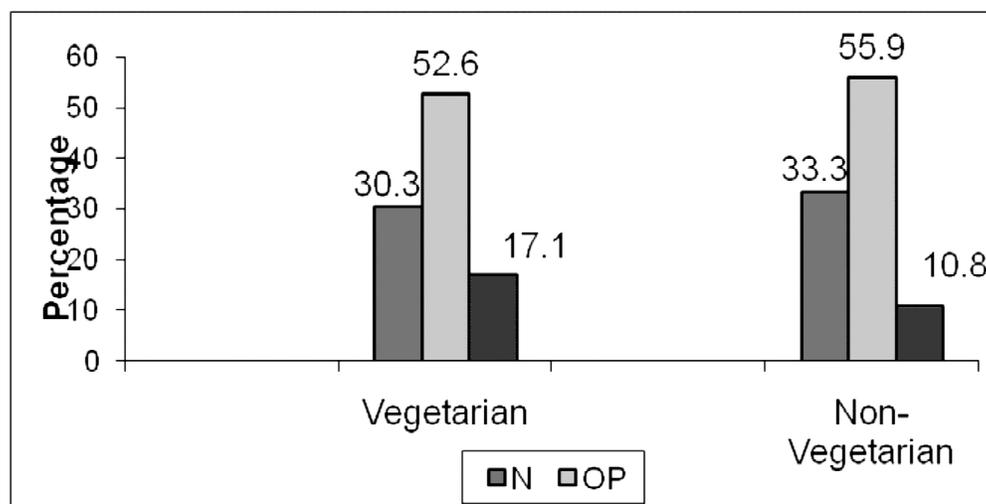
In the vegetarian group 68(17.1%) cases were osteoporotic, 210(52.6%) were osteopenic, and 121(30.3%) were normal. In non-vegetarian group, out of 111 cases, 12(10.8%) were osteoporotic, 62(55.9%) were osteopenic and 37 (33.3%) were normal.

Statistically, there comes out to be no association between dietary habits (veg. and non-veg. diet) and diagnosis of osteoporosis. The calculated value of chi-square test is 2.573 (at 0.05 level of significance) which is less than tabulated value of 5.99, therefore association is not significant.

Though in the present study it seems that the incidence of osteoporosis is more in the subjects taking a vegetarian diet but the statistical test of significance fails to show any association. On the basis of the present study we cannot say that a particular type of diet decreases or increases the chance of osteoporosis. Although a proper nutritional and balanced diet is very essential for peak bone mass attainment and its maintenance throughout life.

Table:- Dietary Habits and Bone Mineral Density

Dietary Habits	Normal	Osteopenic	Osteoporotic	Total
Vegetarian	121 30.3%	210 52.6%	68 17.1%	399 100.0%
Non- Vegetarian	37 33.3%	62 55.9%	12 10.8%	111 100.0%
Total	158 31.0%	272 53.3%	80 15.7%	510 100.0%



Chi-Square test value is 2.573, df is 2.

Graph: Showing Dietary Habits and Bone Mineral Density of the Study Group.

DISCUSSION

Advancement of technology, medical health care, health awareness has led us into the population of aged. With the increasing average life span of people there is an increase in the number of elderly people and our society is becoming more and more geriatric society. More the development of society and nation more will be geriatric population. More the geriatric population more will be geriatric health problems – the most important and the most universal being OSTEOPOROSIS.

Hunt, Johnston et. al. (1989)² have conducted studies comparing bone mass in omnivorous versus vegetarian women. But this study gave mixed result.

Abelow et. al. (1992)³ have given some evidence for an adverse effect of high protein intake. In their study, they have shown that dietary intake of animal protein, estimated from food or food supplies published by the food and agriculture organization of the United Nations, was positively correlated with hip fracture incidence.

In our study we found no significant association between the disease progression of osteoporosis and food habits, as we could not clearly demarcate between vegetarians and non-vegetarians. Most of the non-vegetarians are in fact omnivorous, who do not take a non-vegetarian diet on a regular basis. Therefore, we could

not correlate dietary habits (veg/non-veg) to the incidence of osteoporosis in our study. Although proper balanced diet is very essential for the development of bones. A balanced diet including sufficient amount of proteins, minerals and vitamins should be taken and it is immaterial whether the diet is vegetarian or non-vegetarian. This can prevent osteoporosis from its early onset.

A diet rich in calcium and vitamin D is essential for healthy and strong bones. On the other hand, a high calcium intake alone cannot protect against bone loss caused by estrogen-deficiency, physical inactivity, alcohol abuse, smoking, various medical disorders and medications known to cause bone loss. A detailed menstrual history and also a nutritional survey estimating the dietary intake would help in our better understanding of the causative factors of osteoporosis.

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