

ASSESSMENT OF BONE HEALTH STATUS AND ITS RISK FACTORS IN UNDER PRIVILEGED TRIBAL AND RURAL ELDERLY OF GODHRA AND VADODARA DISTRICT

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ABSTRACT

Background: Bone density is a measurement of the minerals in our bones. This measurement determines bone health, as well as risk for fracture.

Aims & Objectives: To assess the bone health of the elderly subjects and to identify the various risk factors that contribute in poor bone health and leads to osteoporosis.

Materials and Methods: A cross sectional observational study was conducted in the total of 180 elderly subjects from under privileged tribal and rural elderly of Godhra and Vadodara district, Gujarat. Disease (osteoporosis) & exposure status was measured in group of individuals (geriatric age group) simultaneously. A bone mineral density test (BMD), a non-invasive and painless test is the best way to determine the bone density. BMD test was carried out and its association with different risk factors was analysed.

Results: Out of total 180 elderly subjects included in the study, 147 (81.66%) subjects showed abnormal bone mineral density test (osteopenia -Grade 1 / osteoporosis - Grade 2). Abnormal BMD was found in 77.5% of patients in rural areas and 85% of patients in tribal areas. In this study age of the patient, sex, calcium intake, vitamin D intake, pain in joints, lack of stamina and BMI was found to be significantly associated ($P < 0.05$) with poor bone health leading to osteopenia & osteoporosis, while it is observed that osteoporosis is not significantly associated with smoking, alcohol & hypertension ($p > 0.05$).

Conclusion: The present study is useful to measure the frequency (prevalence) of conditions & demonstrate associations for osteopenia and osteoporosis. As they identify the existence of health problems, treatment is possible at an early stage of the disease and quality of life can be improved.

Key Words: Bone Mineral Density (BMD); Geriatrics; Risk Factors; Osteoporosis; Osteopenia

Introduction

The bones in our body are living and growing tissue composed primarily of collagen & calcium phosphate.^[1] The combination of collagen & calcium phosphate make bone both flexible & strong, which in turn helps it withstand stress. More than 99% of the body's calcium is contained in the bones & teeth. The remaining 1% found in the blood.^[2] Throughout lifetime, old bone is removed (a process called resorption) and new bone is added to the skeleton (a process called formation).^[3] Bone formation outpaces resorption until peak bone mass (maximum bone density & strength) is reached around age 30. After that time, bone resorption slowly begins to exceed bone formation. Progressive loss of bone is physiological event which accompanies advance age. This occurs in both men & women beginning in the 4th decade of life. The bone loss is greater & easier to detect in women with the onset of menopause.^[4-7]

The modifiable risk factors associated with osteoporosis are identified as diet low in calcium & vitamin D, long

term use of glucocorticoids and anticonvulsants, amenorrhoea & menopause in women while low testosterone levels in men, anorexia nervosa, inactive lifestyle or extended bed rest, cigarette smoking & excessive consumption of alcohol. And the non-modifiable risk factors associated with osteoporosis are: gender, old age, family history, etc.^[8,9]

Osteopenia is a forerunner of osteoporosis. If it is not diagnosed, osteopenia can lead to osteoporosis. Osteoporosis means "porous bone" is a disease characterized by low bone mass (bone thinning) that leads to fragile bones & an increased risk of fractures of hip, spine & wrist.^[3] Women are more to development of osteoporosis as compared to men. It is often the cause of many health complications, as it progresses silently & unnoticed for years. Only after years of bone loss, signs and symptoms appear.

The present study was designed to assess the bone health of the elderly subjects and to identify the various risk factors that contribute in poor bone health and leads to osteoporosis.

Materials and Methods

This was an observational cross sectional study. The study protocol was approved by the ethical committee of M.S. University of Baroda, Gujarat. The data on 180 subjects of age group above 60 years from Rural Baroda & Tribal Godhra zones were collected. The due informed consent of the patient was taken before enrolling them for the study.

Various demographic, nutritional and other relevant data were collected from the subjects. The assessment of lifestyle factor i.e. nutritional status, dietary profile, morbidity profile is done with the help of data collected on following parameters: (a) Anthropometry: height, weight, BMI; (b) Clinical & Biochemical: Haemoglobin, serum calcium, serum vitamin D3, BMD, Blood pressure; and (c) Dietary profile of subjects by using 24 hour dietary method & food frequency method.

The assessment of bone health status can be done in 3 ways: (1) Biochemical-by taking into consideration serum calcium levels & serum vitamin D levels. (2) Clinical-by taking into consideration bone mineral density. (3) Dietary-by taking into consideration Vitamin D & calcium intake.

Bone Mineral Density (BMD): It is a non-invasive, painless and reliable way to determine bone density. It can identify osteoporosis, determine your risk for fractures & monitor the response to osteoporosis treatment. Different bone density tests may measure hip,

spine, wrist, finger, shin bone or heel. Dual-energy X-ray absorptiometry (DXA, previously DEXA) is a means of measuring bone mineral density (BMD). DXA is the most widely used & thoroughly studied bone density measurement technology. DXA is considered the gold standard for the diagnosis of osteoporosis.^[14]

Statistical Analysis: The data were presented as actual frequencies and percentages. The statistical calculation was done by chi-square test and Yates correction association between risk factors and disease outcome. P value <0.05 was considered significant.

Results

Out of total 180 elderly subjects included in the study, 147 (81.66%) subjects showed abnormal bone mineral density test. Out of total 180 patients, 100 were selected from the tribal areas and 80 were selected from the rural area. Abnormal BMD was found in 77.5% of patients in rural areas and 85% of patients in tribal areas. Out of total 90 patients aged 70 yrs and more, 83 patients showed abnormal BMD. Total 90 females were included in the study, of which 84 females showed abnormal bone mineral density. In this study, 12 patients were alcoholic, out of which 5 showed abnormal BMD. Smoking was present in 29 patients, out of which 24 showed abnormal BMD. Results of bone mineral density tests and its association with different parameters and rural and tribal distribution are shown in table 1. On evaluating the association of different parameters, it was found that abnormal BMD was significantly associated with age, sex,

Table-1: Results of BMD test and its association with different parameters

Parameters		Rural			Tribal		
		Normal	Abnormal	Total	Normal	Abnormal	Total
Age	60 to 70	14	26	40	12	38	50
	≥ 70	4	36	40	3	47	50
Sex	Male	16	24	40	11	39	50
	Female	2	38	40	4	46	50
Alcohol	Yes	4	1	5	3	4	7
	No	14	61	75	12	81	93
Smoking	Yes	2	10	12	3	14	17
	No	14	54	68	15	68	83
Intake of Vitamin D	Normal	8	3	11	4	2	6
	Abnormal	2	17	19	3	21	24
Intake of Calcium	Normal	8	3	11	6	2	8
	Low	2	17	19	1	21	22
Hypertension	Yes	1	14	15	4	17	21
	No	14	51	65	21	58	79
Lack of stamina	Yes	8	64	72	5	76	81
	No	5	3	8	8	11	19
Joint pain	Yes	13	70	83	13	70	83
	No	2	15	17	2	15	17
BMI	Underweight	12	47	59	5	45	50
	Overweight	3	38	41	13	17	30
Total		15	85	100	18	62	80

vitamin D, calcium, lack of stamina, pain in joints and BMI ($p < 0.05$) while alcohol, smoking and hypertension were found not to be associated with abnormal BMD. ($p > 0.05$)

Discussion

Osteopenia and osteoporosis is one of the major prevalent illnesses in elderly patients. As age advances, bone resorption increases as compare to bone formation. Different factors related to nutritional intake and lifestyle were found to be associated with diseases development and advancement. In present study, the cross sectional study design is used to evaluate the association of different risk factors with osteopenia and osteoporosis. Disease (osteoporosis) and exposure status is measured in group of individuals (geriatric age group) simultaneously. In present study; age, sex, calcium intake, Vitamin D intake, pain in joints, lack of stamina and BMI has significant association with osteoporosis; while smoking, alcohol and hypertension are found not to be significantly associated with osteoporosis/osteopenia.

A similar study by Afsaneh Keramat et al^[12], has also evaluated risk factors associated with osteoporosis and compared the Iranian and Indian women in this aspect. They also found that lower education, calcium intake and diet associated with osteoporosis as similar to our study.

In other study by Alexandre Faisal-Cury et al^[13], they had evaluated mainly age in women as risk factor in osteoporosis and concluded that as the age increases chances of osteoporosis.

This study has highlighted the prevalence of osteopenia/osteoporosis in elderly patients as evaluated by BMD. It has also highlighted the different risk factors associated with development of osteopenia/osteoporosis. Some limitation of the study included small sample size and single time point evaluation because of cross sectional design. In this study, all the risk factors associated with osteoporosis could not be evaluated because of lack of biochemical investigations. Long term studies focusing on modification of different lifestyle

related factors and nutritional factors are required. It is necessary to evaluate different risk factors associated with osteoporosis, so the treatment can be stated at an early stage of the disease.

Conclusion

From the analysis of this study; it is concluded that age, sex, calcium intake, vitamin D intake, pain in joints, lack of stamina and BMI are significantly associated with bone health leading to osteopenia and osteoporosis, while smoking, alcohol and hypertension did not prove to be significantly associated with osteoporosis but are injurious to health in other ways and are not advisable.

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