

## Original Research Article

# A camp based screening of BMD in medical students: early detection of an iceberg phenomenon

Santosh Kumar Mishra<sup>1</sup>, Anshuli Trivedi<sup>2\*</sup>, Namita Neelkanth<sup>2</sup>, Anubhooti Trivedi<sup>3</sup>

<sup>1</sup>Department of Orthopaedics, <sup>2</sup>Department of Community Medicine, Gandhi Medical College Bhopal, Madhya Pradesh, India

<sup>3</sup>Department of Out Patient (OPD), Saket Nursing Home Jabalpur, Madhya Pradesh, India

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### \*Correspondence:

Dr. Anshuli Trivedi,

E-mail: [dranshulitrivedi@yahoo.com](mailto:dranshulitrivedi@yahoo.com)

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## ABSTRACT

**Background:** Low Bone mineral density (BMD)/Osteopenia is an iceberg phenomenon. It is ignored by younger population and perceived as geriatric illness. As the study of medicine is very taxing its need of hour to detect low BMD amongst medical students to avoid musculo-skeletal disease due to low BMD in future.

**Methods:** A DXA based technique was used to detect BMD amongst 72 under 25 years female medical students using nonrandom, opportunistic sampling technique. The data was collected in pre-designed pretested proforma and compiled and analyzed using MS-Excel 2010 and Epi info-7.0. The data was expressed in percentages and proportions. Those with osteopenia were given appropriate medical advice.

**Results:** In total 20.93% students had osteopenia and 55.56% participants had musculoskeletal complaints and most common being low back pain esp. in osteopenic participants. A statistically significant low level of BMD was observed amongst sunscreen users and physically inactive participants. No association was seen between BMD and BMI, regular, milk intake, type of diet or fasting.

**Conclusions:** A significant number of female medical students were osteopenic and suffered from musculoskeletal disorders. A regular BMD assessment with calcium/vit D supplementation and regular physical exercise can restore/ conserve BMD. The currently available techniques can detect BMD in females but not in young males.

**Keywords:** DXA, Iceberg phenomenon, Opportunistic sampling, Osteopenia

## INTRODUCTION

Osteoporosis is a systemic metabolic disease resulting in low bone mass, and deterioration of bone structure, which increases the risk for fracture.<sup>1-4</sup> It is more prevalent among women than among men.<sup>3</sup> It defined by WHO as a bone mineral density of < 2.5 STDEV or more below the mean peak bone mass.<sup>5</sup> Osteoporosis is seldom diagnosed as it is usually symptomless. But its main consequence is the increased risk of bone fractures. There is increased bone fragility and fractures occurring in conditions where

healthy people would not normally suffer a fracture.<sup>6</sup> Dual-energy X-ray absorptiometry (DXA, previously DEXA) is by far, the most widely used technique for bone measurements, since it is considered to be cheap, accessible, easy to use, and able to provide an accurate estimation of bone mineral density in adults.<sup>7-9</sup>

However, because osteoporosis is usually not life-threatening, quantitative data from developing countries are scarce. The prevalence of osteoporosis in less developed and developing countries is not clear, as there

are few studies in these populations. There are very few studies on assessment of Bone mineral density (BMD) amongst young population. It is a common perception that it's a degenerative illness and affects geriatric population and hence a very casual attitude is adopted by younger age groups. As the study of medicine is very tough as it involves long stretches of reading as a part of learning curriculum. Also, most of the medical students are hostel dwellers and thrive mainly on mess food and outside junk food. Their habits are frequently unchecked compared to that of those living with families. It is common observation that medical students despite being adequately sensitized about it are very negligent towards their health.

Hence this study gives an opportunity to identify an iceberg phenomenon along with study of factors causing it. Also, in the past meager citations on this topic were found especially amongst Indian medical students hence it gives us scope to explore this problem in in-apparent stage before this becomes a life adjusting event.

## METHODS

A camp based approach was adopted at premises of Gandhi Medical College Bhopal in October 2016 to assess bone mineral density amongst female medical students using DXA technique, in which thickness of the lower 1/3<sup>rd</sup> of Tibia was used. The WHO criteria based on T-score was used to study in which Normal Bone mineral density BMD T-score was  $\geq -1.0$ . Osteopenia is  $-2.5 < T\text{-score} < -1.0$ , Osteoporosis is  $T\text{-score} \leq -2.5$  and severe osteoporosis is a T-score  $\leq -2.5$  with fragility fracture.<sup>5</sup>

A non random, opportunistic sampling technique was used to include participants. Due consent for inclusion in study was taken by participants before recording their socio demographic data along with dietary/lifestyle habits using predesigned pretested proforma. This data was compiled and analyzed by using MS-Excel-2010. A p value of  $< 0.05$  was considered as significant. The results were presented in terms of percentage and proportions. The tests of significance were used for establishing associations between variables. The patients having T-score  $< -1.0$  were given nutritional advice, calcium supplements and were counseled for regular BMD assessment. Only female participants were taken in study because there was no means available to assess BMD for young males. None of the participants had BMD assessment in past.

## RESULTS

In total 72 students participated in study. All the students were under 25 years of age, in total 20.93% students had osteopenia and one student with kypho-scoliosis had osteoporosis (Table 1). In total 52.78% participants had some musculoskeletal complaints and most common complaints was low back pain in 26.39% (Table 1). In

total 77.78% subjects with osteopenia have musculoskeletal complaints ( $p < 0.005$ ).

**Table 1: Distribution of subjects on the basis of BMD.**

	N	%
Normal	53	73.61
Osteopenia	18	20.93
Osteoporosis	1	1.16
Total	72	100
<b>Distribution of subjects on the basis of any musculoskeletal complaints</b>		
	N	%
No complaints	38	52.78
Low back pain	19	26.39
Leg pain	7	9.72
Leg cramps	5	6.94
Tingling/ numbness	3	4.17
Total	72	100
<b>Distribution of subjects on the basis of muscle-skeletal complaints and BMD</b>		
	Complaint present	No complaint
Normal	19	34
Osteopenia	14	4
Osteoporosis	1	0
Chi sq-10.61, df-2, p-0.005		

No statistically significant association was observed between Bone mineral density (BMD) and BMI, type of diet, milk intake or religious fasting. A statistically significant association was seen between low BMD and use of sunscreen as 22.22% frequent (always/mostly) sunscreen users were osteopenic. Also 12.5% students who do not indulge in any regular physical exercise (Never or less than 3 times/week) were osteopenic. Almost 48.6% participants did regular exercise atleast of 30min for more than 3 times/week. None of these students had low BMD. Almost 61.11% participants diagnosed to be osteopenic never consumed in any nutritional supplements (Table 2).

## DISCUSSION

In the study 60% participants with body mass index (BMI) between 18.5-24.5 had normal BMD where as 72.22% osteopenic patients were either under or over weight. However, this finding was not statistically significant. This finding is similar to as stated by Ho AY, Kung AW that in underweight southern Chinese women, aged 20-39 years, low bone mass found to be associated with lower body weight.<sup>10</sup>

No change in BMD was noticed by regular milk intake it is in contrast to common belief that regular milk consumption restores/ maintain BMD. This is similar to that stated by Joanna Cadogan et al that bone turnover was not affected by milk supplementation even in adolescent girls.<sup>11</sup> A positive association of low BMD

with sunscreen use is seen in study, this is in contrast to as stated by Farrerons J et al, that sunscreen SPF15

protection does not seem to increase the risk of osteoporosis.<sup>12</sup>

**Table 2: Distribution of subjects on the basis of BMI and BMD.**

	<18.5	18.5-24.9	>24.9	Total
Normal	9	33	11	53
Osteopenia	6	5	7	18
Osteoporosis	0	1	0	1
Chi sq-1.27, df-4, p-0.866				
<b>Distribution of subjects on the basis of type of diet and BMD</b>				
	Vegetarian	Eqgetarian	Non vegetarian	Total
Normal	27	17	9	53
Osteopenia	10	6	2	18
Osteoporosis	1	0	0	1
Chi sq-7.30 df-4 p-0.12				
<b>Distribution of subjects on the basis of milk intake and BMD</b>				
	Never	<3 TIMES/WK	>3times/day	daily
Normal	17	12	13	11
Osteopenia	7	5	3	3
Osteoporosis	0	0	0	1
Chi sq-4.67 df-6 p-0.58				
<b>Distribution of subjects on the basis of fasting and BMD</b>				
	Never	Occasionally	At least once a week	Total
Normal	24	18	11	53
Osteopenia	9	7	2	18
Osteoporosis	1	0	0	1
Chi sq-1.98 df-4 p-0.73				
<b>Distribution of subjects on the basis of use of sunscreen and BMD</b>				
	Always	Mostly	Never	Total
Normal	8	26	19	53
Osteopenia	9	7	2	18
Osteoporosis	0	0	1	1
Chi sq-12.23 df-4 p-0.01				
<b>Distribution of subjects on the basis of taking calcium/Vit D supplements and BMD</b>				
	Never	Once in 15 days	Once in more than 15days	Total
Normal	39	11	13	53
Osteopenia	11	2	5	18
Osteoporosis	0	1	0	1
Chi sq-11.06 df-4 p-0.025				
<b>Distribution of subjects on the basis of physical activity and BMD</b>				
	Never	<3 times/wk	>3 times/wk	Regular
Normal	11	17	12	13
Osteopenia	7	1	0	10
Osteoporosis	1	0	0	0
Chi sq 16.47 df-6 p-0.0114				

In total 36.11% participants and 61.11% osteopenic individuals did not consumed any Calcium/ Vit D supplements. It is evident that increasing calcium intake from dietary sources or by taking calcium supplements produces small non-progressive increases in BMD.<sup>13</sup> It is known from previous studies that exercise plays an

important role in preventing osteoporosis. As the participants that indulged in regular exercise had better BMD score. These findings are similar to as stated in studies conducted by Multani NK, Kaur et al, that bone mineral density is higher in sportspersons than their non-sports cohort.<sup>14</sup>

## CONCLUSION

Hence the current study shows that significant number of under 25 years of medical students were osteopenic. This finding gives an indication of iceberg phenomenon, rehabilitative measures should be taken before condition causes significant morbidity hampering studies and work in medical profession. A significant association with use of sunscreen on regular basis, lack of regular physical exercise with low BMD. However, those taking supplements of Calcium/Vit D have greater BMD. No association was seen between type of diet, irregular diet i.e. fasting or regular milk intake and BMD. Due to lack of available technology in our setup male participants could not be included.

Hence it is recommended that a regular BMD assessment along with regular physical exercise should be included in daily routine of medical students. The students should try to maintain a normal BMI and those with slightest symptoms of osteopenia like low back pain, muscle cramps should take Calcium/Vit D supplementation and physical exercise after thorough clinical workup. The students should spend more time in sunlight.

Limitation of the study, the technique used in study could not detect BMD of young males.

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