Study of DEXA Scan Proved Incidence of Osteoporosis / Osteopenia as per WHO T-Score Among Healthy Individuals in Gurgaon District of Haryana.

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ABSTRACT

Background: Osteoporosis is a proven risk for the fractures especially in the old age. This is painless and silent in the course. Dual-Energy X-ray Absorptiometry (DEXA) scan gives good prediction in the diagnosis of osteoporosis as per WHO T-score. The treatment for antifracture can be started early to avoid the morbidity in the form of fracture of hip, spine and other skeletal sites. **Methods**: This is retrospective mixed study of 68 individuals (50 female and 18 male) with the age group range of 40-76 years from the region of Gurgaon district of Haryana from May 2016 to January 2017. All were subjected to DEXA scan investigation in routine manner. All those having any systemic disease were not included in the study. **Results**: There were 20 individuals who were having either osteoporosis or osteopenia (29.41%) and among them majority were from female group (80%).Average age group was above 57 years. T-score was more deranged and decreased in lumbosacral spine scan as compared to neck of the femur in hip joint. **Conclusion**: DEXA scan is a very good modality to find out the risk and incidence of fractures among vulnerable age group. The prediction by T score of DEXA can prevent the morbidity by providing calcium supplements and treating the individuals with the appropriate therapy

Keywords: Osteoporosis, DEXA scan, WHO T-score, antifracture.

INTRODUCTION

DEXA scan finds out the bone mineral density status in individuals. This uses two different types of X-ray beams for the evaluation of bone density. This can measure up to 2% of bone loss in a year. This has got very low dose of radiation. This is helpful in old age where the risk of fracture is quite high.Osteopenia and osteoporosis are responsible for most of the old age fractures.[1,2] Single X-ray Absorptiometry (SXA) can be used for bone density in heel and fore arm. Peripheral dual energy x-ray Absorptiometry (P-DXA) can be used for both the upper and lower limbs.

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MATERIAL AND METHODS

The study was conducted from May 2016 to January 2017 in the department of Radio-diagnosis in SGT Medical College Budhera (Gurgaon). All the individuals of both the sexes hailing from Gurgaon district were included in the study. The investigation was voluntarily and written consent was obtained. It was conducted on digital Hologen Discovery Dexascan equipment [Figure 1]

All the individuals were prepared for the test by avoiding bearing clothes having metal buttons. They were given soft gown for bearing. All those who were taking calcium supplement were asked to withhold for 24 hours before the test. Lateral vertical assessment (LVA) was also advised for the individuals who were over 70 years of age to rule out any marginal vertebral compression. The table was padded and the legs were supported by padded box to make the pelvis and lumbar region straightened [Figure 2] .For hip joint the foot is placed on the brace with inwards rotation.

The generator lies below the table and the detector is slowly passed over the area to be scanned. Total time taken for the test is 20-30 minutes.

Total sixty eight (n=68) individuals were subjected to DEXA scan examination .No difficulty was faced as this is painless, safe and quick investigation. Two regions viz lumbar spine (L1 to L4 vertebrae) and

hip joint were scanned for the study. Written consents of the patients were taken. The total number had sex ratio distribution of 50 female and 18 male. Age group extended from 40 to 76 years.

Following were the inclusion criteria
- Age group 40 – 76 years of mixed gender
- Without any family history of fracture
- All the individuals who reported in outpatient department for routine health checkup without any ailment or deranged blood parameters.
- Females of peri-menopausal and post-menopausal included in the study

Exclusion criteria were:
- History of any present or past medication of corticoids
- Previous fracture history
- All the patients of chronic illness like hyperparathyroidism,diabetes ,tuberculosis,hypertension or endocrinal disorders etc.

Every individual was assessed for cigarette smoking, alcohol consumption, height and weight.

Figure 1: Hologen Discovery DEXA- scan machine with padded table top and overhead detector.

Figure 2: Diagrmatic representation for the position of the patient on the DEXA table for the lumbar region.

S. No	Dexa Results Summary		
1	Total Number Of Patient	-	68
	Female	-	50
	Male	-	18
2	Total No Of Positive Patients	-	20
	Female Patients	-	16
	Male Patients	-	4
	Age	Minimum	Maximum
3	Age Group (Year)	40	76
	Average Group Of Age (Year)	57	
4	T- Score		
A	T- Score Of L.S.Spine	-1.9	-5.2
	Average T-Score	-3.2	
B	T- Score Of Hip	-1.6	-4.2
	Average T-Score	-2.9	
5	Location		%
	Gurgaon	20	100

Figure 3: DEXA Scan Summary of the patients.
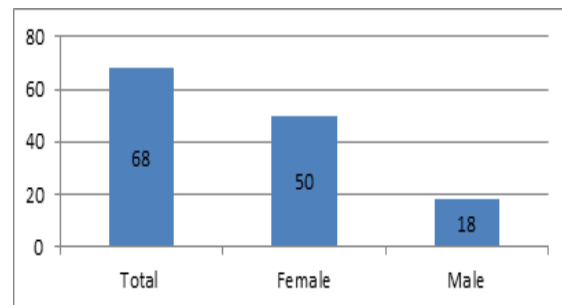

Figure 4: Total number of patients with male & female ratio.
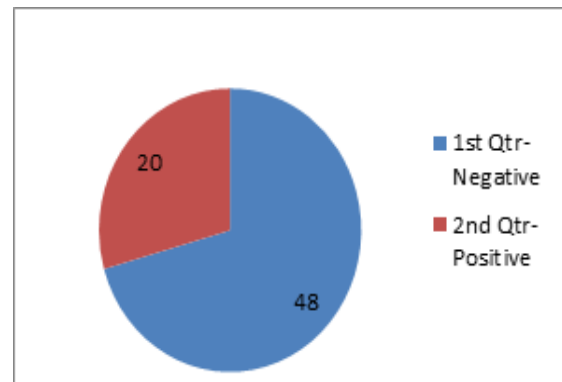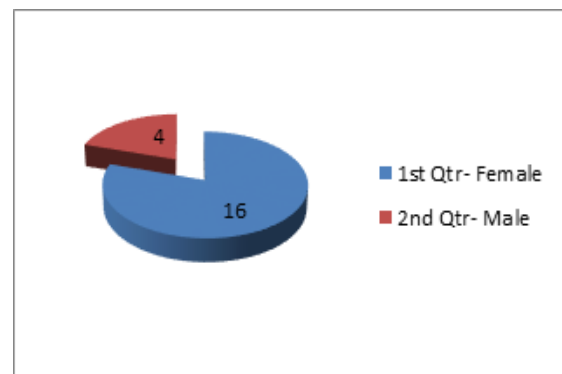

Figure 5: Representation of positive and negative cases.
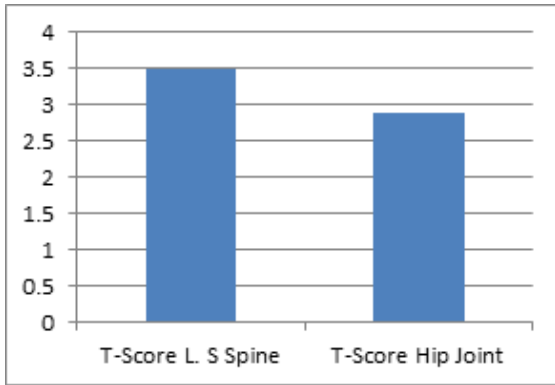

Figure 6: Sex ratio among positive and negative cases.
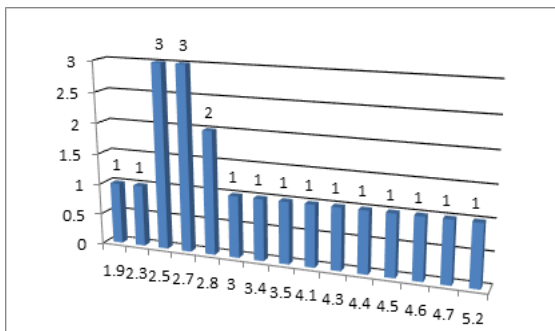
Figure 7: T-Score Ratio L.S Spine VS Hip joint.

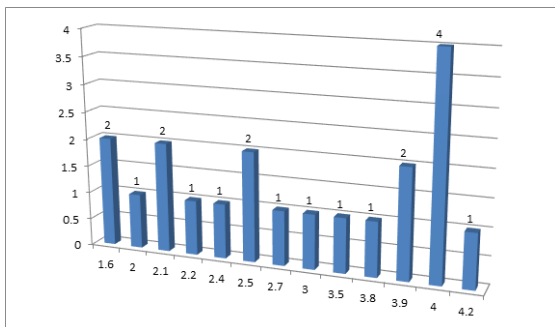**Figure 8: L. S Spine T-Score values with number of patients.**

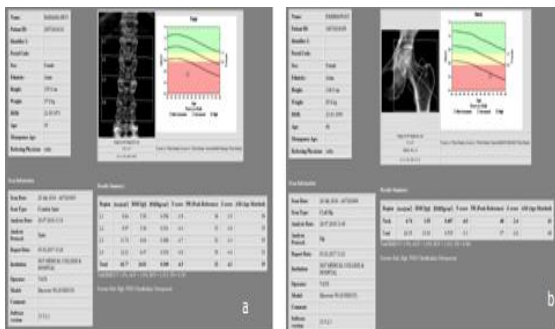**Figure 9: Hip Joint T-Score values with number of patients.**

Figure10: Sample report of the LS spine and the neck of femur in Hip joint.

RESULTS

All the results were assessed as per WHO T-score grading. T-Score is a number that denotes the amount of bone as compared to peak bone mass of the young adult of the same gender. Z-score denotes the comparison of the bone with the same gender and age group. Total 68 individuals were subjected for the test with 20 male and 48 females in the age group of 40-76 yrs (mean 57 years).20 cases (29.41%)were found to be having osteoporosis or osteopenia with 16 females (80%) and 4 male (20%).11 out of 16 females were > 50 years old (68.75%) and all were of post-menopausal group. The range of T-score in LS has been noticed as - 1.9 to - 5.2 (average -3.2). Three (1 male and 2 females) out of 20 cases (15%) had shown as T-score > -2.5 (osteopenia) and rest seventeen (85%) as osteoporosis .There was mismatch of estimation for LS spine and the neck of the femur in five cases comprising four females (80%) and one male (20%).In all these cases there was T score > - 2.5 in neck of the femur comparing to < - 2.5 in the LS spine. [Figures 3-9]. The report is well documented in the format with the color coding [Figure 10].The details of the patients have been given in the master chart [Figure 11]

S. no.	Patient's Name	Age (Yrs)	Sex	Weight	Height	Part Examine	Location	Any Treatment Drug	Result	T-Score	Z-Score
							May 2016 to Jan 2017				
1	Mrs. LW	66	F	67 kg	149 cm	L.S. Spine	Madenpur- Gurgaon	NO	Osteoporosis	2.8	
						Left Hip			Osteoporosis	3	
2	Mrs. G	61	F	59 kg	158 cm	L.S. Spine	Gurgaon	NO	Osteoporosis	2.5	
						Left Hip			Osteoporosis	3.9	
3	Mrs. S	76	F	35 kg	146 cm	L.S. Spine	Jhanjhrolak hera, Gurgaon	NO	Osteoporosis	4.4	
						Left Hip			Osteoporosis	3.9	
4	Mrs. U	60	F	70 kg	155 cm	L.S. Spine	Jhdola, Gurgaon	NO	Osteoporosis	3.5	
						Left Hip			Osteoporosis	3.5	
5	Mrs. B D	45	F	47 kg	155 cm	L.S. Spine	Hayatpur, Gurgaon	No	Osteoporosis	4.5	
						Left Hip			Osteoporosis	4	
6	Mr. R	51	M	50 kg	160 cm	L.S. Spine	Shamaspur, Gurgaon	No	Osteopenia	4.1	
						Left Hip			Osteopenia	4.2	
7	Mrs. P	66	F	68 kg	146 cm	L.S. Spine	Budhera - Gurgaon	No	Osteoporosis	2.7	
						Left Hip			Osteoporosis	4	
8	Mrs. B	54	F	56.7 kg	156 cm	L.S. Spine	Gurgaon	No	Osteoporosis	4.7	
						Right Hip			Osteoporosis	3.8	
9	Mrs. S	45	F	62 kg	150 cm	L.S. Spine	Gurgaon	No	Osteopenia	1.9	
						Left Hip			Osteopenia	2.1	
10	Mrs. GD	46	F	60 kg	146 cm	L.S. Spine	Budhera - Gurgaon	No	Osteopenia	2.3	
						Left Hip			Osteopenia	2.4	
11	Mr. S	40	M	40 kg	159 cm	L.S. Spine	Gurgaon	No	Osteoporosis	2.8	
						Left Hip			Osteopenia	2.1	
12	Mr. RS	60	M	50 kg	157 cm	L.S. Spine	Gurgaon	No	Osteoporosis	4.3	
						Left Hip			Osteoporosis	4	
13	Mrs. P D	60	F	65.8kg	146 cm	L.S. Spine	Gurgaon	No	Osteoporosis	2.7	
						Left Hip			Osteoporosis		

Figure 11: Master chart of the individuals' undergone routine DEXA investigation.

DISCUSSION

Old age is accompanied with the depletion of bone mineral which is responsible for the osteoporosis. Osteoporosis literally means porous bones and is called as silent crippler which can cause sudden fractures. Osteoporosis often affects women after menopause because of hormonal depletion.[3] 47% female in United States has got decreased bone density either as osteopenia or osteoporosis. Our present study had shown as 80% in Gurgaon region of Haryana. There may be many other factors

contributing to the present results in addition to India being developing nation. One among two in females and one among ten in males suffer from decreased bone density. This is comparable to the other studies. It is mandatory to get to know about the bone mineral density of the ageing bones. Bone mineral density shows the exact true bone mass. DEXA scan is recommended for the 50-65 years age group. All those individuals who are on medication responsible for diminished bone density must undergo DEXA scan evaluation irrespective of the age. The importance of DEXA has been compared like that of blood pressure in stroke cases. This uses very little dose of ionizing radiation. DEXA scan measures the bone mineral density which is indirectly indicated by T score.[4] Two different low dose x-ray beams of different energy traverse through the part being scanned (lumbar spine and hip joint). There are two types of equipments as central and peripheral devices. Central is preferred and we have used the same in our study. There is no special preparation for the test. Those who are on calcium supplement or had undergone barium or contrast studies should not undergo the test for two days because of the false reading. Pregnant females are also to be avoided this test. There is very less radiation dose involved in the test. One scan dose is 0.0001mSv which is comparable to three hours natural background radiation. This is even less than the radiation one receives from Delhi flight to London and back. Other method for measuring bone mass is computerized tomography (QCT) but DEXA is gold standard modality because of easy use with minimal radiation dose. This is frequently used to follow up of those cases that are on treatment for osteoporosis. Osteoporosis can be diagnosed by knowing the T score where the bone mineral density of the individual is compared with the normal healthy 30-years old adult. Z score denotes the comparison of the bone mass with the same gender and age group. This is considered of value in children where the skeleton is immature and is growing with the age.[5] This is called as young adult reference range. This is expressed as standard division (SD).WHO T-score can be measured as follow:

a) Normal :   -1 or above
b) Osteopenia: -1 – 2.5
c) Osteoporosis: -2.5 or less

This is of great advantage for the prevention of fractures.[6,7] If the results show osteoporosis than calcium and Vitamin D can be taken in time to prevent the fractures.

CONCLUSION

DEXA scan is a very good modality to find out the risk and incidence of fractures among vulnerable age group. The prediction by T score of DEXA can prevent the morbidity by providing calcium supplements and treating the individuals with the appropriate therapy. This is easily available, painless, cheap and noninvasive. The radiation exposure is not harmful as the radiation is very low and soft. Female post-menopausal group is the most affected group and should be advised for the DEXA test after every two years. The sensitivity of LS spine is more in diagnosing osteoporosis as compared to the femoral neck estimation. DEXA evaluation is of paramount importance among people who are on long term medication which is responsible for bone mass depletion. Patients who are on long term corticoids therapy top among the list of sufferer.

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