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ASSESSMENT OF THE RATE OF MINERAL DENSITY IN BONES AND THE FACTORS CONTRIBUTING TO LOW BONE DENSITY IN PEOPLE SUFFERING FROM SPONDYLOARTHROPATHIES

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Abstract:

Objective: *The objective of the present study is to assess the rate of mineral density in bones and to check the factors contributing to low bone density in people suffering from spondyloarthropathies.*

Methods: *The present research study was organized in Madina Teaching Hospital Faisalabad. The time duration of this cross-sectional study was between June and November 2017.Those individuals were enrolled for the study who were suffering from spondyloarthritis. These patients were examined for the bone mineral density of hips and lumber spine. The examination was carried out through dual energy x-ray absorptiometry scan. The comparison was made between osteopenia and osteoporosis by estimating.*

Both ankylosing spondylitis disease activity index, bath ankylosing spondylitis metrology index, Bath ankylosing spondylitis function index, time period of disorder, identification, erythrocyte sedimentation rate, c- reactive protein and human leukocyte antigen sub type B27 for statistical analysis, SPSS 21 was used.

Results: *Total people enrolled for this study were 25. Out of these the no number of male patients were 16(69%). At hip and in spine, the percentage of presence of osteoporosis was noticed 5(20%) and 9(36%) respectively. On the other hand, osteopenia was observed at hip and in spine with percentage of 9(36%) and 8(32%) respectively. Moreover; 18(72%) was the frequency of low bone mineral density at spine and hip. Out 16 males, the line period of disease of 20(80%) of males was less than 40 years. Furthermore, 18(27%) was the percentage of males having low bone mineral at spine and hip. The relation between bone mineral density and other factors was not valuable. (p 70.05 each).*

Conclusion: *Low bone mineral density was observed in most of people suffering from spondyloarthritis. The disease can be indicated in earlier stages,*

Keywords: *Ankylosing spondylitis, Spondyloarthritis, Osteoporosis.*

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INTRODUCTION:

The spondyloarthropathies (SPA) is a multiple situation of persistent swelling. This condition is associated with genetic clinical and radiographical aspects. There are different forms of SPAS. These include undifferentiated SPA; enteropathic inflammatory bowel disease (IBD) associated SPA; reactive arthritis (RSA) and prototype psoriatic arthritis (PSA). About 0.105% of the population of Europe is affected by SPA. This disease usually starts at young age [1]. SPA got very significance economically due to its invalidity. The information about bone mineral density (BMD) in SPA is not enough. There is difficulty between the association of long standing As and loss of bone mass in femur and spine. The prevalence of this association is observed between 20to 60% in various research studies [2].

The incidence of AS/SPA and rate of death is enhanced due to spinal fractures and malformation by osteoporosis. Radiography is not reliable technique for the analysis of skeletal variation. So, for estimation of BMD, the technique which is mostly favored is Dual Energy x-ray Observation (DXA) [3]. There is no various identification of causes of osteoporosis in SPS. So, it is believed that major factor contributing to osteoporosis are in sufficient movement and obstruction due to spinal pain. [4]. Other factors which may lead to osteoporosis are hormonal factors and medicines. The aim of this study is to assess the rate of BMD in SPA in patients.

PATIENTS AND METHODS:

The present study was organized in Madina Teaching Hospital Faisalabad. The time duration of this cross – sectional study was between June and November 2017. Those individuals were enrolled for this study who were suffering from spondyloarthritis. These patients were examined for the bone mineral density of hips and lumbar spine. The examination was carried out through dual energy x – ray absorptiometry scan. Amar criteria was set, according to which patients were assessed. Different criteria were set for different kind of arthritis and on this basis, patients were categorized. If patients fulfill the Amar criteria, they have enteropathic and reactive arthritis, Psoriatic arthritis is present if criteria regarding to classification of psoriatic Arthritis (CASPAR) is fulfilled and patients have as if they satisfy the New York criteria. If arthritis is present in patient which is unable to identify or patient satisfy classification criteria for one of other kind; axial spondylitis or peripheral spondyloarthritis,, then patient had possibility of inflammatory bowel disease [5].

Exclusion criteria was also set. Those individuals were expelled from this study who had used studies for 2 weeks or above at a dose of prednisolone above 7.5mg per day. Pregnant patients were also excluded from the study. Demographic data like age and gander of patients and variables related to disorder such as presence of peripheral arthritis and uveitis, time of identification of disease and time period of disorder etc. Were collected. From all the patients, information was collected regarding analysis of laboratory physical assessment radiographs of spine. DXA scan and verified medical history. Furthermore, Both Ankylosing spondylitis Metrology Index (BASMI). Both Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Unclosing Spondylitis Functional for obtaining activity score of disorder [6]. Laboratory was analyzed for the C – creative protein (CRP), human leukocyte antigen subtype B27 (HLA – B27) and erythrocyte sedimentation rate (ESR). Measurement was made for the analysis of Spondylo Arthritis international Society (ASAS) endeared disease activity scare (ASDAS – CRP and ASDAS – ESR) [6]. World Health organization defined BMD according to criteria. The criteria were as follows: (1) osteopenia (T score between -1.0 and -2.5) in spine and or hip, without osteoporosis, (2) osteoporosis (T scare $\leq$ -2.5 in the spine or / and hip) and (3) normal bone density (T scare $\geq$ -1.0 both in spine and hip) For those people with age less than 50 years, 2 scares were used in place of T- scares [8]. DXA machine (Hologic Discovery W1 (S/N 86292) USA) was employed for assessment of BMD at the postero anterior (PA) lumbar spine (L 2 – L4), and hip. If the individuals have osteopenia and/or osteoporosis, then they have low one mineral density (BMD) [9]. For the quantitative variables like age and time period of symptoms, mean ± standard deviation (SD) were calculated. For the qualitative variables like gender and smoking status, percentages and frequencies were measured. SPSS version 21 was used for the assessment of information.

RESULTS:

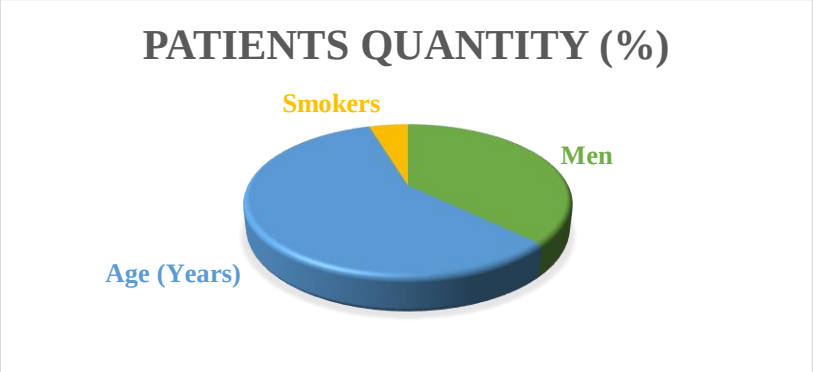
Total patients employed for this study who satisfied the criteria were 47. The number of Males and females was 16(64%) and 9(36%) respectively. None of the patient used alcohol but percentage of smokers was 23(92%), 2(4.2%) of the participants were expelled because of pregnancy, 11(23.4%) due to steroid and 9(91%) because of declined DXA scanning. The time duration of symptoms in 5(20%) of patients was less than or equal of 10 years and in 20(80%) of patients. It was less than 10years (Table 1).

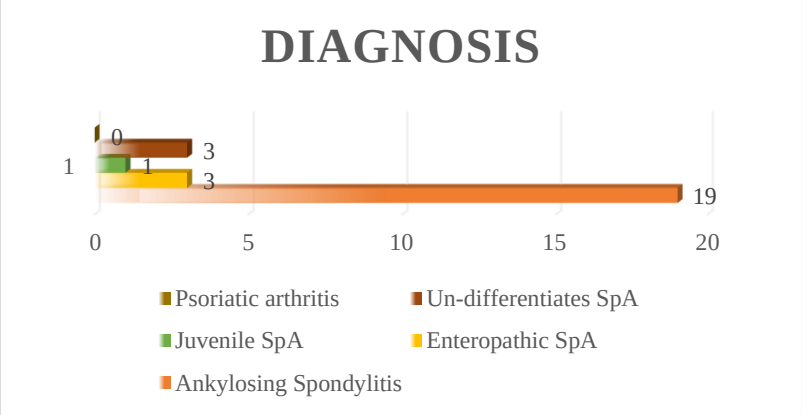
Table No 01: Demographic, clinical and laboratory characteristics

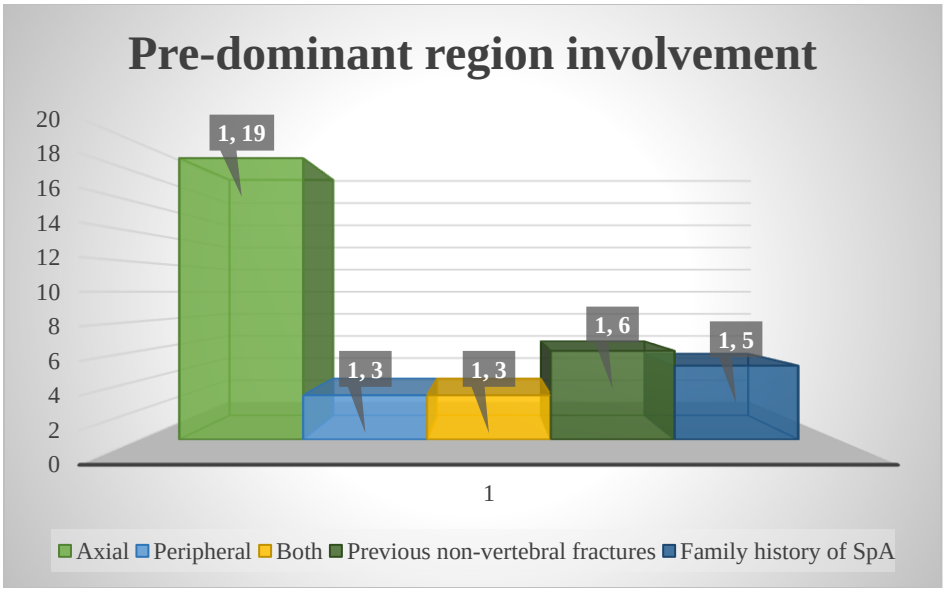
Demographic variable	**Patients quantity (%)**	**Mean ± SD**	**Range**
Men	16 (64)		
Age (Years)	25	37.2 ± 11.5	15 – 55
Smokers	2 (8)		
Diagnosis			
Ankylosing Spondylitis	19 (76)		
Enteropathic SpA	3 (12)		
Juvenile SpA	1 (4)		
Un-differentiates SpA	3 (12)		
Psoriatic arthritis	0 (0)		
Pre-dominant region involvement			
Axial	19 (76)		
Peripheral	3 (12)		
Both	3 (12)		
Previous non-vertebral fractures	6 (24)		
Family history of SpA	5 (25)		
Years since onset of symptoms (Years)		5.1 ± 6.0	0.6 – 20
Time since diagnosis (months)		2.2 ± 2.6	0 – 10
History of anterior uveitis	4 (16)		
Backache	22 (88)		
Morning stiffness	21 (84)		
Duration of morning stiffness			
Severity of morning stiffness (0-10)		6.4 ± 3.2	0 – 10
No. of swollen joints		1.1± 1.7	0 – 7
Dactylitis	4 (16)		
Alternating Buttock pain	15 (60)		
Heel pain	13 (52)		
Chest pain	8 (32)		
Pain improvement with NSAIDS	21 (84)		
Patient Global assessment		7.1 ± 1.8	4 – 10
BASDAI		5.0 ± 2.1	2 - 9.6
BASFI		4.8 ± 3.0	0 - 9.9
BASMI		3.4 ± 2.1	0.56 - 9.1
MASSES		2.5 ± 3.3	0 – 13
Spinal Pain score (VAS: 0-10)		6.9 ± 3.3	0 – 10
Peripheral arthritis pain score (VAS: 0-10)		3.7 ± 3.6	0 – 10
Chest Expansion (cms)		4.1 ± 1.64	1 – 7
Modified Schober (cms)		3.9 ± 2.2	1-10
Tragus to wall distance (cms)		15.5 ± 8.3	6 – 48
Maximum intermalleolar distance (cms)		91 ± 21.7	34-127
Cervical Rotation (degrees)		68 ± 25	10- 90
Lateral spinal flexion (cms)		13.6 ± 7.8	3 – 28
Elevated CRP	19 (76)		
Elevated ESR	9 (36)		
ASDAS CRP		3.2 ± 0.83	1.5 - 4.8
ASDAS ESR		3.5 ± 1.05	2.4 - 6.7
Positive HLAB27	8(32)		
Normal Vitamin D levels	16 (64)		
X-ray sacroiliac joint			
normal	2 (8)		
Grade1	2 (8)		
Grade 2	5 (20)		

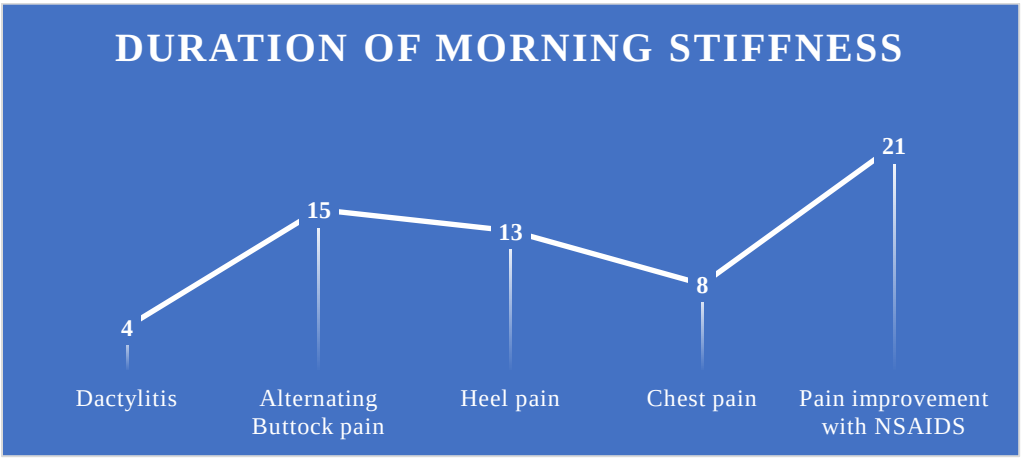
Grade 3	11 (44)		
Grade 4	3 (12)		
Syndesmophytes	7 (28)		
MRI sacroiliac joint (n=10)			
Acute sacroiliitis	7 (28)		
Chronic sacroiliitis	2 (8)		
Normal	1 (4)		

SpA: Spondyloarthropathies.
NSAIDS: Non-steroidal anti-inflammatory drugs.
BASDAI: Bath Ankylosing Spondylitis Disease Activity Index.
BASFI: Bath Ankylosing Spondylitis Functional Index.
BASMI: Bath Ankylosing Spondylitis Metrology Index.
MASSES: Maastricht Ankylosing Spondylitis Enthesitis Score.
ESR: Erythrocyte sedimentation rate
CRP: C-reactive protein.
HLAB27: Human leukocyte antigen subtype B27.
VAS: Visual analogue score.
ASDAS: Ankylosing spondylitis disease activity score.
MRI: Magnetic resonance imaging.







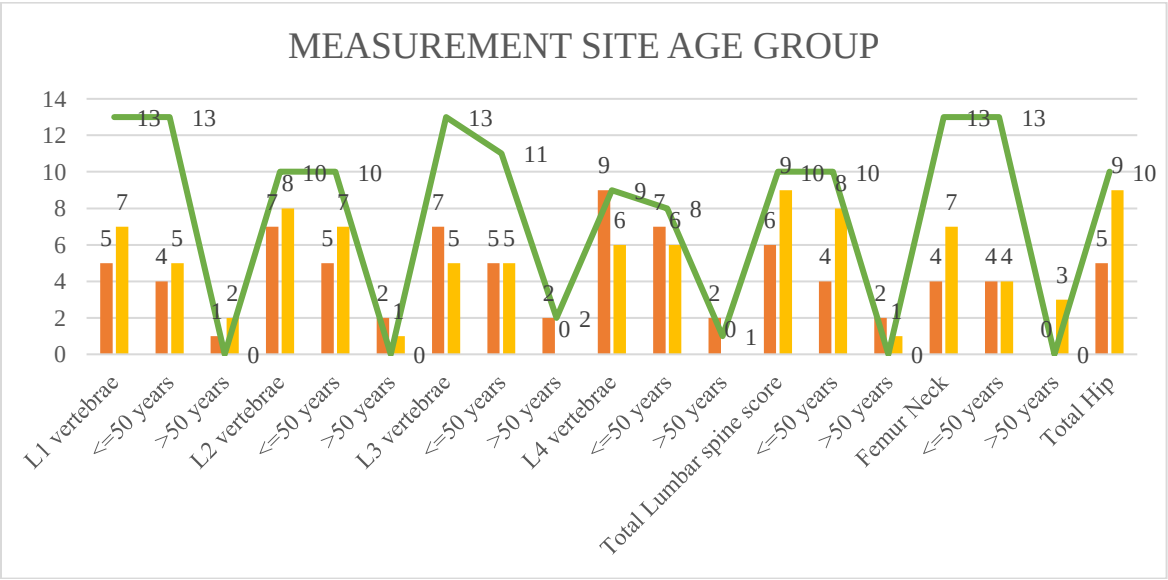


Both axial and peripheral involvement was observed in 3(12%)whereas peripheral involvement was noticed in 3(12%) and 19(76%) of the patients were noticed with the predominal axial involvement juvenile SPA was identified in 1(4%) cases , enteropathic arthritis was diagnosed in 3(12%) cases, undifferentiated SPA was observed in 2(8%) of cases and in 19(76%) cases, As was identified, further more osteoporosis was observed in spine region in 9(36%)cases and at hip in 5(36%)case on the other hand, osteopenia was noticed in spine region in 8(32%) cases and at hip in 9(36%) cases. The final percentage of patients who had low BMD either at hip or spine was 18(72%).

Table No 02: Bone mineral density (BMD) measured by Dual energy X-Ray absorbtiometry (DXA) at different skeletal sites and different age groups.

Measurement site Age group	BMD Mean ± SD	T-score Mean ±SD	Z-score Mean± SD	Patients with osteoporosis /BMD below expected range for age, Number (%)*	Patients with osteopenia number (%)	Patients with normal BMD Number (%)
L1 vertebrae	0.93± 0.16	-0.92±1.52	-0.75±1.41	5 (20)	7 (28)	13 (52)
<=50 years	0.94±0.16	-0.72±1.49	-0.63±1.40	4(18)	5(20)	13 (52)
>50 years	0.78±0.09	-2.3±0.95	-1.6±1.48	1 (2)	2 (8)	0 (0)
L2 vertebrae	0.97 ± 0.19	-0.99±1.78	-0.83± 1.72	7 (28)	8 (32)	10 (40)
<=50 years	0.99±0.19	-0.77±1.75	-0.69±1.71	5 (20)	7 (30)	10 (40)
>50 years	0.81±0.12	-2.60±1.12	-1.83±1.67	2 (8)	1 (2)	0 (0)
L3 vertebrae	1.0 ± 0.21	-0.90±1.84	-0.73± 1.72	7 (28)	5 (20)	13 (52)
<=50 years	1.03±0.21	-0.70±1.8	-0.60±1.70	5 (20)	5 (20)	11 (44)
>50 years	0.85±0.17	-2.3±1.43	-1.6±1.91	2 (8)	0 (0)	2 (8)
L4 vertebrae	1.01 ± 0.25	-0.87±2.14	-0.73± 2.15	9 (36)	6 (24)	9 (36)
<=50 years	1.03±0.25	-0.69±2.2	-0.61±2.2	7 (28)	6 (24)	8 (32)
>50 years	0.87±0.15	-2.2±1.30	-1.5±1.7	2 (8)	0 (0)	1 (4)
Total Lumbar spine score	0.97 ± 0.20	-0.95±1.74	-0.84± 1.72	6 (24)	9 (36)	10 (40)
<=50 years	0.99±0.20	-0.75±1.73	-0.71±1.72	4 (16)	8 (32)	10 (40)
>50 years	0.83±0.13	-2.3±1.2	-1.7±1.7	2 (8)	1 (4)	0 (0)
Femur Neck	0.80 ± 0.19	-0.83±1.61	-0.59± 1.56	4 (16)	7 (28)	13 (52)
<=50 years	0.824±0.19	-0.64±1.63	-0.50±1.64	4 (16)	4 (16)	13 (52)
>50 years	0.64±0.04	-2.1±0.28	-1.1±0.57	0 (0)	3 (12)	0 (0)
Total Hip	0.88 ± 0.21	-0.81±1.62	-0.72± 1.65	5 (20)	9 (36)	10 (40)

*Data presented as the sum of patients younger than 50 years, with a Z-score < -2.0 SD and patients 50 years or older with a T-score < -2.5 SD.



Out of those patients who had low MBD at spine. Predominant Axial disorder was found in 13(76.5%),AS was noticed in 12(63.2), high value of ASDAS-CRP was observed in 11(64.7%) and no syndesmophytes was noticed in 7(63.6%) further more 8(88.9%) were observed positive for HLA-B27 allele, males were 14(82.4%)time period of disorder below 10 years was found in 13(68.4%) and patient less than 50 years of age were 14(82.4%)

DISCUSSION:

The study illustrated that in most of the individual suffering with SPA, Axial and peripheral skeleton is affected by shortage in BMD on PXA scanning. The patients selected for this study were not identified with osteoporosis or osteopenia. in Pakistan, limited research was made related to BMD status of population. So first report about BMD status in Pakistani population is provided by our study [5, 6, 7] for the identification of disorder progression in SPAs and in time identification the most authentic and reaction technique is BMD assessed by DXA [8, 9].In those patients who were diagnosed with disorder earlier high widespread of low BMD(47%) in both femur and lumber spine was observed in a study [10] in current research study, the percentage of patients who had low BMD is 72% . In our study, people were selected with different time period of disorder. The factor may contribute to the high extent of low BMD. In our study, As was noticed in most of the cases out of these cases. Low BMD was observed in 68% cases.

Tries results can be compared to the observed widespread of osteoporosis in AS. The range of AS was from 19% to 62% uncertain outcomes were produced by the studied held previously. But in our research study, equal extent of low MBD at spine 56% and femur 68% was observed. One such study [11] illustrated that osteoporosis in AS in mainly limited to axial skeleton. While no such dissimilarity was observed by another study [12].

The factor that contribute to SPA connected osteoporosis is still uncertain. Current studies illustrate that focalization of diffuse bone loss in SPA is caused by receptor activator of nuclear factor kappa B/ Ligand (RAND/RANKL) and activated osteoclasts [13]. The study of bone biopsies from the iliac crest of as patients hold the theory that osteoporosis is common procedure that influence complete that lumbar spine BMD firmly associate with low trabecular peripheral bone volume and trabecular thinning. By means of quantitative CT (QCT) scans lumber spine BMD was calculated [14]. The connection between duration of disorder and particular factors contribute (BASMI, MASFI), Subtype of spa and disorder functional scores (ASDAS-CRP, ASDAS-ESR, CRP, ESR, BASDAT) couldn't be estimated through the current research study, it is due to the reason that our study contain restricted number of individual .in our study ,no association with low BMD was found according to some other studies (14, 15], it was observed that swelling and functioning of disease (BASDAI) effect BMD same way on the other hand, No similar relation was noticed in some other studies [15]. Low bone mineral density (BMD) is present at initial stages of AS. This supported by face that high currency different populations. Which is illustrated by different studies [16]. According to few other research studies [17, 18], connection between low BMD and cracking chance has been found. So, it is required to identify the discharge in time. Also, extensive therapy as well as secondary osteoporosis in needed.

CONCLUSION:

Low bone mineral density was observed in most of people suffering from spondyloarthritis at lumbar spine and femoral neck. This disease can be indicated in earlier stages by adding seriousness of disorder and its time period screening in time with DXA scan should be done in all individuals with SPA. The advantage of this screening is that this disease can be prevented earlier and natural record of this state may be changed with treatment on time

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