

Original Article

Frequency of Osteopenia and its association with Socio Economic Status among general female population aged 18-60 years

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Abstract:

Osteopenia is regarded as the Bone Mineral Density (BMD) which is lower than that of the average value but not as low as Osteoporosis. In Pakistan, Osteoporosis and Osteopenia among women have become one of the most common problems of recent times. **Objectives:** To find the frequency of osteopenia among females in Faisalabad and its association with SES (Socio Economic Status). **Methodology:** It was an analytical and cross-sectional study which was conducted at Niaz Medicare Clinic in Faisalabad. The study was completed in 9 months from 18 October 2019 to 18 July 2020. Non probability purposive sampling was done and 323 females were taken for the study. **Results:** The results demonstrated that 56.3% of the population had Osteopenia. Socio Economic Status had as statistically significant association with Osteopenia ($p=0.041$). The results also revealed that the females belonging to middle class and lower class had a higher prevalence of Osteopenia than the females of upper Socio Economic Status. **Conclusion:** the frequency of Osteopenia was fairly high among females specifically the age group 18-29 years. There was an association found between Osteopenia and Socio Economic status ($p=0.041$).

Key words: Osteopenia, Socio Economic Status, Bone Mineral Density

Introduction:

Osteopenia is regarded as the Bone Mineral Density (BMD) which is lower than that of the average value but not as low as Osteoporosis [1]. There are certain Standard Deviation (SD) levels according to which a person may be diagnosed as Osteopenia [2]. If the SD level is from -1.1 to -2.49 SD, then the person is said to have osteopenia [3]. Lack of proper treatment can further aggravate the situation leading to osteoporosis which in turn can increase incidence of bone fractures [4].

The bone growth depends on Socio Economic Status as well as vitamin D which influence its

development [5, 6]. A recently published systematic review concluded that while greater educational attainment is associated with greater BMD among women [7], evidence of income associations with BMD is lacking [8]. Socio Economic Status has strong links with obesity and chronic diseases [9], which influence fracture risk via pathway that are independent of BMD, it is not immediately apparent that fracture risk should be higher in those from low SES [10]. In another research in Turkey, low Socio Economic Status was found to be a risk factor for osteopenia [11]. In India,

about 66% females with lower Socio Economic Status had osteopenia as opposed to 57% females with higher Socio Economic Status [12]. The people who belong to low Socio Economic Status are unable to purchase sufficient quantity of milk and its products owing to its high price [13]. Adding to this, gender discrimination is more common among lower class with regard to calcium intake between sexes [14, 15]. It is observed that male dominance is more common in our society which means that they are more educated than women [16]. A study conducted in India found that the ratio of osteopenia in women between the ages of 20-76 years was 32.13% and there was a correlation between low BMD with the low Socio Economic Status [17].

Frequency of osteopenia as well as osteoporosis in Pakistan, their research related to the burden of this disease and osteoporosis related fractures are sparse [18]. Pakistan doesn't have many resources to cope with health problems [19]. In 2011, it was estimated that Gross Domestic Product (GDP) of Pakistan's percentage of healthcare expenditure was only 2.5% [19, 20].

Pakistan is progressing at a fast pace yet it struggles to cope with the problem of osteopenia mainly due to lack of awareness regarding this disease, low literacy rate and its expensive treatment. It is important to identify the risk factors associated with osteopenia in order to create awareness and take precautionary measures for this disease. The main factors that were taken into account were the Socio-Economic Status.

Material and Methods:

It was an analytical and cross-sectional study which was conducted at Niaz Medicare Clinic in Faisalabad. The study was completed in 9 months from 18 October 2019 to 18 July 2020. Non probability purposive sampling was done and 323 females were taken for the study. It was categorized as upper, middle and lower class. This variable was assessed to see Socio Economic Status affected the BMD or

not. Collected data was calculated and analyzed using SPSS version 24. For quantitative data like age, weight, height, mean \pm Standard Deviation (SD) was used. For categorical data, frequency (%) was used. P-value \leq 0.05 was taken as significant. Chi Square was used to find association between Osteopenia and Socio Economic Status.

Results:

The number of females who participated in this study was 323. 161 females belonged to the age group 18-29 years. 73 females were between the ages of 30 to 45 years while 89 females were above the age of 45 years. The females belonging to lower class were 99. 151 females had a middle class background whereas 73 females were associated with upper Socio Economic Status. The results of BMD were categorized as normal, osteopenia and osteoporosis.

| Age (years) | |
|-------------|--------|
| Mean | 34.37 |
| S.D | 13.009 |
| Range | 42 |
| Minimum | 18 |
| Maximum | 60 |

Table.1: Descriptive statistics of age (years)

The frequency of Osteopenia in terms of different Socio Economic Status also indicated positive association ($p=0.041$). Women who belonged to middle and lower Socio Economic Status had high prevalence of Osteopenia (60.3% and 59.6% respectively). Women of upper Socio Economic Status reportedly showed higher frequency of normal BMD at 37% than women of other two Socio Economic backgrounds.

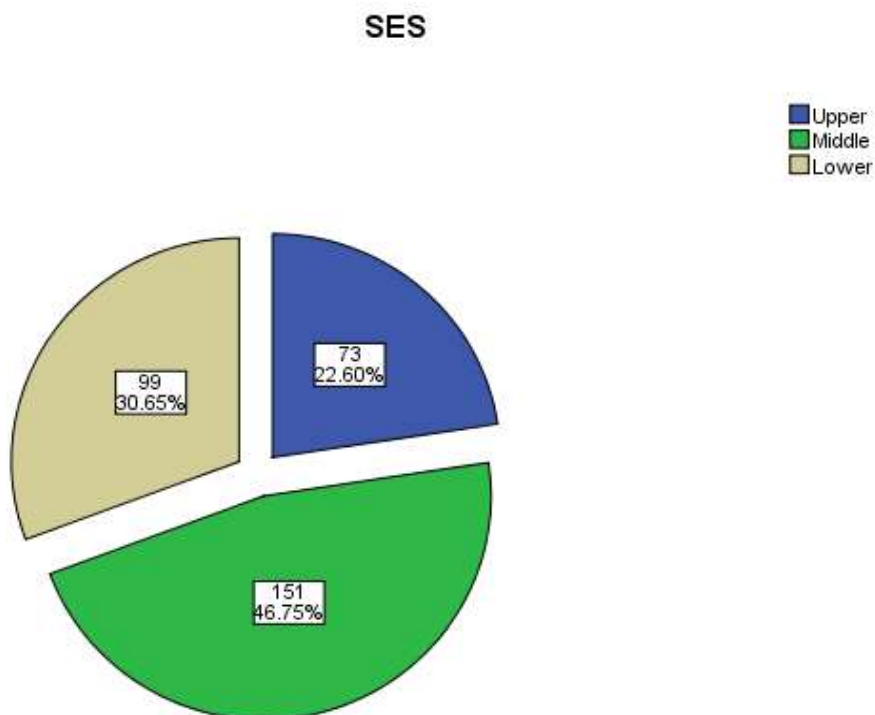


Figure.1: Descriptive statistics of Socio Economic Status

| | | BMD | | | Total |
|-------|--------|------------|--------------|-----------|-----------|
| | | Osteopenia | Osteoporosis | Normal | |
| SES | Upper | 32(43.8%) | 14(19.2%) | 27(37%) | 73(100%) |
| | Middle | 91(60.3%) | 30(19.9%) | 30(19.9%) | 151(100%) |
| | Lower | 59(59.6%) | 21(21.2%) | 19(19.2%) | 99(100%) |
| Total | | 182(56.3%) | 65(20.1%) | 76(23.5%) | 323(100%) |

Table.2: Comparison of BMD in different socio economic status

Chi-square = 9.991

P-value = 0.041 (Significant)

Discussion:

In this study, the frequency of osteopenia was found to be common among general female population aged 18-60 years. This frequency (56.3%) coincides with the prevalence of osteopenia in a study conducted in Faisalabad where more than 50% females had osteopenia [21]. This study is further endorsed by another study depicting the prevalence of osteopenia to be 64.1% [22]. This is higher than the findings of

this study. However, 49.8% of the females living in Brazil had osteopenia in a research study conducted to find factors that are related to osteopenia and osteoporosis.²⁵ However, the variation in the frequency is not meaning fully different from this study. Further, a cross sectional study concluded that the prevalence of osteopenia was higher than that of osteoporosis (57.4% and 15.9% respectively) [23]. This

reflects that the osteopenia has become a health concern among different countries including Pakistan.

Socio Economic Status was statistically significantly associated with osteopenia ($p=0.041$). This shows that osteopenia correlation with Socio Economic Status. According to a study carried out in Spain, low Socio Economic Status and poverty seems to affect the BMD by making bones vulnerable to osteoporotic fractures [24]. Similarly, a study concluded Socio Economic Status to influence the prevalence of Osteopenia and Osteoporosis as these bone conditions were observed to be common among people of the low Socio Economic Status [25]. A contrary data was reported in a study which concluded no noticeable difference between three socio economic groups with respect to BMD levels. This study reflected that the prevalence of females belonging to middle class and lower class to be highly affected by osteopenia (60.3% and 59.6% respectively). Upper middle class has been shown to be highly affected with osteopenia in another study (53.43%)[26].

There was a significant correlation between osteopenia and place of residence ($p=0.024$). Both the urban and rural females had a high prevalence of Osteopenia which was 59.5% and 43.8% respectively. However, Females who belonged to urban areas had a higher percentage of Osteopenia than those who belonged to rural background. These findings are comparable to another study which revealed that urban population is more vulnerable to Osteopenia than rural population.

Conclusion:

The frequency of Osteopenia was found to be 56.3%. There was a significant association found between Osteopenia and Socio Economic Status.

References:

1. Ochs-Balcom HM, Hovey KM, Andrews C, Cauley JA, Hale L, Li W, et al. *Short sleep is associated with low bone mineral density and osteoporosis in the*

women's health initiative. J. Bone Mine. Res. 2020;**35**(2):261-8. doi: 10.1002/jbmr.3879

2. Hoshi H, Monoe F, Ohsawa I, Ohta S, Miyamoto T. *Astaxanthin improves osteopenia caused by aldehyde-stress resulting from Aldh2 mutation due to impaired osteoblastogenesis*. Biochem. Biophys. Res. Comm. 2020;**527**(1):270-5. doi: 10.1016/j.bbrc.2020.04.013
3. Organization WH. *WHO Technical Report Series: World Health Organization*; 1994.
4. Karaguzel G, Holick MF. *Diagnosis and treatment of osteopenia*. Rev. endoc. metab. disord. 2010;**11**(4):237-51. doi: 10.1007/s11154-010-9154-0
5. Din S-u, Hashmi N. *Socio-economic investigation of osteoporosis patients*. Masya. Kebud. dan Polit. 2020;**33**(2):153-61. <http://dx.doi.org/10.20473/mkp.V33I2.2020.153-161>
6. Klein GL, Langman CB, Herndon DN. *Vitamin D depletion following burn injury in children: a possible factor in post-burn osteopenia*. J. Trau. Acu. Care Surg. 2002;**52**(2):346-50. doi: 10.1097/00005373-200202000-00022
7. Marín-Cascales E, Alcaraz PE, Ramos-Campo DJ, Rubio-Arias JA. *Effects of multicomponent training on lean and bone mass in postmenopausal and older women: a systematic review*. Menop. 2018;**25**(3):346-56. doi: 10.1097/GME.0000000000000975
8. Piepkorn B, Kann P, Forst T, Andreas J, Pfütznner A, Beyer J. *Bone mineral density and bone metabolism in*

- diabetes mellitus. *Horm. Metab. Res.* 1997;**29**(11):584-91. doi: 10.1055/s-2007-979106
9. Olney RC. *Regulation of bone mass by growth hormone.* *Med. Pedi. Oncol.* 2003;**41**(3):228-34. <https://doi.org/10.1002/mpo.10342>
 10. Soomro RR, Ahmed SI, Khan M. *Frequency of osteopenia and associated risk factors among young female students.* *J. Pak. Med. Assoc.* 2017;**67**:365-8. https://inis.iaea.org/search/search.aspx?orig_q=RN:48071664
 11. Silva ACV, Rosa Mld, Fernandes B, Lumertz S, Diniz RM, Damiani MEFdR. *Factors associated with osteopenia and osteoporosis in women undergoing bone mineral density test.* *Rev. brasil. Reuma.* 2015;**55**:223-8. <https://doi.org/10.1016/j.rbr.2014.08.012>
 12. Meeta AAR, Agashe SV, Wajahat A, Sarada CV, Vaidya AD, Vaidya RA. *A clinical study of a standardized extract of leaves of Dalbergia sissoo (Roxb ex DC) in postmenopausal osteoporosis.* *J. Mid-life Hlth.* 2019;**10**(1):37. doi: 10.4103/jmh.JMH_22_19
 13. Gupta A. *Vitamin D deficiency in India: prevalence, causalities and interventions.* *Nutrients.* 2014;**6**(2):729-75. doi: 10.3390/nu6020729
 14. Sanwalka NJ, Khadilkar AV, Mughal M, Sayyad MG, Khadilkar VV, Shirole SC, et al. *A study of calcium intake and sources of calcium in adolescent boys and girls from two socioeconomic strata, in Pune, India.* *Asia Paci. j. clin. nutr.* 2010;**19**(3):324-9. <https://pubmed.ncbi.nlm.nih.gov/20805075/>
 15. Lopez ED, Aranda M, Tapia B, Diaz C. *Osteoporosis and osteopenia treatments in a Mexican female population older than 50 years, recording medical experience.* *Maturitas.* 2017;**100**:194-5. doi:10.1016/j.maturitas.2017.03.250
 16. Otomo-Corgel J. *Osteoporosis and osteopenia: implications for periodontal and implant therapy.* *Periodontology* 2000. 2012;**59**(1):111-39. doi: 10.1111/j.1600-0757.2011.00435.x
 17. Habib S, Iqbal R, Shahid M, Habib A. *Growing prevalence of osteoporosis in Pakistan: Call for action.* *J. Pak. Med. Assoc.* 2015;**65**(2):230-1. <https://pubmed.ncbi.nlm.nih.gov/25842568/>
 18. Khan AH, Jafri L, Ahmed S, Noordin S. *Osteoporosis and its perspective in Pakistan: A review of evidence and issues for addressing fragility fractures.* *Ann. Med. Surg.* 2018;**29**:19-25. doi: 10.1016/j.amsu.2018.03.019
 19. Roth GA, Huffman MD, Moran AE, Feigin V, Mensah GA, Naghavi M, et al. *Global and regional patterns in cardiovascular mortality from 1990 to 2013.* *Circulation.* 2015;**132**(17):1667-78. <https://doi.org/10.1161/CIRCULATIONAHA.114.008720>
 20. Nazir S, Sagheer U, Riaz S, Khan ZM. *Frequency of Osteoporosis and Osteopenia and its associated factors among general population in Faisalabad.* *Prof. Med. J.*

2019;**26**(12):2216-21.

doi:10.29309/TPMJ/2019.26.12.4073

21. Larijani B, Hossein-Nezhad A, Mojtahedi A, Pajouhi M, Bastanhigh MH, Soltani A, et al. *Normative data of bone mineral density in healthy population of Tehran, Iran: a cross sectional study*. BMC Musculosk. Disor. 2005;**6**(1):1-6. doi: 10.1186/1471-2474-6-38
22. Padmanabhan K, Paul J, Sudhakar S, Selvam PS, Priya VS, Kirthika SV. *Which is more prevalent among the female population-Osteopenia or Osteoporosis? A cross sectional study*. Res. J. Pharm. Tech. 2019;**12**(3):1163-8. doi:10.5958/0974-360X.2019.00192.6
23. Brennan SL, Pasco JA, Urquhart DM, Oldenburg B, Hanna F, Wluka AE. *The association between socioeconomic status and osteoporotic fracture in population-based adults: a systematic review*. Osteoporosis international. 2009;**20**(9):1487-97. doi: 10.1007/s00198-008-0822-9
24. Jagiasi J, Bochara A. *The prevalence of osteoporosis and osteopenia in persons attending a tertiary care hospital in Mumbai*. Intern. J. Ortho. Sci. 2018;**4**(1):656-8. doi:10.22271/ortho.2018.v4.i1j.94
25. Singh P, Paul V. *A cross-sectional study of osteoporosis among pre and post-menopausal women of Allahabad district*. 2017.