

Incidence of Osteoporosis among Adult Smokers

Rizwan Anwar¹, Omer Farooq Tanveer², Muhammad Abdul Hanan¹, Tanveer Haider², Muhammad Arif³

¹Senior Registrar Orthopedic Surgery, Allama Iqbal Memorial Hospital, Sialkot.

²Associate Professor, Allama Iqbal Memorial Hospital, Sialkot.

³Assistant Professor, Islam Medical College, Sialkot.

Received: March 2020

Accepted: March 2020

ABSTRACT

Background: Objectives: To find out incidences of osteoporosis among adult smokers. **Methods:** Total 500 adult smokers fulfilling inclusion and exclusion criteria were included in this study after taking informed consent. Bone mineral density of every person was done with the help of portable ultrasound machine at calcaneum. **Results:** Total numbers of adult smokers were 500 with median age of 41 years (range 31-59 years). Out of these 496 were male (94.2%) and 4 were female (0.08%). Osteoporosis was diagnosed in 128 smokers (29.4%) out of 500 ($p = 0.00$). osteopenia was diagnosed in 297 smokers (59.4%). Rest of smokers had normal bone mineral density. According to study published in Nigerian journal of clinical practice, the prevalence of osteoporosis in patients who were smokers and snuff users in past or currently was 17.2% as compared to those who were only smokers (5.1%). Another study done in National research institute of tuberculosis and lung diseases, prevalence of osteoporosis in male smokers without chronic obstructive pulmonary disease was 8% as compared to these with COPD (52%). Incidence of osteoporosis among the healthy adults calculated in our study was 29.4%, which is highly significant. Factors affecting the outcome in our study were: Age of smoker, No of cigarettes smoked per day, Duration of smoking. **Conclusion:** Smoking increases the risk of osteoporosis and decreases bone mineral density. Public awareness programs through compains in mass media should be done at national and international levels to stop smoking.

Keywords: Calcaneum, osteoporosis, pulmonary disease, symposiums, smoking.

INTRODUCTION

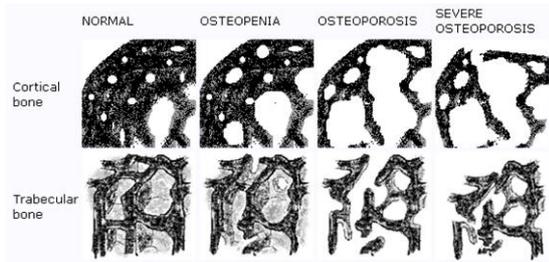
Osteoporosis means porous bones. Osteoporosis is a condition that results from loss of bone tissue. It weakens the bones in the body and makes them more susceptible to fractures.^[1] Osteoporosis is generally regarded as a disease most prevalent in women, but up to 30% of hip fractures and 20% of vertebral fractures occur in men.^[2] The size of bones remain the same, but their strength and density are reduced. Osteoporosis usually affects bones in the spine, hips and wrists, and it can result in physical impairment or death.

Currently, the diagnosis of osteoporosis is defined by the World Health Organization (WHO), and is based on the results of dual energy x-ray absorptiometry (DXA) testing, which evaluates the bone mineral density (BMD) present at several sites. WHO defines osteoporosis as a BMD value more than 2.5 standard deviations (SD) below the average value for a young, healthy woman (a T-score of <-2.5 SD).^[3] Osteopenia, or low bone mass, is defined as -1.0 to -2.5 SD, or 10% to 30%,

below the normal bone mass.^[4] One of the factors that cause the condition is smoking. Smoking is one of the major Components determining bone mineral density (BMD).^[5] Smoking is associated with lower BMD of neck and spine in both males and females and is known to increase hip fracture rates compared with nonsmokers.^[6,7] Hip fracture risk among smokers increases at all ages but rises from 17% at age 60 to 71% at age 80 and 108% at age 90.^[8] Smoking exerts adverse effects on bone strength through direct toxicity of nicotine, non-nicotine components of cigarette smoke which acts on osteoblasts by specific receptors with consequences including inhibition of collagen synthesis, increased cell turnover, down regulation of cell proliferation with high doses, and induction of premature osteoblast cell death, which all can lead to fragile bones.^[9,10] Smoking indirectly affects the bone strength through decreased intestinal calcium absorption,^[11] increased metabolism,^[12] decreased production of estrogen,^[13] and through hypcortisolism.^[14] People exposed to smoke have more chance of lumber and femoral neck osteoporosis than nonsmokers or peoples how are not exposed to smoke.^[15] Thus the rationale of the study is to determine that smokers have more chances of osteoporosis than nonsmokers.

Name & Address of Corresponding Author

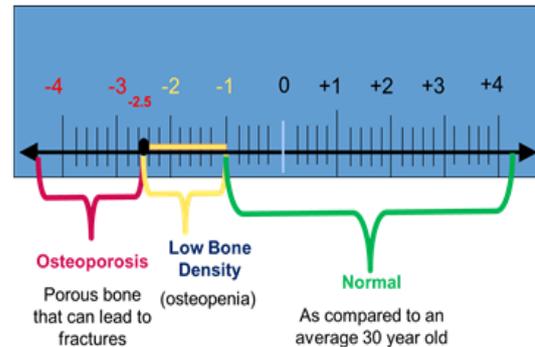
Dr Rizwan Anwar,
Senior Registrar
Department of Orthopedic Surgery,
Allama Iqbal Memorial Hospital,
Sialkot.



measured from heel of the patient. This test was carried out in OPD department of orthopedics, Lahore General Hospital Lahore. T-score (the number of standard deviations above or below the mean for a healthy 30 Year old adult of the same gender and ethnicity as the patient) of -1.0 was taken as reference. T-Score of -2.5 or low was taken as diagnostic of osteoporosis.

MATERIALS AND METHODS

This cross sectional study was conducted in the department of orthopedics, Post graduate medical institute, Lahore general hospital, Lahore from March 2019 to August 2019. Total 500 patients with minor trauma ,attendants accompanying them, doctors, paramedical staff age > 30 years and < 60 years with history of more than 5 years of smoking, coming in OPD and ward of orthopedics department, Lahore general hospital, were included in this study. Patients with endocrine problems i.e. Hyperthyroidism, Hypothyroidism, Cushing’s syndrome, Diabetes mellitus, female patients with pregnancy and lactation, Patients with chronic renal failure, obesity, alcohol drinking, underweight and inactive patients and Patients taking drugs i.e. steroids, anti-epileptics, L – thyroxin, heparin, warfarin, aromatase inhibitors, methotrexate, and proton pump inhibitors were excluded from this study. Their bone mineral density was measured by peripheral dual-energy X- ray absorptiometry (DEXA) Scan. Peripheral DEXA Scan was done with the help of portable machine. BMD was



RESULTS

Total numbers of adult smokers were 500 with median age of 41 years (range 31-59 years). Male smokers were 496 (94.2%) and female smokers were 4 (0.08%). Osteoporosis was diagnosed in 128 smokers (29.4%) out of 500 (p = 0.00). Osteopenia was diagnosed in 297smokers (59.4%). Rest of 75 smokers had normal bone mineral density.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | Yes | 128 | 25.6 | 25.6 | 25.6 |
| | No | 372 | 74.4 | 74.4 | 100.0 |
| | Total | 500 | 100.0 | 100.0 | |

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------|-----------|---------|---------------|--------------------|
| Valid | Yes | 297 | 59.4 | 59.4 | 59.4 |
| | No | 203 | 40.6 | 40.6 | 100.0 |
| | Total | 500 | 100.0 | 100.0 | |

| Chi-Square Tests | | | |
|------------------------------|----------|----|-----------------------|
| | Value | Df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 129.035a | 5 | .000 |
| Likelihood Ratio | 129.091 | 5 | .000 |
| Linear-by-Linear Association | 112.803 | 1 | .000 |
| N of Valid Cases | 500 | | |

DISCUSSION

Osteoporosis is generally regarded as a disease most prevalent in women, but up to 30% of hip fractures and 20% of vertebral fractures occur in men. One of the factors that cause the condition is smoking. Smoking is one of the major Components determining bone mineral density (BMD). Smoking is associated with lower BMD of neck and spine in both males and females and is known

to increase hip fracture rates compared with nonsmokers. Hip fracture risk among smokers increases at all ages but rises from 17% at age 60 to 71% at age 80 and 108% at age 90. According to study published in Nigerian journal of clinical practice, the prevalence of osteoporosis in patients who were snuff users and smokers either in past or currently was 17.2% as compared to those who were only smokers (5.1%).^[16] Another study done in National research institute of tuberculosis and

lung diseases, prevalence of osteoporosis in male smokers without chronic obstructive pulmonary disease was 8% as compared to these with COPD (52%).^[17] In our study, Osteoporosis was diagnosed in 128 smokers (29.4%) out of 500 adult smokers ($p = 0.00$). Osteopenia was diagnosed in 297 smokers out of 500 adult smokers (59.4%). Rest of smokers had normal bone mineral density. Frequency of osteoporosis among the healthy adults calculated in our study is 29.4%, which is highly significant.

Factors affecting the outcome in our study were

- Age of smoker
- No of cigarettes smoked per day
- Duration of smoking

Every factor is directly proportional to outcome, i.e., when age of smoker, no of cigarettes smoked per day and duration of smoking increases, risk of osteoporosis increases accordingly.

CONCLUSION

Smoking increases the risk of osteoporosis and decreases bone mineral density. Public awareness programs through compains in electronic and print media, symposiums, seminars, and school and college awareness programs, pamphlet distributions etc. should be done at national and international levels to stop smoking.

REFERENCES

1. Brian K Alldredge; Koda-Kimble, Mary Anne; Young, Lloyd Y.; Wayne A Kradjan; B. Joseph Guglielmo. Applied therapeutics: the clinical use of drugs. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins. 2009 pp. 101–3. ISBN-0-7817-6555-2.
2. Eastell R, Boyle IT, Compston J, Cooper C, Fogelman I, Francis RM, Hosking DJ, Purdie DW, Ralston S, Reeve J, Reid DM, Russell RG, Stevenson JC. Management of male osteoporosis: Report of the UK Consensus Group. QJM 1998; 91: 71–92.
3. World Health Organization (WHO): WHO Scientific Group on the Assessment of Osteoporosis at Primary Health Care Level. Brussels, Belgium: WHO Press, Geneva, Switzerland, 2004.
4. US Department of Health and Human Services (USDHHS): Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville, MD: U.S. Government Printing Office, Office of the Surgeon General, 2004, p 107.
5. Wong PK, Christie JJ, Wark JD. The effects of smoking on bone health. Clin Sci (Lond) 2007;113:233–241.
6. Ward KD, Klesges RC 2001 A meta-analysis of the effects of cigarette smoking on bone mineral density. Calcif Tissue Int 2007. 68:259–270.
7. Höidrup S, Prescott E, Sørensen TIA, Gottschau A, Lauritzen JB, Schroll M, Grønbaek M Tobacco smoking and risk of hip fracture in men and women. Int J Epidemiol apr 2000, 29: 253– 259.
8. Ganesan Ganesan Ram, Ramachandran Thirunthaiyan, Perumal Suresh, Parachur Karthik Anand. Assessment Of Risk Factors As Predictors For Osteoporosis Fragility Hip Fractures Using DEXA Scan. Int J Biol Med Res. 2013; 4(4): 3581-3584
9. Walker LM, Preston MR, Magnay JL, Thomas PBM, Haj AJ. Nicotinic regulation of c-fos and osteopontin expression in human-derived osteoblast-like cells and human trabecular bone organ culture. Bone 2001; 28: 603–608.
10. Iwaniec UT, Fung YK, Akhter MP, Haven MC, Nespor S, Haynatzki GR, Cullen DM. Effect of nicotine on bone mass, turnover, and strength in adult female rats. Calcif Tissue Int 2001; 68: 358–364.
11. Krall EA, Dawson-Hughes B. Smoking and bone loss among post- menopausal women. J Bone Miner Res 1991; 6:331-38.
12. Baron JA, La Lecchia C, Levi F. The antiestrogenic effect of cigarette smoking in women. Am J Obstet Gynecol 1990; 162:502-14.
13. Kilany YF, Abou Holw SA, Abouel-Nour MF, Morsy AT. Early development of osteoporosis in male smokers with hypoandrogenism due to fascioliasis with or without schistosomiasis added by life style. Journal of the Egyptian Society of Parasitology. 2009; Dec; 39(3):789-802. PubMed PMID: 20120745
14. Friedman AJ, Ravnika VA, Barbieri RL. Serum steroid hormone profiles in postmenopausal smokers and nonsmokers. Fertil steril 1987;47:398-401.
15. Kim KH, Lee CM, Park SM, Cho B, Chang Y, Park SG, et al. Secondhand smoke exposure and osteoporosis in never-smoking postmenopausal women: the Fourth Korea National Health and Nutrition Examination Survey. Osteoporosis international : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA. 2013 Feb;24(2):523-32. PubMed PMID: 22532000.
16. Ayo-Yousaf, Olutola B G. Epidemiological association between osteoporosis and combined smoking and use of snuff among South African women. Niger J Clin Pract 2014; 17:174-7.
17. Roozbeh Nagshin, comparison of osteoporosis between male smokers with and without chronic obstructive pulmonary disease. NRITLD, 3(9), pp.13-18, 2004.

Copyright: © Annals of International Medical and Dental Research. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Anwar R, Tanveer OF, Hanan MA, Haider T, Arif M. Incidence of Osteoporosis among Adult Smokers. Ann. Int. Med. Den. Res. 2020; 6(3):OR01-OR03.

Source of Support: Nil, **Conflict of Interest:** None declared