JOMH
Journal of Men's Health

Original Article
DOI: 10.22374/1875-6859.13.2.7

THE CURRENT ISSUES ON OSTEOPOROSIS AMONG MALE SAUDI ARABIANS

By Mir Sadat-Ali, MBBS, MS, PhD, FRCS, D Orth[1], Ali W. Almomen, MBBS[2], Hussain K. AlOmar, MBBS[3], Sultan A. AlAlwan, MBBS[3], Abid H. Gullenpet, MD, FRCR[1], Fawaz M. AlAnii, MBBS, SSC Ortho[4].

[1]College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam. [2]King Fahd Specialist Hospital, Dammam, Saudi Arabia. [3]King Fahd Hospital of the University, AlKhobar. [4]Department of Orthopedic Surgery, King Fahd Hospital of the University, Al Khobar.

Submitted: August 8, 2017. Accepted: November 26, 2017. Published: December 8, 2017.

ABSTRACT

Background and Objectives

Osteoporosis was reported to be common among the Saudi Arabian population. In the last decade there have been no reports related to the male osteoporosis in Saudi Arabian citizens. The objective of this study was to find the hospital-based prevalence of male osteoporosis and the associated diseases.

Methodology

This is a retrospective study between January 2014 and December 2016 in which all patients who were referred for DEXA (Dual Energy X-ray Absorptiometry) scan to the radiology department of the King Fahd Hospital of the University, AlKhobar were included. Patient's demographic data were collected from the medical records. Patients who were younger than 50 and those who had a fragility fracture were excluded from the analysis. From the Picture Archiving and Communication System (PACS, Siemens AG, Erlangen, Germany) the readings of the DEXA were collected. Associated diseases of the patients were also extracted from the QuadruMed Data Base. The data was entered in the database and analyzed using SPSS Inc. version 19 and p value of <0.05 was considered significant.

Results

Four hundred and fifty-five patients had a DEXA scan during the study period. Three hundred and seventy-one (81.5%) were ≥50 years. The average was 65.33±9.85 years (range 50–97). On the basis of Spinal T score, 222 (59.8%) were osteoporotic with the Spinal T score of <−3.58±0.88, while, with Hip T score 120 (32.3%) were osteoporotic with T score of <−3.24±0.59. Thirty-six (9.7%) had a normal DEXA of spine and 74(19.9%) of patients had normal DEXA when the Hip T score was taken into consideration. Patients could be divided into 4 groups based on their diseases; they were on treatment for cardiac disease 106 (28.5%), Diabetes mellitus 95 (25.7%), osteoarthritis 141 (38%) and respiratory disease 29 (7.8%). Based on the Spinal T score osteoporosis was observed in 61/106 (57.5%) patients with cardiac disease,

62/95 (65.3%) in diabetics, in osteoarthritis 83/141 (58.9%) and 16/29 (55.1%) in patients with respiratory system diseases. Majority of the patients had vitamin D3 analysis and were most of the patients were in the deficiency range. From 222 (59.83%) patients who were diagnosed to have osteoporosis only 108 (48.64%) were on appropriate treatment for osteoporosis.

Conclusion

This study finds that the prevalence of osteoporosis in Saudi Arabian males is higher than in the western world and has increased in the last decade. The authors believe a more determined effort is needed to lower the screening age for osteoporosis and report the observations. This will allow a consensus to be reached regarding the frequency of osteoporosis in Saudi Arabian males and implement appropriate measures to limit its growth.

Primary osteoporosis (postmenopausal and senile) is a skeletal disease due to the aging process during which bone loss increases faster than the bone formation. Bone loss causes architectural deterioration leading to fragility fractures. This disease is silent till a fracture occurs; however, early telltale signs are present in the form of weakness, imbalance, and frequent falls. Postmenopausal osteoporosis and secondary osteoporosis due to steroid therapy is extensively studied.[1–6] As osteoporosis was labelled as a women's disease, for long periods of time male osteoporosis received little attention, even though in USA in 2005, about 30% of the osteoporotic fractures occurred in men. Additionally, the cost to the health care system was $4.25 billion[7] and the first-year mortality was 30% and another 30% fractured again.[8] With so much at stake male osteoporosis still remains an under diagnosed and undertreated condition. In light of these issues, the endocrine society of America recommended testing higher risk men aged 70 and men with risk factors aged 50–69.[9] Chronic diseases that have been associated with secondary osteoporosis include diseases such as chronic obstructive pulmonary disease (COPD) [10,11] cardiovascular disease,[12] and osteoarthritis.[13] Other important causes of secondary osteoporosis are cigarette smoking and alcohol abuse.[14]

The Saudi Arabian population is not immune to osteoporosis and studies put the prevalence of osteoporosis to be 30.3% in postmenopausal women and around 30.7% in men.[15] Prospective screening for healthy males between 50 and 79 years of age indicated the prevalence of osteoporosis in 30.7% and osteopenia in 46.3%. This suggests that 77% of the screened population had low bone mass.[16–18] Even with such a high percentage of the population affected, a decade has passed and no report has appeared in the literature on male osteoporosis among the Saudi population. Hence, we took up this study to assess whether the last decade has had any effect on the prevalence of male osteoporosis.

PATIENTS AND METHODS

This was a retrospective hospital-based study done between January 2014 and December 2016 in which all patients who were referred for DEXA (Dual Energy X ray Absorptiometry) scan to the radiology department of the King Fahd Hospital of the University, AlKhobar were studied. Ethical approval was obtained from the IRB of the University.

Patients demographic data were collected from the medical records included, age, preexisting diseases, and medications being taken. The results of serum calcium, phosphorous, parathyroid hormone, and vitamin D3 (25OHD) levels (if performed) were collected. 25OHD was assessed using chemiluminescence immunoassay (CLIA). Vitamin D level of ≥30 ng/mL was considered as normal, between 21 and 29 ng/mL as insufficient, and ≤ 20 ng/mL as deficient. Patients who were younger than 50 years and those who had a fragility fracture were excluded from the analysis. From the Picture Archiving and Communication System (PACS, Siemens AG, Erlangen, Germany) the readings of the DEXA were collected. DEXA was performed using Hologic Discovery QDR Series, Marlborough, MA, USA and software for Asians was used. The data was analyzed using the 2013 International Society for

Clinical Densitometry consensus conference endorsement of the female reference database for T-score calculation in men.[19] A T score of <1 was considered as normal, <−1 to <−2.5 as osteopenia, and <−2.5 as osteoporosis. Patients suffering from diseases like diabetes mellitus, cardiac disease, respiratory disease and osteoarthritis were also extracted from the QuadruMed Data Base. The data was entered in the database and analyzed using SPSS Inc. version 19. Data are presented as a mean ± standard deviation (SD), with 95% confidence intervals (CI) and a *p* value of <0.05 was considered significant.

RESULTS

During the study period, 455 patients had a DEXA scan. Three hundred and seventy-one (81.5%) were ≥50 years of age. The demographic data is given in Table 1. The average age was 65.33±9.85 years (Range 50–97). In the majority of the patients' serum level of vitamin D3 was done and most of them were in the deficiency range (≤20ng/mL) (Figure 1). On the basis of Spinal T score, 222 (59.8%) were osteoporotic with the Spinal T score of <−3.58±0.88, while with Hip T score 120 (32.3%) were osteoporotic with T score of <−3.24±0.59. Thirty-six (9.7%) had a normal DEXA of spine and 74 (19.9%) of patients had normal DEXA when Hip was taken into consideration.

Patients could be divided into 4 groups based on their chronic diseases they were on treatment for cardiac disease 106 (28.5%), Diabetes mellitus 95 (25.7%), osteoarthritis 141 (38%) and respiratory disease 29 (7.8%). Based on the Spinal T score osteoporosis was observed in 61/106 (57.5%) patients with cardiac disease, 62/95 (65.3%) in diabetics, in osteoarthritis 83/141 (58.9%), and 16/29 (55.1%) in patients with respiratory system diseases. Table 2 gives the details of the 4 diseases, T scores and prevalence of osteoporosis. A total of 222 (59.83%) were diagnosed to

TABLE 1 Demographic Data of Patients with DEXA Scans

Total Number of Patients:	455
Patients ≥ 50 years	371 (81.5%)
Average Age in Years:	65.33±9.85
Normal T score (Spine)	36 (9.7%)
Normal T score (Hip)	74 (19.9%)
Osteoporosis (Spine)	222 (59.8%)
Osteoporosis (Hip)	120 (32.3%)

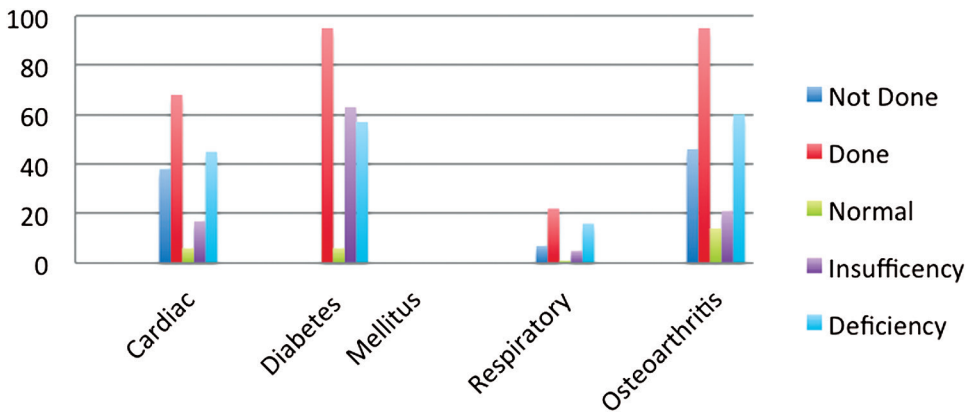

FIG. 1 Status of vitamin D in all patients.

have osteoporosis but only 108 (48.64%) were on appropriate treatment for osteoporosis (Figure 2).

DISCUSSION

Our study reveals startling facts that the prevalence of hospital-based male osteoporosis was around (59.83%) and secondly the prevalence was highest in patients with diabetes mellitus (65.2%), osteoarthritis (58.9%) cardiac disease 57.5%. This study indicates that the prevalence of male osteoporosis is much higher than reported before in Saudi Arabia and rest of the world. The incidence of male osteoporosis was reported to be in the range of 4–7% and a study from Denmark which used bone mineral density (BMD) to diagnose osteoporosis in the age group 60–74 found that 10.2% were suffering with osteoporosis.[20] Our patients from nearly the same age group had a 6 times higher prevalence of osteoporosis. It was estimated that men who are past age 50 lose about 1% of the BMD yearly which will make 1 in 5 men ≥50 years will suffer an osteoporotic in the remaining life time.[21] In Canada the incidence was 6.6%[22], in Korea it was reported as 7.5%.[23] In 1997, it was reported based on the NHANES study, in US men ≥50 years, 36% were osteoporotic and 28–47% osteopenic.[24] Two years later it was found that the incidence of osteoporosis in US males in 1999 was 6.25% with 1.5 million men out of a population of 24.7 million over age 65 have osteoporosis.[25,26] It is now settled that by using the National Osteoporosis Foundation (NOF) male-specific T-score reference, the incidence is 7%.[27] However, the number of males with osteoporosis is increasing. The National Osteoporosis Foundation reported that males suffering from osteoporosis in 2002 increased from

TABLE 2 Number of Patients, Diseases and Prevalence of Osteopenia and Osteoporosis

	Cardiac Disease	Diabetes Mellitus	Osteoarthritis	Respiratory Disease
Number of Patients	106	95	141	29
Average Age	66.41± 9.69	65.82±8.36	65.27±10	66.1±8.2
Normal	13	10	11	2
Osteopenia (Spinal-TScore)	32 (1.83±0.78)	23 (−1.82±.83)	47 (−1.78±.69)	11 (−1.95±1.74)
Osteoporosis (Spinal-TScore)	61 (−3.6±10.8)	62 (−3.5±0.61)	83 (−3.76±0.92)	16 (−3.81±-1.31)

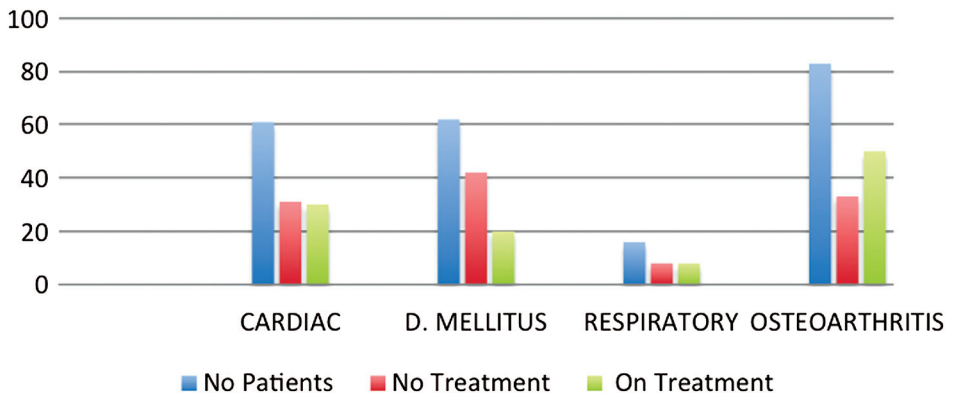

FIG. 2 Osteoporosis patients on treatment.

2.3 million to 2.8 million by 2010.[28] The prevalence of osteoporosis in Saudi Arabian men nearly doubled. In the last decade the average reported prevalence from the 3 regions of Saudi Arabia was 30.7%[15] and this study found that the prevalence increased to 59.8% for osteoporosis. Overall the prevalence of osteoporosis among Saudi Arabian males is quite high and even more so in patients who are suffering with chronic diseases.

Are patients who have osteoporosis getting the appropriate treatment? The answer to this is no. There exists a wide gap between the diagnosis and treatment of osteoporosis. In 2014, a report from Saudi Arabia in one hospital, the treatment gap was about 20%.[29] Jennings et al[30] found that only 2% were prescribed ideal therapy. Hajcsar et al[31] reported that patients attending fracture clinics after a fragility fracture only 20% received the treatment. Another surprising fact was that DEXA was done to diagnose osteoporosis but the appropriate treatment was not instituted in 48.4% of the cases. This may be because many patients and some physicians think that osteoporosis is a women's disease, hence men with osteoporosis are neglected. The importance of early diagnosis of osteoporosis and appropriate treatment in the prevention of the fragility fractures needs to be emphasized. If we miss the safety window, patients and the country can suffer a huge cost both monetarily and socially.

The incidence of hip fractures secondary to osteoporosis has increased in the past decade the world over by 11%. From Netherlands, Hartholt et al[32] reported that the incidence of hip fractures rose by 43% from 1981 to 2008 and vertebral fractures from 18.9/100,000 persons in 1986–1990 to 61.3/100,000 persons.[33] The incidence of fragility fracture of the femur in the Middle-East and Asia Pacific is expected to increase many times over in the coming years in comparison to the present status.[34–38] It appears that the prevalence of fragility femoral fractures did not change much in the last decade based on one region and an extrapolation of the whole country.[39–40] A recent study undertaken involving some hospitals in all regions of Saudi Arabia for SAudi National Hip Fracture Registry (SAFE) under the patronage of Saudi Osteoporosis Society and Ministry of Health, will shed more light on the correct prevalence of fracture femur due to osteoporosis.[41]

This study has some limitations being a retrospective in nature and hospital based. It could have given more strength if population controls were screened at the same age group, but earlier studies have shown that data extracted from the hospital-based studies is comparable between the 2 groups. As the only study of its kind in the past decade, our data yields important facts about the changing pattern of osteoporosis in the male Saudi population. In conclusion, this study finds that prevalence of osteoporosis in Saudi Arabian males has increased in the last decade. Additionally, it appears that there is total apathy among the physicians in Saudi Arabia to report their findings of male osteoporosis they are treating. We believe more determined efforts are needed to lower the screening age for osteoporosis and to report observations so that a consensus can be reached about the incidence of osteoporosis and implement appropriate measures to limit a further rise among the male population of Saudi Arabia.

DISCLOSURE

There was no grant received for this study and the authors do not have any conflict of interests.

REFERENCES

1. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis prevention, diagnosis, and therapy. JAMA. 2001;285:785–95.
2. Kanis JA, Melton LJ 3rd, Christiansen C, et al. The diagnosis of osteoporosis. J Bone Miner Res 1994;9:1137–41.
3. Siris ES, Miller PD, Barrett-Connor E, et al. Identification and fracture outcomes of undiagnosed low bone mineral density in postmenopausal women: results from the National Osteoporosis Risk Assessment. JAMA 2001;286:2815–22.
4. Compston J, Cooper A, Cooper C, et al. UK clinical guideline for the prevention and treatment of osteoporosis. Arch Osteoporos 2017 Dec;12(1):43. doi: 10.1007/s11657-017-0324-5. Epub 2017 Apr 19.
5. Canalis, E, Bilezikian, JP, Angeli A, et al. Perspectives on glucocorticoid-induced osteo- porosis. Bone 2004;34:593–98.
6. Compston J, Reid DM, Boisdron J, et al. Recommendations for the registration of agents for prevention and

treatment of glucocorticoid-induced osteoporosis: an update from the Group for the Respect of Ethics and Excellence in Science. Osteoporos Int 2008;19: 1247-50.
7. Burge R, Dawson-Hughes B, Solomon DH, et al. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. J Bone Miner Res 2007 Mar;22(3):465–75.
8. von Friesendorff M, McGuigan FE, Besjakov J, et al. Hip fracture in men-survival and subsequent fractures: a cohort study with 22-year follow-up. J Am Geriatr Soc 2011 May;59(5):806–13.
9. Watts NB, Adler RA, Bilezikian JP, et al. Osteoporosis in men: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab 2012;97:1802–22.
10. Silva DR, Coelho AC, Dumke A, et al. Osteoporosis prevalence and associated factors in patients with COPD: a cross-sectional study. Respir Care 2011;56(7):961–68.
11. Morden NE, Sullivan SD, Bartle B, et al. Skeletal health in men with chronic lung disease: rates of testing, treatment, and fractures. Osteoporos Int 2011;22(6):1855–62.
12. Shen C, Deng J, Zhou R, et al. Relation between bone mineral density, bone loss and the risk of cardiovascular disease in a Chinese cohort. Am J Cardiol 2012;110(8):1138–42.
13. Castaño-Betancourt MC, Rivadeneira F, Bierma-Zeinstra S, et al. Bone parameters across different types of hip osteoarthritis and their relationship to osteoporotic fracture risk. Arthritis Rheum. 2013;65(3): 693–700.
14. Seeman E, Melton LJ 3rd, O'Fallon WM, Riggs BL. Risk factors for spinal osteoporosis in men. Am J Med 1983;75: 977–83.
15. Sadat-Ali M, Al-Habdan IM, Al-Turki HA, et al. An epidemiological analysis of the incidence of osteoporosis and osteoporosis-related fractures among the Saudi Arabian population. Ann Saudi Med 2012 Nov-Dec;32(6):637–41.
16. Ardawi MS, Maimany AA, Bahksh TM, et al. Bone mineral density of the spine and femur in healthy Saudis. Osteoporos Int 2005 Jan;16(1):43–55.
17. Sadat-Ali M, AlElq A. Osteoporosis among male Saudi Arabs: a pilot study. Ann Saudi Med 2006 Nov-Dec;26(6):450–4.
18. El-Desouki MI, Sulimani RA. High prevalence of osteoporosis in Saudi men. Saudi Med J 2007 May;28(5):774–7.
19. Melton 3rd LJ, Chrischilles EA, Cooper C et al. How many women have osteoporosis. J Bone Miner Res 1992;7:1005–1010.
20. Frost M, Wraae K, Abrahamsen B, et al. Osteoporosis and vertebral fractures in men aged 60-74 years. Age Ageing. 2012 Mar;41(2):171–7.
21. Tenenhouse A, Joseph L, Kreiger N, et al. Estimation of the prevalence of low bone density in Canadian women and men using a population- specific DXA reference standard: the Canadian Multicentre Osteopo- rosis Study (CaMos). Osteoporos Int 2000;11:897–4.
22. Choi YJ, Oh HJ, Kim DJ et al. The prevalence of osteoporosis in Korean adults aged 50 years or older and the higher diagnosis rates in women who were beneficiaries of a national screening program: the Korea National Health and Nutrition Examination Survey 2008-2009. J Bone Miner Res 2012 Sep;27(9):1879–86.
23. Looker AC, Orwoll ES, Johnston CC Jr, et al. Prevalence of low femoral bone density in older U.S. adults from NhaNES III. J Bone Miner Res 1997;12:1761–68.
24. Siddiqui NA, Shetty KR, Duthie EH Jr. Osteoporosis in older men: discovering when and how to treat it. Geriatrics 1999;54:20.
25. US Census Bureau. The older population in the United States. Available at: https://www.census.gov/prod/2000pubs/p20-532.pdf.
26. Ensrud, K., Parimi, N., Fink, H, et al. Estimated GFR and risk of hip fracture in older men: comparison of associations using cystatin C and creatinine. Am J Kidney Dis 2014;63:31–39.
27. NOF. America's Bone Health: The State of Osteoporosis and Low Bone Mass in Our Nation. Washington, DC: National Osteoporosis Foundation; 2002.
28. Amin S, Achenbach SJ, Atkinson EJ, et al. Trends in fracture incidence: a population-based study over 20 years. J Bone Miner Res 2014 Mar;29(3):581–9.
29. Sadat-Ali M, Al-Omran A, Al-Bakr W, et al. established osteoporosis and gaps in the management: review from a teaching hospital. Ann Med Health Sci Res 2014 Mar;4(2):198–201.
30. Jennings LA, Auerbach AD, Maselli, J et al. Missed opportunities for osteoporosis treatment in patients hospitalized for hip fracture. J Am Geriatr Soc 2010;58:650–7.
31. Hajcsar EE, Hawker G, Bogoch ER. Investigation and treatment of osteoporosis in patients with fragility fractures. CMAJ 2000 Oct 3;163(7):819–22.
32. Hartholt KA, Oudshoorn C, Zielinski SM, et al. The epidemic of hip fractures: are we on the right track? PLoS One 2011;6(7):e22227. doi: 10.1371/journal.pone. 0022227. Epub 2011 Jul 25.

33. Oudshoorn C, Hartholt KA, Zillikens MC et al.Emergency department visits due to vertebral fractures in the Netherlands, 1986-2008: steep increase in the oldest old, strong association with falls. Injury 2012 Apr;43(4):458–61.
34. Tuzun S, Eskiyurt N, Akarirmak U et al. Turkish Osteoporosis Society.Osteoporos. Incidence of hip fracture and prevalence of osteoporosis in Turkey: the FRACTURK study. Osteoporos Int 2012 Mar;23(3):949–55.
35. The Middle East & Africa Regional Audit: Epidemiology, costs & burden of osteoporosis in 2011. International Osteoporosis Foundation; 2011. Available at: www.iofbonehealth.org/middle-eastafrica-.
36. Hagino H, Katagiri H, Okano T, et al. Increasing incidence of hip fracture in Tottori Prefecture, Japan: trend from 1986 to 2001. Osteoporos Int 2005;16:1963–8.
37. Koh LK, Saw SM, Lee JJ, et al. National Working Committee on Osteoporosis. Hip fracture incidence rates in Singapore 1991-1998. Osteoporos Int 12:311–18.
38. Sambrook PN, Seeman E, Phillips SR, et al. Preventing osteoporosis: outcomes of the Australian Fracture Prevention Summit. Med J Aust 2002;176 Suppl:S1.
39. Sadat-Ali M, Al-Dakheel DA, Azam MQ, et al. Reassessment of osteoporosis-related femoral fractures and economic burden in Saudi Arabia. Arch Osteoporos. 2015;10:37. doi: 10.1007/s11657-015-0240-5. Epub 2015 Oct 22. PMID: 26494131.
40. Bubshait D, Sadat-Ali M. Economic implications of osteoporosis related femoral fractures in the Saudi Arabian society. Calcif Tissue Int 2007 Dec;81(6):455–8.
41. AlSulaimani R. SAudi National Hip Fracture Registry (SAFE). Personal communication 2017.