

Chapter 5

OSTEOPOROSIS

Nilüfer Aygün BİLECİK¹

INTRODUCTION

Osteoporosis (OP) is the most common disease affecting the metabolism of bones. The first definitive definition of OP was made in 1820 by a French pathologist named Jean Georges Lobstein as “porous bone”, then in 1947 by Albright as “too little bone in bone”. Osteoporosis is a condition characterized by decreased bone density, resulting in fragile and porous bones. It is defined as a reduction in bone mass per unit volume. (1). The World Health Organization (WHO) defines OP as “a systemic skeletal disease characterized by low bone mass and an increase in bone fragility and fractures as a result of impairment of the microarchitectural structure of bone tissue”. This definition is an international consensus set at the 1990 World Health Organization Osteoporosis Conference (2). With the consensus of WHO in 1994, the definition of OP was revised, so it was adopted that the definition of OP should be made according to the values obtained using DXA (dual x-ray absorptiometry) and the presence of fracture (WHO Study Group 1994). In fact, the purpose of this definition is both to prevent conceptual confusion and to clarify the prevalence of OP over certain numerical values (3).

According to this;

Normal: Bone mineral density (BMD) and bone mineral content below 1 standard deviation (SD) compared to a young adult,

Osteopenia: BMD is between -1 and -2.5 SD compared to young adults,

Osteoporosis: BMD greater than -2.5 SD compared to young adults,

Established OP: BMD greater than -2.5 SD compared to a young adult and the presence of one or more additional fractures.

According to this last definition, fracture is not essential for my definition of osteoporosis. If DEXA is not used, the old definition will apply.

¹ MD Adana City Hospital, drmilaygun@gmail.com, ORCID iD: 0000-0002-5113-2287

is recommended in patients with acute vertebral fractures or chronic pain from multiple vertebral fractures. However, patients should be trained to perform isometric exercises when using back braces, as long-term brace application can lead to muscle atrophy and muscle weakness. walking aids; It consists of conventional canes, broad-based supporting canes and walkers. Most hip fractures occur as a result of falls. Therefore, in addition to the above measures, specially designed trochanteric cushions can be used to provide external protection to the hip joint during falls in elderly men and women (39,40). In the prevention of osteoporosis, pain due to fractures, prevention of falls and improving the quality of life, physical therapy agents as well as exercise and physical activity are useful. its importance will gain more importance with increasing age as it is today (39,40,44).

REFERENCES

1. Melikoğlu M. Osteoporoz tanımlaması ve sınıflaması. *Türkiye Klinikleri J PM&R-Special Topics* 2012;5(3):1-5.
2. Sweet MG, Sweet J, Jeremiah MP, Galazka SS. Diagnosis and treatment of osteoporosis. *Am Fam Physician* 2009;79(3):193-200.
3. Edwards MH, Jameson K, Denison H, Harvey NC, Sayer AA, Dennison EM, et al. Clinical risk factors, bone density and fall history in the prediction of incident fracture among men and women. *Bone* 2013;52(2):541-7.
4. Şen N, Tuncer T. Osteoporoz patofizyolojisi. *Türkiye Klinikleri J PM&R-Special Topics* 2012;5(3):11-6.
5. Bonjour JP, Chevalley T, Ferrari S, Rizzoli R. The importance and relevance of peak bone mass in the prevalence of osteoporosis. *Salud Publica Mex* 2009;51(Suppl 1):5-17.
6. Wong PK, Christie JJ, Wark JD. The effects of smoking on bone health. *Clin Sci (Lond.)* 2007;113(5): 233-41.
7. Türkiye İstatistik Kurumu [internet]. Küresel yetişkin tütün araştırması, 2012 [cited 2015 Jul 9]. Available from: <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=13142>.
8. Arasil T. Osteoporoz epidemiyolojisi ve Türkiye verileri. *Türkiye Klinikleri J PM&R-Special Topics* 2012;5(3):6-10.
9. Tuzun S, Eskiuyurt N, Akarirmak U, Saridogan M, Senocak M, Johansson H, et al. Incidence of hip fracture and prevalence of osteoporosis in Turkey: the FRACTURK study. *Osteoporos Int* 2012;23(3):949-55
10. Uğur M. Osteoporozda risk faktörleri. *Türkiye Klinikleri J PM&R-Special Topics*, 2012;5(3):17-22
11. Erdem HR. Osteoporozda tanı yöntemleri. *Türkiye Klinikleri J PM&R-Special Topics* 2012;5(3):34-42.
12. Civitelli R, Armamento-Villareal R, Napoli N. Bone turnover markers: understanding their value in clinical trials and clinical practice. *Osteoporos Int* 2009;20(6):843-51.
13. National Osteoporosis Foundation [Internet]. Clinician's guide to prevention and treatment of osteoporosis 2010 [cited 2015 Oct 10]. Available from: <http://nof.org/files/nof/public/content/file/344/upload/159.pdf>

14. Wheeler G, Elshahaly M, Tuck SP, Datta HK, van Laar JM. The clinical utility of bone marker measurements in osteoporosis. *J Transl Med* 2013;(11):201.
15. Tang BM, Eslick GD, Nowson C, Smith C, Bensoussan A. Use of calcium or calcium in combination with vitamin D supplementation to prevent fractures and bone loss in people aged 50 years and older: a meta-analysis. *Lancet* 2007;370(9588):657-66.
16. Yamauchi H, Suzuki H, Orimo H. Calcitonin for the treatment of osteoporosis: dosage and dosing interval in Japan. *J Bone Miner Metab* 2003;21(4):198-204.
17. Akesson K. New approaches to pharmacological treatment of osteoporosis. *Bull World Health Organ* 2003;81(9):657-64.
18. McClung M, Harris ST, Miller PD, Bauer DC, Davison KS, Dian L, et al. Bisphosphonate therapy for osteoporosis: benefits, risks, and drug holiday. *Am J Med* 2013;126:13-20.
19. Roelofs AJ, Thompson K, Gordon S, Rogers MJ. Molecular mechanisms of action of bisphosphonates: current status. *Clin Cancer Res* 2006;12:6222-30.
20. Xu XL, Gou WL, Wang AY, Wang Y, Guo QY, Lu Q, et al. Basic research and clinical applications of bisphosphonates in bone disease: what have we learned over the last 40 years? *J Transl Med* 2013;11:303.
21. National Osteoporosis Foundation. *Clinician's Guide to Prevention and Treatment of Osteoporosis*. Washington, DC: National Osteoporosis Foundation, 2013.
22. Rizzoli R, Adachi JD, Cooper C, Dere W, Devogelaer JP, Diez-Perez A, et al. Management of glucocorticoid-induced osteoporosis. *Calcif Tissue Int* 2012;91:225-43.
23. Herrera A, Lobo-Escolar A, Mateo J, Gil J, Ibarz E, Gracia L. Male osteoporosis: A review. *World J Orthop* 2012;3:223-34.
24. Lippuner K. The future of osteoporosis treatment - a research update. *Swiss Med Wkly* 2012;142:13624.
25. Diab DL, Watts NB. Denosumab in osteoporosis. *Expert Opin Drug Saf* 2013.
26. Cummings SR, San Martin J, McClung MR, Siris ES, Eastell R, Reid IR, et al. Denosumab for prevention of fractures in postmenopausal women with osteoporosis. *N Engl J Med* 2009;361:756-65.
27. Seeman E, Delmas PD, Hanley DA, Sellmeyer D, Cheung AM, Shane E, et al. Microarchitectural deterioration of cortical and trabecular bone: differing effects of denosumab and alendronate. *J Bone Miner Res* 2010;25:1886-94.
28. Bone HG, Chapurlat R, Brandi ML, Brown JP, Czerwinski E, Krieg MA, et al. The effect of three or six years of denosumab exposure in women with postmenopausal osteoporosis: results from the FREEDOM extension. *J Clin Endocrinol Metab* 2013;98:4483-92.
29. Grey A, Bolland M. Web of industry, advocacy, and academia in the management of osteoporosis. *BMJ* 2015;(351):h3170. doi: 10.1136/bmj.h3170.
30. Eskiuyurt N. Osteoporozdan korunma; genel önlemler (kalsiyum, d vitamini ve fiziksel aktivite). *Türkiye Klinikleri J PM&R-Special Topics* 2012;5(3):98-103.
31. Das S, Crockett JC. Osteoporosis - a current view of pharmacological prevention and treatment. *Drug Des Devel Ther* 2013;7:435-48
32. Hurtel-Lemaire AS, Mentaverri R, Caudrillier A, Cournarie F, Wattel A, Kamel S, et al. The calcium-sensing receptor is involved in strontium ranelate-induced osteoclast apoptosis. New insights into the associated signaling pathways. *J Biol Chem* 2009;284:575-84.

33. Cianferotti L, D'Asta F, Brandi ML. A review on strontium ranelate long-term antifracture efficacy in the treatment of postmenopausal osteoporosis. *Ther Adv Musculoskelet Dis* 2013;5:127-39.
34. Reginster JY, Kaufman JM, Goemaere S, Devogelaer JP, Benhamou CL, Felsenberg D, et al. Maintenance of antifracture efficacy over 10 years with strontium ranelate in postmenopausal osteoporosis. *Osteoporos Int* 2012;23:1115-22.
35. Rizzoli R, Reginster JY. Adverse drug reactions to osteoporosis treatments. *Expert Rev Clin Pharmacol* 2011;4:593-604.
36. <http://www.ema.europa.eu/ema/index>.
37. Whitaker M, Guo J, Kehoe T, Benson G. Bisphosphonates for osteoporosis--where do we go from here? *N Engl J Med* 2012;366:2048-51.
38. Diab DL, Watts NB. Bisphosphonate drug holiday: who, when and how long. *Ther Adv Musculoskelet Dis* 2013;5:107-11.
39. Sindel D. Osteoporozda rehabilitasyon. *Osteoporoz Kitabı*. İstanbul: Epsilon Matbaası; 2002. s.122-34.
40. Oral A, Küçükdeveci AA, Varela E, Ilieva EM, Valero R, Berteanu M, et al. Osteoporosis. The role of physical and rehabilitation medicine physicians. The European perspective based on the best evidence. A paper by the UEMS-PRM Section Professional Practice Committee. *Eur J Phys Rehabil Med* 2013;49:565-77.
41. Howe TE, Shea B, Dawson LJ, Downie F, Murray A, Ross C, et al. Exercise for preventing and treating osteoporosis in postmenopausal women. *Cochrane Database Syst Rev* 2011;CD000333.
42. Slatkovska L, Alibhai SM, Beyene J, Cheung AM. Effect of wholebody vibration on BMD: a systematic review and meta-analysis. *Osteoporos Int* 2010;21:1969-80.
43. Lau RW, Liao LR, Yu F, Teo T, Chung RC, Pang MY. The effects of whole body vibration therapy on bone mineral density and leg muscle strength in older adults: a systematic review and meta-analysis. *Clin Rehabil* 2011;25:975-88.
44. Sindel D, Dilşen G, Kubat A. Postmenopozal osteoporozda rehabilitasyon açısından yaşam kalitesi sonuçları. *Romatol Tıp Rehab* 1995;6:144-8.