Original Article

Osteoporosis and Silent Vertebral Fractures in Nursing Home Resident Elderly Men in Turkey

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Abstract

Osteoporosis is an important cause of vertebral fractures and there is an increased risk for osteoporosis in nursing home residents. Most of the men with osteoporosis and osteoporotic fractures are not diagnosed and do not receive treatment. Our study aim was to determine osteoporosis and silent vertebral fracture prevalence in male nursing home residents in Corum, Turkey. This cross-sectional study included 2 groups of patients: 71 male nursing home residents (nursing home group) with a mean age of 76.0 ± 0.8 years and 44 men living in their own homes (control group) with a mean age of 74.4 ± 0.7 years. Bone mineral densitometry was performed in all subjects, and results were evaluated according to the World Health Organization criteria. Vertebral deformity was evaluated using the spinal deformity index, and fracture risk was calculated using the Fracture Risk Assessment Tool. In all participants, serum calcium, phosphorus, 25 (OH) vitamin D, parathyroid hormone, and alkaline phosphates levels were measured and medical histories were recorded. Osteoporosis was detected in 25.3% of men residing in nursing homes and in 8.8% of men living in their own homes. Silent vertebral fracture was present in 27.8% of patients older than 65 years. Vertebral fracture rate was higher in nursing home residents (42.2%) than men living in their own homes (17.6%); 5.6% of nursing home group and 8.9% of control group patients were aware of their fractures. Our results demonstrated that male nursing home residents are at a higher risk for both osteoporosis and vertebral fractures compared to the men living in their own homes.

Key Words: Nursing home; old men; osteoporosis; vertebral fracture.

Introduction

Fractures are seen more frequently in older ages in both sexes *(1)*. Lifelong osteoporotic fracture risk is about 50% in a woman older than 50 years, whereas the rate for men is 13%−25% *(2)*. Osteoporosis is a major cause of vertebral fractures. Vertebral fractures may be asymptomatic or may cause back pain, height shortage, immobilization, and deformities *(3,4)*. Vertebral fracture is a major risk factor for future fracture risk regardless of whether symptomatic or silent. A

history of fracture in vertebrae is associated with a 5-fold increased risk for subsequent vertebral fracture and a 2- to 3-fold increased risk for fractures in other bones *(5)*. Vertebral fractures are seen in 15% of elderly men, but only 10% of them are aware of their fractures *(6)*.

The risk of fractures is high in nursing home residents because they are prone to falling due to muscle weakness and vision and balance problems. In nursing homes, osteoporosis is observed in 71.1% of women and 67% of men aged between 75 and 84 years *(7)*. These rates are much more higher than the rates seen in the general population. This difference can be explained by some factors such as immobilization, less exposure to sun, and higher number of concomitant diseases in nursing home residents. Vertebral fracture studies, such as osteoporosis studies, have mostly focused

on postmenopausal women. However, especially elderly men with high risk, such as male nursing home residents, should be evaluated carefully for vertebral fractures.

The aim of this study was to determine the prevalence of osteoporosis and silent vertebral fractures in elderly men residing in nursing homes, using bone mineral densitometry (BMD) and spinal deformity index (SDI).

Materials and Methods

Study Design and Participants

This study was performed in the Department of Endocrinology and Metabolic Disease at Hitit University Hospital, Corum, Turkey between September 2013 and November 2013. The study involved 71 of 112 patients (mean age: 76 ± 0.8 years) living in nursing homes (NG), and 44 of 56 patients (mean age: 74.4 ± 0.7 years) living in their own homes (served as controls, CG) who met the inclusion criteria. Two nursing homes in Corum were visited by a single physician from where the NG subjects were recruited. Patients who had applied to hospital for any reason other than exclusion criteria and had met inclusion criteria formed the CG.

Male patients older than 65 years, who could walk, perform their daily activities and self-care, and who had no back pain according to visual analog scale were included in the study. Bedridden patients, patients with secondary forms of osteoporosis or with congenital anomalies, hemivertebra, conditions that may cause the vertebral deformities such as Scheuermann disease and Schmorl nodes, degenerative joint diseases including osteoarthritis, or history of medications (steroids, thiazides, glitazones, and so forth) that can cause secondary osteoporosis were excluded.

Informed consent forms in accordance with the Declaration of Helsinki were obtained from all subjects who had volunteered to be included in the study. The study protocol was approved by the local ethics committee.

All participants were questioned for their social habits, chronic diseases, prior fracture history, life styles, and medications. Body weight and height were measured in our endocrinology clinic by the same clinician. Both measurements were made twice and the average of these 2 measurements was recorded. Participants were questioned for fragility fracture history and the history had been confirmed with vertebral X-rays where available; those without an X-ray but a convincing history were also recorded to have fragility fracture. Vertebral fracture awareness is defined as patients' self-declaration of a history of vertebral fracture that had been stated to the patient by a physician.

Biochemical Evaluation

Serum samples were obtained from each subject in a fasting state, between 8:00 AM and 9:00 AM, and were promptly centrifuged and analyzed within hours. Serum free T4, free T3, thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), and total testosterone concentrations were measured by the chemiluminescence microparticle immunoassay method (Cobas E6000, Roche Diagnostics, Germany). Serum inorganic phosphorus and calcium levels were measured photometrically on AU5800 analyzer (Beckman Coulter, Fullerton, CA). Levels of parathyroid hormone (PTH) were determined by Elecsys 1010 system (Roche, Manheim, Germany). Serum 25 (OH) vitamin D levels were quantified by liquid chromatography mass spectrometry on Acquity UPLC and Quattro Premier XE Micromass spectrometry analyzers (Waters).

Spinal Deformity Index

All patients underwent lateral thoracolumbar spine radiography including vertebrae from T4 through L4. Vertebral fracture was evaluated by a single radiologist without knowledge of the clinical features of patients, using the Genant method, which is one of the semiquantitative vertebral fracture assessment methods [8]. At lateral spinal radiographs, vertebrae from T4 through L4 were gradated according to the decrease in vertebral bodies and the rate of reduction in anterior, middle, and/or posterior heights: grade 0 = normal; grade 1 = mild deformation (presence of a 20%−25% reduction in the anterior, middle, and/or posterior heights and a 10%−20% reduction in vertebral body); grade 2 = moderate deformation (presence of a 25%−40% reduction in the anterior or middle or posterior heights and a 20%−40% reduction in vertebral body); grade 3 = severe deformation (presence of 40% reduction in the anterior or middle or posterior heights and a 40% reduction in vertebral body). SDI was calculated by dividing the total vertebral deformity score by the total number of vertebrae. Grades 1 to 3 are included as fractures.

Bone Mineral Densitometry

BMD evaluations of the lumbar spine and femoral neck areas were performed using dual-energy X-ray absorptiometry (Hologic Inc., Bedford, MA). Diagnosis of osteoporosis and osteopenia was made according to World Health Organization (WHO) classification. Osteoporosis was diagnosed as BMD of the hip or lumbar area below or equal to 2.5 standard deviations compared to the young-adult reference population. Osteopenia was diagnosed when BMD of the hip or lumbar area is between −1.0 and −2.5 standard deviations. For the lumbar spine, BMD reference values provided by the manufacturer (Hologic database) and for the total and femoral neck BMD data from the NHANES III survey for men were used.

The Fracture Risk Assessment Tool

The Fracture Risk Assessment Tool (FRAX) has been developed by the WHO to evaluate the 10-year fracture probability of patients [9]. FRAX integrates clinical risk factors and BMD at the femoral neck to calculate the 10-year probability of hip fracture and major osteoporotic fracture. The criteria which were adapted for Turkey by the WHO were used.