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Epidemiology of Osteoporosis and Osteoporotic Fractures in South Korea

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Several epidemiologic studies suggested that osteoporosis and osteoporotic fractures are not uncommon in South Korea. However, these previous cohort studies had limitations that may have influenced their results and the generalizability of the study conclusions, including small sample sizes, inclusion of only women, enrollment of participants from specific areas, and nonrandom selection of participants. Recently, epidemiologic studies using a nationwide claim register have been performed to overcome these limitations through collaboration between the Korean Society of Bone and Mineral Research and Health Insurance Review Assessments. Our review of the Korean Nationwide-database Osteoporosis Study could be helpful to obtain accurate incidence and prevalence estimations of osteoporosis and osteoporosis-related fractures in Korea.

Keywords: Epidemiology; Osteoporosis; Osteoporotic fractures; Korea

INTRODUCTION

Osteoporosis is an important worldwide public health concern [1-4]. In addition, osteoporosis-related fractures are one of the leading causes of significant morbidity and disability in elderly patients and increases the economic burden on the health care system [1-4].

Several studies have concluded that incidences of osteoporosis and osteoporosis-related fractures (hip, spine, distal radius, and humerus) vary across the world. It is reasonable to hypothesize that Korea might be a low-risk country for osteoporosis because it is one of Asian countries. However, there is a lack of studies and insufficient information to confirm this theory. In addition, comparison rates with other countries have not yet been established.

Recently, the Korean Nationwide-database Osteoporosis Study (KNOS) was performed through a collaboration between the Korean Society of Bone and Mineral Research (KSBMR) and Health Insurance Review and Assessments (HIRA) [5-10]. The KNOS included data from the Korean national claim registry using international classification of disease (ICD)-10 codes. Our review of the KNOS may be helpful for estimation of osteoporosis and osteoporosis-related fracture rates in Korea.

IDENTIFICATION OF PATIENTS WITH OSTEOPOROSIS

An operational definition of a patient with osteoporosis was established for the KNOS through a collaboration between the KSBMR and HIRA [7,9,10]. This definition included the following criteria: 1) use of exclusive medications for osteoporosis treatment (bisphosphonate, selective estrogen receptor modifi-

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er, vitamin K2, calcitonin, ipriflavone); 2) ICD diagnostic code of osteoporosis (ICD-10 codes M80 to M82) and use of those medications that are used not only osteoporosis but also other diseases (hormone therapy, calcium, vitamin D, oxymetholone); 3) males over 70 years and females over 65 years of age with a diagnosis of osteoporosis; 4) history of medication induced osteoporosis and/or past medical history suggestive of secondary osteoporosis in a middle-aged patient group (males, 50 to 69 years; females, 50 to 64 years); 5) presence of osteoporosis-related fractures (spine M48.4, M48.5, S22.0, S22.1, S32.0; cervical S42.0; humerus S42.2, S42.3; distal radius S52.5, S52.6; hip S72.0, S72.1; distal tibia S82.3, S82.5, S82.6). If patients met at least one of the five criteria, they were defined as an osteoporosis patient for the purposes of the study. These criteria did not identify patients with osteoporosis but identified patients undergoing treatment for osteoporosis. However, criteria using a coding system have become popular among epidemiologic studies using nationwide databases [9,10].

Although KNOS did not follow WHO criteria for osteoporosis, the operational definition of osteoporosis showed satisfactory validity when compared with other previous epidemiological studies from other countries [9].

PREVALENCE OF OSTEOPOROSIS TREATMENTS

Given the operational definition, approximately 1.31 million people visited a medical facility for diagnosis or treatment of osteoporosis in 2008 [10]. Meanwhile, according to the 2008 Korean National Health and Nutrition Examination Survey that was based upon the WHO definition of osteoporosis, 4.9% of males and 32.4% of females older than 50 years of age carried a diagnosis of osteoporosis [11]. This suggests that osteoporosis is present in 2.51 million people or, approximately 19.3% of people over 50 years of age. In other words, only 52.2% of patients (1.31/2.51) with osteoporosis visited medical facilities for diagnosis. It is well known, however, that the incidence rate of osteoporosis is influenced by various factors including the definition of osteoporosis, methods used to determine bone mineral density, and the reference population used to calculate T scores [12,13].

Although the number of patients receiving care for osteoporosis has gradually increased (1.07 million patients in 2005, 1.20 million people in 2006, and 1.33 million people in 2007) the recognition and cure rates of osteoporosis are relatively lower than other chronic diseases [7,10].

OSTEOPOROTIC FRACTURES AS A COMPLICATION OF OSTEOPOROSIS

It is universally accepted that osteoporosis is an important factor elevating the risk of osteoporotic fractures in areas such as the wrist, vertebral column, hip, and proximal humerus.

To identify osteoporosis-related fractures, certain ICD-10 codes and a patient age cutoff value of 50 years were used in the KNOS [14-16]. Fractures were identified on the basis of selected ICD-10 codes; hip (ICD-10 codes S72.0 [fracture of the femoral neck], S72.1 [pertrochanteric fracture], and seven procedures [open reduction of fractured extremity-femur, closed pinning-femur, external fixation-pelvis/femur, closed reduction of fractured extremity-pelvis/femur, bone traction, skin traction, hemiarthroplasty-hip]); spine (S22.0 [fracture of the thoracic spine], S22.1 [multiple fractures of the thoracic spine], S32.0 [fracture of the lumbar spine], M48.4 [fatigue fracture of vertebra], and M48.5 [collapsed vertebra, NEC]); distal radius (S52.5 [fracture of the distal radius] and S52.6 [combined fracture of the distal radius/ulna]); humerus (S42.2 [fracture of the proximal humerus] and S42.3 [fracture of shaft of humerus]); and overall any fractures [6].

The crude overall incidence of osteoporosis-related fractures was 1,635 per 100,000 person years from 2005 to 2008 and the gender-specific incidence was 725 per 100,000 person years for men and 2,408 per 100,000 person years for women. For both genders, the incidence rate of most osteoporosis-related fractures increased with age [6].

The residual lifetime risk of osteoporosis-related fractures for individuals over age 50 was estimated to be 23.8% for men and 59.5% for women [6]. After a fracture occurs, a serious problem or reduction in quality of daily life may result. In the case of hip fractures requiring surgery, the residual lifetime risk was 5.3% and 12.3% in males and females, respectively [6]. Additionally, the residual lifetime risk of distal radius fractures was 4.9% and 21.7% in males and females, respectively [6]. Although the residual lifetime risk of a hip fracture at age 50 was 5.23% in men and 12.31% in women, which was lower than that of Japan, the residual lifetime risk of distal radius fractures was similar to that in Sweden, a population with high risk for osteoporotic fractures [6].

HEATH CARE UTILIZATION BY PATIENTS WITH OSTEOPOROSIS

The KNOS study found that doctors recognized osteoporosis

in 1.23 million patients over 50 years of age in 2007. Among these patients, approximately 89.9% were females. In terms of age groups, the utilization of health care in the 50- to 64-year-old group was 516 patients per 10,000 people while the elderly group (65 to 74 years of age) was 1,661 patients per 10,000 people, which was 3.2-fold higher than that of the 50- to 64-year-old group. Additionally, the utilization of health care in older than 75-year-old group reached 1,880 patients per 10,000 subjects, indicating that the number of patients with osteoporosis recognized by doctors increased as the population aged [7].

A clinic (54.3%) was most frequently utilized by osteoporosis patients after osteoporosis was first diagnosed. However, patients with a history of fracture and drug-induced or secondary osteoporosis visited medical facilities capable of delivering higher levels of care more frequently than clinics (hospitals 25.5% and general hospitals 29.9%) [7].

Regarding the devices to diagnose osteoporosis, dual-energy X-ray absorptiometry (DXA scanning) was the most commonly utilized method (46.3%) followed by quantitative computed tomography (18.2%) and radiographic absorptiometry (2.3%) [7].

Of the osteoporosis patients recognized by doctors in 2007, 58.4% of the patients were prescribed antiosteoporosis drugs for 6 months or more. The average number of days of osteoporosis drug therapy was 70 days [7].

MORTALITY AFTER OSTEOPOROTIC FRACTURES

Osteoporotic hip fractures have become public health concern as they require surgery in most cases. The treatment of osteoporotic fractures frequently result in a number of difficulties because they mainly occur in elderly patients with weak bone strength and reduced fracture healing capacity. However, osteoporotic fractures also induced many other problems in patients including a difficult time returning to daily life after the fractures and a higher mortality than in the general population.

The KNOS presented standardized mortality ratios (SMR) in order to find excess mortality associated with hip fractures (ICD-10 codes of S72.0 [fracture of the neck of the femur] or S72.1 [trochanteric fracture]). SMRs are defined as the age and gender matched ratios of observed mortality to expected mortality. KNOS demonstrated that the excess mortality within 1 year was about four times and three times higher for males and females in patients with hip fractures compared to that of the individuals without fractures, respectively [8]. The SMR of hip fractures was the highest during the first 3 months after the fracture but gradually declined as time progressed. Nevertheless, SMRs were almost 2-fold higher at the 2 year follow-up [8].

Vertebral fractures (ICD-10 code of S22.0 [fracture of the thoracic spine], S22.1 [multiple fractures of the thoracic spine], S32.0 [fracture of the lumbar spine], M48.4 [fatigue fracture of vertebra], and M48.5 [collapsed vertebra, NEC]) have a low diagnostic rate due to mild symptoms and infrequent utilization of medical facilities. There was an approximate 3.5-fold and 2.5-fold higher mortality within 1 year after vertebral fracture in males and females, respectively, when compared to the general population [5]. The overall mortality rates at 3 months, 6 months, 1 year, and 2 years after vertebral fracture in men (55.6%, 94.1%, 146.1%, and 206.1%, respectively) were higher than women (24.1%, 43.6%, 71.6%, and 104.8%, respectively). In both genders, age-specific mortality rates after vertebral fracture were higher than those of the general population [5].

Moreover, it should be considered that the socioeconomic burdens placed on patients after an osteoporotic fracture has the potential to be quite significant. This is because secondary osteoporotic fractures may take place in patients in whom it may be difficult to return to their normal activity even after fractures are successfully treated [5,8].

TREATMENTS OF OSTEOPOROSIS

In Korea, the most commonly used drugs to treat osteoporosis were bisphosphonates [7]. During the last 5 years, the number of bisphosphonate prescriptions increased more than 3-fold due to attitude changes with regards to osteoporosis and osteoporotic fractures. However, despite the gradual increase in the utilization of osteoporosis drugs, osteoporotic fractures did not significantly decrease in Korea, unlike in other developed Western countries [17].

Several factors should be considered for this finding. Insufficient drug compliance might be a reason in individual patients. Poor awareness of osteoporosis has been suggested to be important in drug compliance [18]. In addition, the medical reimbursement system can also influence this finding. During the study period, South Korea reimbursement guidelines for osteoporosis treatment only covered a period of 6 months and required that patients had a T score of less than -3.0 or history of osteoporosis-related fractures of the spine or hip. Since October 2011, reimbursement guidelines have been changed to cover a period of 12 months after an annual check of bone mineral

density and the cutoff value for reimbursement has also been also changed to a T score of -2.5. In addition to drug therapy, environmental improvements, and educational awareness of this disease should be utilized to eventually aid in reducing occurrence of osteoporotic fractures in Korea.

CONCLUSIONS

Although Korea has been known as a low-risk country for osteoporosis, KNOS demonstrated that the socioeconomic burdens of osteoporosis has increased and mortality after osteoporosis-related fracture is higher than the general population in Korea. The KNOS could serve as baseline data for estimation of osteoporosis and osteoporosis-related fractures in Korea.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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