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Estimated prevalence of osteoporosis from a Nationwide Health Insurance database in Taiwan

Nan-Ping Yang, Chung-Yeh Deng, Yiing-Jenq Chou, Po-Quang Chen, Ching-Heng Lin, Pesus Chou, Hong-Jen Chang *

Institute of Public Health, National Yang-Ming University, Community Medicine Research Center, Taipei, Taiwan 112, Taiwan

Abstract

Approximately 9.24% of the Taiwanese population is aged 65 years or older. Among them, osteoporosis is a major problem, along with it associated age-related fractures. We investigated the prevalence of osteoporosis in 1996–2001 by sampling Taiwan's National Health Insurance (NHI) database. Data from 102,763 men (51.27%) and 97,654 women (48.73%) were evaluated. In this cohort, osteoporosis was recorded in each yearly dataset if the codes 733.0 or 733.00–733.09 were found on a search of the administrative or outpatient sub-databanks. A stable estimated prevalence of osteoporosis was calculated according to Taiwan's NHI sampling data from 1999 to 2001. The results showed a trend toward increasing proportions of coded osteoporosis with age, more predominantly in the female population. The averaged prevalence of osteoporosis, between 1999 and 2001, in those aged ≥50 years was 1.63% for men and 11.35% for women. These estimates were lower than those reported elsewhere for Taiwan and for Japan but more equal to that in the Mexican American sub-population of the United States. In conclusion, the prevalence of osteoporosis is underestimated in the NHI database. Policymakers should be aware of this finding and allocate resources accordingly.

Keywords: Osteoporosis prevalence; Taiwan

1. Introduction

Osteoporosis is a metabolic bone disease characterized by low bone mass and micro-architectural deterioration of bone tissue. It is a major public health problem because of its association with age-related fractures. The cumulative lifetime risk of fracture after the age 50 years approaches 80% for women in Western populations, and the for populations in Asia and Latin America are rapidly approaching this rate [1].

Osteoporotic fractures exact a terrible toll on the population with respect to morbidity, cost, and to a lesser extent mortality. These effects can lead to psychological problems, social consequences, functional limitations, and poor quality of life [2]. Relative mortality rates increase 1.2–2.3 times after vertebral fracture, and hip fracture lead to 10–20% excess deaths, mostly because of medical complications [3,4]. In 1995, direct medical expenditures for osteoporotic fractures in the United States were an estimated $13.8 billion [5]. In

* Corresponding author. Tel.: +886 2 28229695; fax: +886 2 28201461.
E-mail address: changhongjen@yahoo.com.tw (H.-J. Chang).

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1998, total direct and indirect costs of hospitalization, nursing home care, and other costs related to osteoporosis and osteoporotic fractures in the United States were $21.9 billion [6].

Worldwide, the total number of hip fractures in 1990 was estimated to be 1.26 million [7]. If no change in the age- and sex-specific incidences is assumed, the number is expected to approximately double to 2.6 million by the year 2025 and to increase to 4.5 million by the year 2050. In 1990, 26% of all hip fractures occurred in Asia; this figure could rise to 37% in 2025 and to 45% in 2050 as major demographic changes occur. [7]. Therefore, from the perspective of health policy, the issue of osteoporosis will become increasingly important in the future.

Until now, the operational definition of osteoporosis by the World Health Organization (WHO) was restricted to white women, i.e., those with bone mineral density more than 2.5 standard deviations below the normal mean for young white women [8,9]. However, the exact prevalence of osteoporosis was difficult to estimate because of differences in sex, race, approaches to normalize for bone size, specific skeletal sites assessed, and diagnostic criteria [10]. Therefore, most epidemiological studies of osteoporosis, including those conducted in Taiwan [11], have focused on osteoporotic fractures [12,13]. To promote an accurate preventive programs for osteoporosis, descriptive epidemiological studies are needed. The purpose of this study was to estimate the prevalence of osteoporosis in Taiwan based on information from the National Health Insurance (NHI) database. Taiwan's NHI, a universal health insurance program was implemented in 1995 and covers comprehensive services. More than 97% of the 23 million people of Taiwan have benefited from this program, and the NHI consistently receives a 70% public satisfaction rate [14,15]. The NHRI provided a database of 200,432 random subjects, about 1% of the population, to perform a related health insurance study.

2. Methods

2.1. Data source

In Taiwan, the NHI Plan has accumulated 23.75 million administrative and claims records, forming the largest such collection in the world. The National Health Research Institutes cooperates with the NHI Bureau (NHIB) to establish an NHI research database.

How to establish the research database? First, all citizens who have established a registered domicile for at least in the Taiwan area should be enrolled in NHI. Second, all the individuals included in the entire claims database (the general population) were given various random numbers by using a random number function. Simple random sampling of about 50,000 people at a time was performed in 2000. Third, the academic sampling database consisted of four simple randomly sampled subsets and finally included 200,432 enrollees. Forth, the database of medical claims of this sample group, including ambulatory care, inpatient care, dental services, and prescription drugs, were traced back since 1996. Therefore, an academic retrospective cohort group was established. Finally, this academic cohort database was tested and noted without differences in age, sex, and medical costs from all enrollees [16].

The prevalence of osteoporosis was evaluated for the 6 years from 1996 to 2001 on the basis of the above academic cohort database.

2.2. Definition of osteoporosis

Actually, the diagnostic coding of NHI in Taiwan is according to the *International Classification of Diseases, Ninth Clinical Modification* (ICD-9-CM). According to the definition on the Taiwan NHI's Fee Schedule for Medical Services and the Reference List for Drugs, osteoporosis means a value for lumbar or hip BMD, tested by DXA, that is more than 2.5 S.D. below the young adult mean value. It is follow the WHO's rules in 1994. The studied cohort population was recorded as having osteoporosis in each yearly dataset if the ICD-9-CM codes 733.0 (osteoporosis, OS) or 733.00 (OS, unspecified), 733.01 (senile OS), 733.02 (idiopathic OS), 733.03 (disuse OS), and 733.09 (OS, others) were found during a search of the administrative or outpatient sub-databanks. Only data from people aged 30 years or older were included.

2.3. Quality control of medical services and codes in Taiwan's NHI system

NHIB had established a uniform system to control the quality of medical services and codes. If medical services provided by the contracted medical care in-