

Changing epidemiology of osteoporotic hip fracture rates in Hong Kong

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Abstract

Summary This study analyses the trend in hip fracture incidence in Southern Chinese in Hong Kong. The results show that the age-adjusted incidence has stabilized in recent years. Among subjects aged 50–59 years, a declining fracture rate is observed. Increasing awareness and a healthier ageing population could partly explain this improvement.

Introduction Studies published in the early 1990s projected that half of the world's hip fractures would occur in Asia, mostly in China, by 2050. Whether this prediction will become a reality is not clear. This study was conducted to determine the incidence (per 100,000 persons) of hip fracture in Southern Chinese subjects ≥ 50 years in Hong Kong between 1995 and 2004 and compare them with the fracture rates during the previous 30 years in order to help predict the impact on future public health services in Hong Kong.

Methods Data were obtained from the Clinical Data Analysis Reporting System (CDAS) of the Hospital Authority of Hong Kong.

Results The age-specific incidence of hip fracture showed a downward trend in subjects aged 50–59 years in both sexes, but remained stable for other age-groups. Plateauing and declining fracture rates were observed when compared with previous reports of a more than twofold increase in

incidence of hip fractures from the 1960s to 1980s in Hong Kong. The exact reasons for this improvement are unclear, but a cohort effect towards healthier ageing and increasing awareness of osteoporosis among the adult population in Hong Kong is considered as a possible factor.

Keywords Hip fracture · Incidence · Chinese · Hong Kong

Introduction

Osteoporosis has become a major health problem in recent decades. The public health impact of osteoporosis arises from its association with fragility fractures, the most serious of which are hip fractures due to their high morbidity and mortality [1]. As almost all hip fractures require hospitalization, hip fracture rates have been used as a reliable index of the magnitude of the problem of osteoporosis in Asia [2].

Loss of bone density occurs with advancing age, and rates of fracture increase markedly with age. Increasing life expectancy in many parts of the world is predicted to have major implications for the distribution of the burden of hip fractures [3]. There was substantial variation in hip fracture rates between countries and in the 1990s, approximately half of all hip fractures among elderly people occurred in Europe and Latin America. However, due to the rapid growth of the aging population in Asia, it is predicted that by 2050 over half of all hip fractures will occur in Asia [4].

Studies in Hong Kong and Singapore in the 1990s show data which are consistent with this prediction. A survey conducted in Hong Kong in 1985 shows that the incidence of hip fracture had more than doubled from 1966 to 1985 in men and women over the age of 50 [5]. Hip fracture incidence rates in Singapore also rose rapidly from the 1960s to the early 1990s [6].

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However, fracture trends in many western industrialised countries suggest that hip fracture rates appear to rise rapidly (possibly coincident with the early stages of economic development) then stabilise and eventually decline. This can firstly be seen in countries in Northern Europe. A Swedish study in 2002 forecast a total decrease of 11% in hip fracture incidence up to the year 2010 [1]. A recent study in Finland indicates that fracture rates may be starting to stabilise [7]. In the UK the incidence of hip fracture stabilized among women in England and Wales between 1979 and 1985 [8]. Furthermore, an Australian study shows that over a 12-year period between 1989 and 2000 there was a 4–6% per year reduction in the incidence rate of overall osteoporotic fractures in a local population [9].

It is possible that hip fracture rates in Hong Kong and Singapore may also be starting to stabilise. After the steep rise in incidence rates up to 1985, a later study [5] shows that between 1985 and 1995 fracture rates in Hong Kong began to level off. A similar pattern can be seen in Singapore where during the last 10–15 years the incidence of hip fractures has also plateaued [6].

In the light of the above recent observations, the aim of this paper is to analyse trends in hip-fracture rates in Hong Kong between 1995 and 2004 in order to predict the impact on future public health services in Hong Kong.

Methods

The Hospital Authority in Hong Kong was established in 1990 under the Hospital Ordinance to manage all public hospitals. There are 41 public hospitals in Hong Kong, serving 94% of the population, the remaining 6% receiving private health care. The Clinical Data Analysis Reporting System (CDAS) was established by the Hospital Authority in 1990, which marks the beginning of systematic recording

of patient data in Hong Kong. Inpatient data from all public hospitals are submitted to the CDAS.

Using this database, researchers have collected data from 1995 to 2004 of Hong Kong residents aged 50 years and above admitted for the principal diagnosis of a proximal hip fracture based on the International Classification of Diseases ICD 10 codes 820. Only patients aged 50 years and above are included as it is felt that younger patients are more likely to have sustained hip fractures as a result of trauma rather than as a consequence of osteoporosis. To avoid duplication and multiple entries due to hospital transfer and repeated admissions, only the head count of acute admission for hip fracture was included in the analysis.

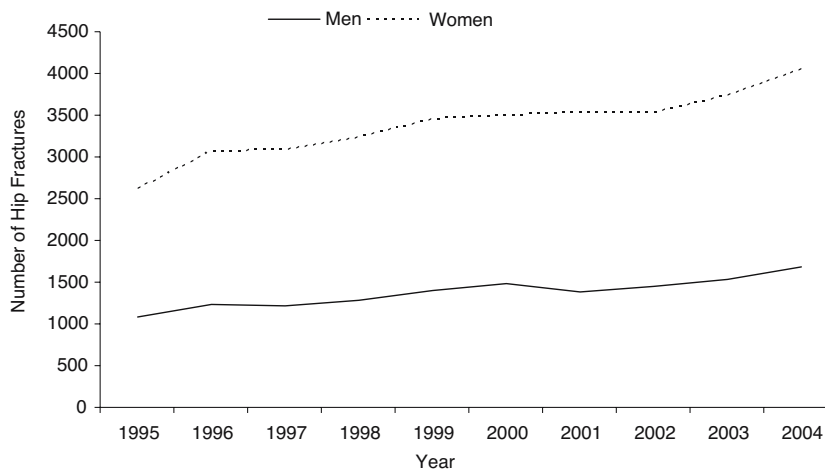
To calculate the incidence rates of fracture, annual midyear populations are taken from the Hong Kong Government Census and Statistics Department. Age-specific (grouped into 10-year age groups) and gender-specific incidence rates are calculated for hip fractures for each year between 1995 and 2004.

Results

Figure 1 shows the number of hip fractures in men and women ≥ 50 years from 1995 to 2004. With the increasing size of the older population, a rising trend is observed in the number of hip fractures in Hong Kong, especially among women (Fig. 1). The age-specific hip fracture rates in men and women are shown diagrammatically in Figs. 2a–d. These data demonstrate that the incidence rates of all groups had declined with the most marked decrease seen in the 50–59 age group. In this age group, from 1995 to 2004, almost a 50% reduction in fracture rates was observed in both men and women.

The cohort graphs in Fig. 3 indicate that the majority of hip fractures occur in those 80 years and above. However,

Fig. 1 Total number of hip fractures in Hong Kong from 1995 to 2004



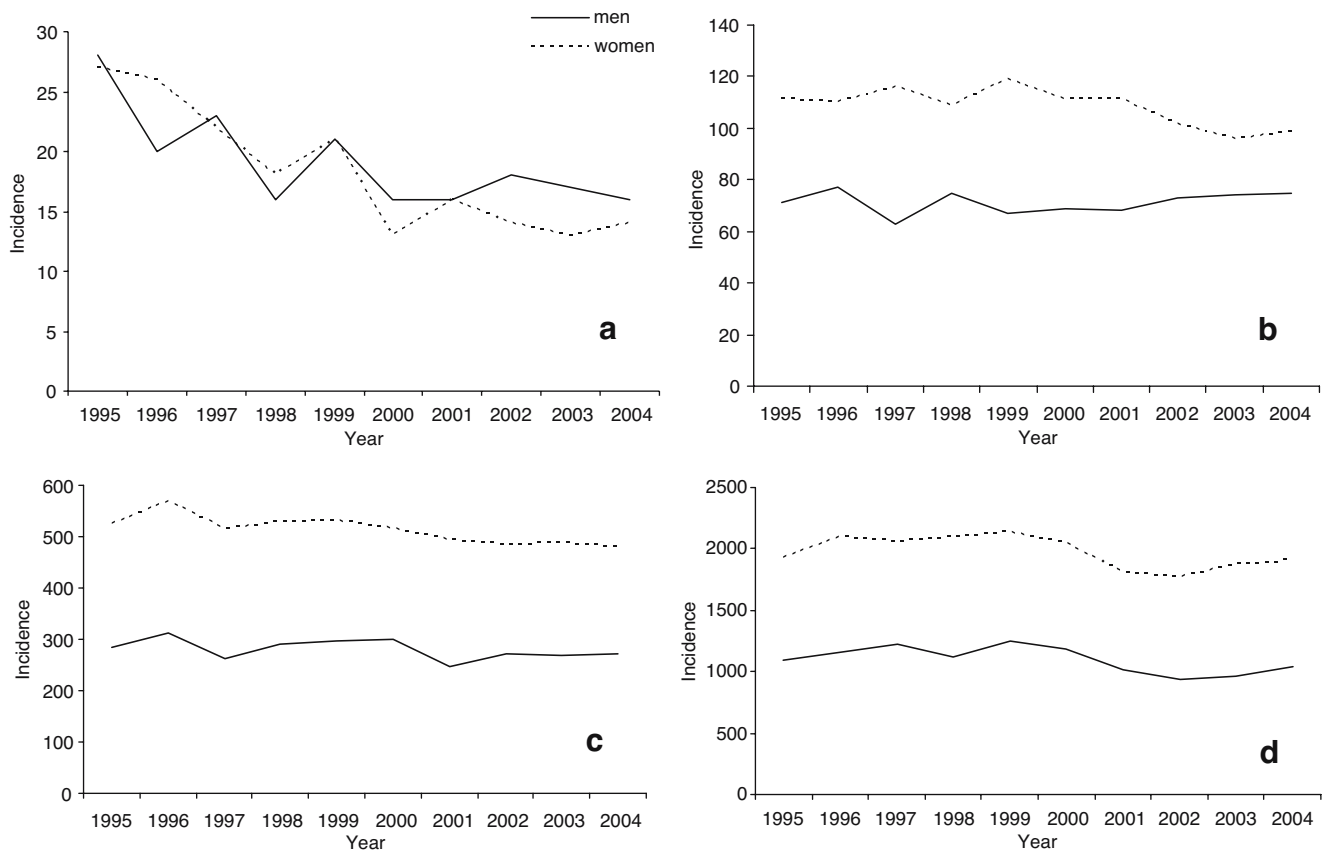


Fig. 2 Age-specific hip fracture rates in Hong Kong per 100,000 population from 1995–2004: **a** Age 50–59 years; **b** Age 60–69 years; **c** Age 70–79 years; **d** 80 years and above

the 2004 incidence rates are lower than previous years in this cohort.

We compared these data with published data in Hong Kong which were likely drawn from hospital records. A previous report on hip fracture incidence rates in Hong Kong gives data from 1966 to 1991 [5], which combined with the present data (1995–2004) demonstrate that hip fracture rates rose rapidly in Hong Kong up to 1985 in men,

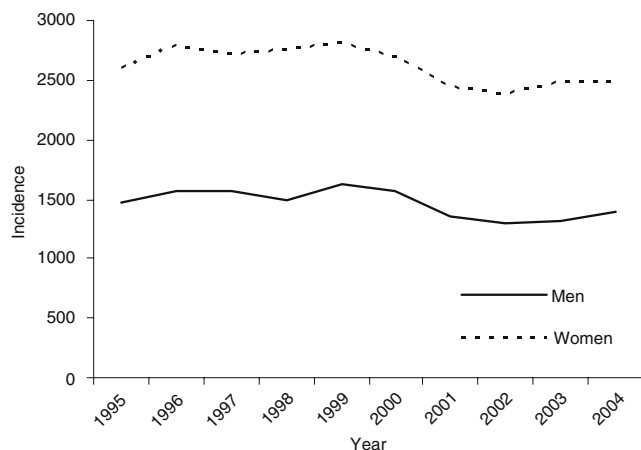


Fig. 3 Gender-specific incidence of hip fractures in Hong Kong from 1995 to 2004

and up to 1996 in women (Fig. 4). In women, there was an increase in fracture incidence until 1996, and thereafter the incidence declined. The incidence of hip fracture in men began to plateau after 1985 and decrease after the year 2000 (Fig. 4).

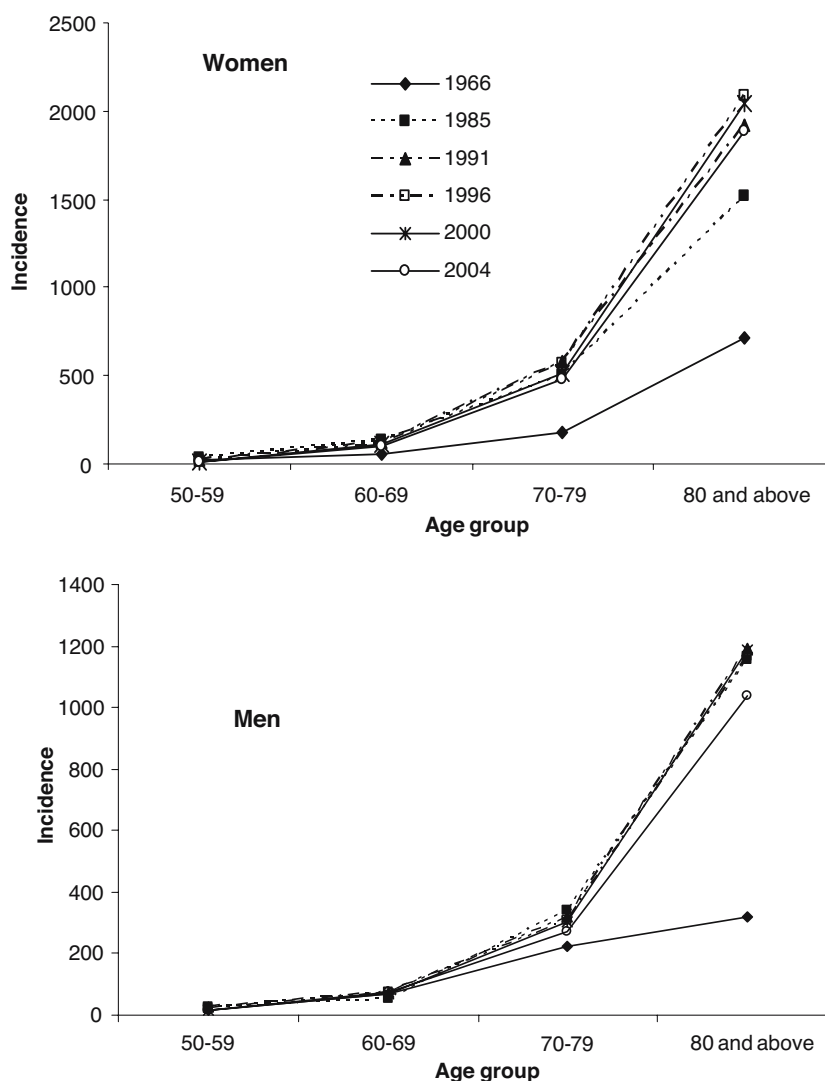
Discussion

Consistent with trends in western industrialised countries [7–9], during the past 10 years in Hong Kong there has been a decline in fracture rates in men and women aged 50 years and above. The reasons for this are unclear but there are various possibilities.

Firstly, there has been improved availability of medical intervention to prevent osteoporosis. Bisphosphonates were made available to the general public in 1995, and to all hospitals by the Hong Kong Hospital Authority two years later. Unfortunately, there is no good information on the use of anti-osteoporosis agents to determine the magnitude of their impact on fracture reduction in Hong Kong.

A second possibility is that since 1994 there has been increased medical attention to the menopause and HRT as well as increased media attention. A study carried out by

Fig. 4 Compilation of published information on gender-specific incidence of hip fractures in Hong Kong from 1966 to 2004



Tang et al. [10] in the late 1990s shows that before 1994, the use of HRT in Hong Kong women was estimated to be around 2–3% of menopausal women. The study also revealed that there was lack of knowledge amongst the general public regarding the menopause and its health consequences [10]. Since then, public health activities on promotion of women's health were launched and guidelines have been issued on the prescription of HRT for Asian women as there is evidence that menopausal symptoms may vary considerably when comparing Asian women with their western counterparts [11]. These actions may have helped to increase the health awareness of postmenopausal women and the usage of HRT in Hong Kong.

Thirdly, the decrease in incidence of hip fractures over the 10-year period of study may also be a result of increased awareness of osteoporosis, resulting in changes in diet and lifestyle, including higher levels of dietary calcium intake and increased physical activity, as the

population (in particular the younger age group) becomes more health conscious. Previous studies have documented that a low dietary calcium intake is a unique feature of the Asian diet [5].

Cohort effects are also possible. For example, patients 50 years and over during the mid-1990s may have been more economically disadvantaged in their earlier years and suffered from poor diet and general medical care, which may have predisposed to osteoporosis [WHO]. A secular change in body weight and height, which are major determinants of bone mineral density, could also contribute to the observed change in hip fracture incidence.

Another fifth possible reason for the decline or stabilisation in hip fracture incidence in the last decade could be a result of better community awareness in the prevention of falls. Increase in hip fracture from 1996 to 1990 is associated with urbanisation of Hong Kong and reduction in weight-bearing activity of the people. However since the

establishment of the Hospital Authority in 1990 health promotion and awareness has become more structured. For example the Community Geriatric Assessment Team (CGAT) was also established in 1990. This team enhances the interface between medical and social services through an outreach service for elderly people living in residential care settings by providing comprehensive multi-disciplinary assessment and management. Rehabilitation programmes and training of staff in institutions are also provided for continuation of care in the community [12]. Fall prevention is one of the major focus of these programmes and it is likely that reduction in falls would contribute significantly to the decline in hip fracture incidence.

Finally, the possible effect of an earlier age of menarche could account for a decline in osteoporotic fracture. As previous research shows, the probability of developing osteoporosis and sustaining a fracture is dependent on two major factors: peak bone mass achieved as a young adult and the rate of bone loss over succeeding years [13]. It has been suggested that the younger the age of menarche, the greater the peak bone mass which is protective against osteoporosis. A study conducted in young females also confirmed that the late onset of menarche beyond the age of 14 years was associated with a 2.2-fold increased risk of low BMD at the hip [14]. With modern dietary habits weight gain in adolescence may be greater than was the case in previous generations resulting in a younger age of menarche [15], both factors contributing to protection against osteoporosis. However, as the data given in this paper relate only to a ten-year period, any changes in menarche are unlikely to have made a significant impact.

There are some limitations to this study. The data used to calculate incidence figures for the different age groups are obtained from the Hospital Authority CDAS, which represents only 94% of the Hong Kong population. Capture of information by the CDAS system is based upon the diagnosis of the patient, and there may be incomplete entry of information on the early years of introduction of the system. However, it is believed that this is not a major problem, as if this were the case, a rising trend rather than a stabilising of hip fracture rates would be seen. In this present report, data from a previous epidemiological study in Hong Kong [5] have been included. The data collection methodology of this earlier study is unclear and since they are collected prior to less robust data collection may have occurred. However, an analysis of the long-term trend in Hong Kong shows a rapid increase in hip-fracture incidence, followed by a levelling off and in recent years a decline. This pattern emulates the pattern observed in other developed countries in Europe and Australia.

Urbanisation within a newly developing economy and the consequences on the urban population with regard to dietary habits and a more sedentary lifestyle appear to be

associated with the initial rapidly rising fracture trends. During the 1960s to the 1990s, similar changes in socioeconomic development occurred in Hong Kong and Singapore. Differences in hip fracture rates between Hong Kong and Singapore and other slower developing Asian countries may partly reflect time trends in urbanization and life expectancy [6]. The pattern seen in Hong Kong and Singapore over the past 40 years may well apply to other developing Asian countries and give rise to public health care issues.

In summary, this paper shows that in Hong Kong between 1995 and 2004, there has been a stabilization or even slight decline in the age-specific incidence of hip fracture with the most significant decrease observed in the 50–59 age group. The causes are likely to be multifactorial, some of which are postulated. If the age-specific incidence of hip fracture continues to decrease at the average rate observed between 1994 and 2004, the epidemic that has been predicted in previous forecasts [3, 4] is unlikely to occur in Hong Kong, although absolute numbers of hip fractures may increase consistent with an ageing population.

Future work will focus on the impact that preventive measures are having on fracture incidence and whether the downward trend in incidence is likely to be continued. Epidemiological studies will need to be carried out in other Asian countries to help predict the impact on their own public health services.

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