

India

Overview

As the second most populous country in the world, India is home to a very large population of osteoporosis patients. Although rather late off the block in terms of economic reforms and development, a steady increase in life expectancy to 66 years is rapidly leading to a very large ageing population, which is at risk of osteoporosis. Serious attention to osteoporosis in India started only a little over a decade ago- the first DXA machine was installed in 1997. Recent years have witnessed a flurry of activity in this area, which, however, is yet to translate into any discernible changes in government policy or recommendations.

The exact hip fracture incidence remains a challenge to investigators, but data from expatriate Indians, places their incidence somewhat lower than white Caucasians and Chinese, and higher than Malays. Lack of hip fracture data is the biggest impediment to influencing government policy (vertebral fracture data is expected soon). A series of studies from across the country have established vitamin D deficiency as a key factor influencing the bone health of Indians and suggest that supplementation may be required to achieve optimal vitamin D levels in urban Indians. BMD normograms are in the final stages of development; available data shows lower bone density in Indians as compared to Western Caucasians. Diagnostic facilities -DXA scanners- although steadily increasing in numbers, remain confined to urban areas. Most drugs used in treatment of osteoporosis are available in generic and branded formulations.

The Indian Society of Bone and Mineral Research (ISBMR) runs structured programs to enhance awareness and set standards of care for health professionals, which have had a significant impact on osteoporosis care in India. There has been substantial progress in public awareness in urban areas,

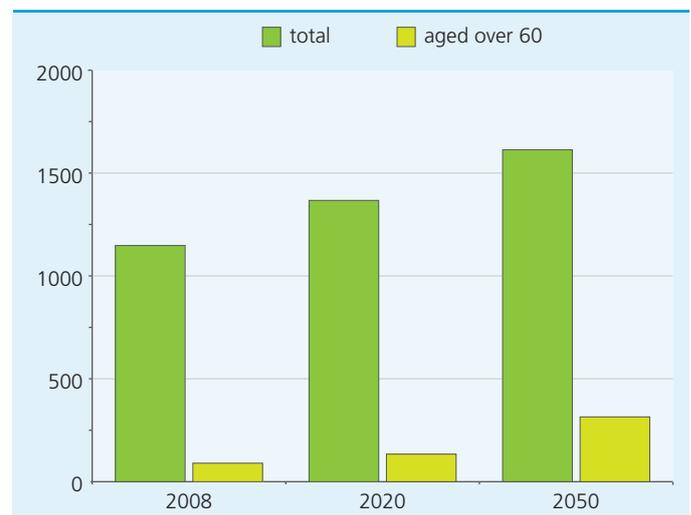
thanks largely to media interest and individual efforts of opinion leaders.

A two pronged approach is required to tackle this growing problem in India. One, a public health approach which emphasizes nutrition, exercise and sunlight exposure beginning in childhood, so as to achieve a better peak bone mass; and a clinic based approach which allows greater accessibility and affordability of DXA scanning as well as widespread use of appropriate pharmacologic therapy through inclusion in government programs or reimbursement policies.

Key findings

The population of India in the year 2008 was 1148 million¹. It is expected to increase to 1214 million by 2010; of this 7.5%, i.e. 91 million will be adults over 60 years of age. The population will increase to 1367 million by 2020 and 1613 million by 2050 (figure 1); of which 9.8 % (134 million) and 19.6 % (315 million) respectively will be adults over 60 years². These staggering numbers give some idea of the population at risk for osteoporosis in India in the years to come. In 2003 a highly conservative estimate by a group of experts suggested that 26 million Indians suffer from osteoporosis, and this number is expected to reach 36 million by 2013³.

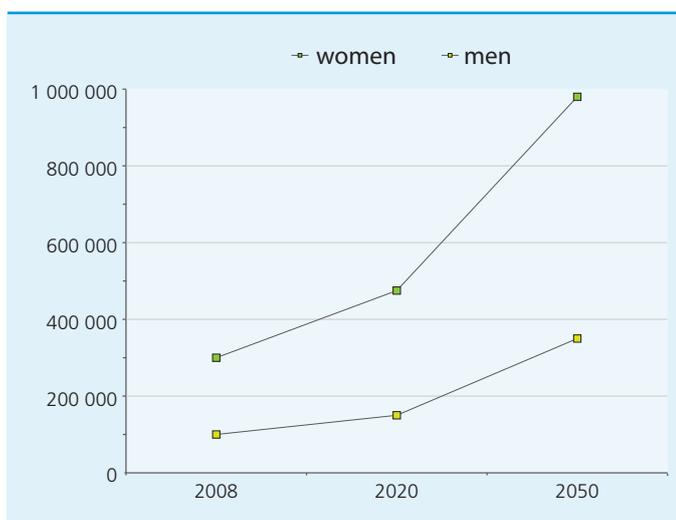
Figure 1 Population prediction for India until 2050



Although community based epidemiological data is lacking, hospital based studies suggest that hip fractures are common in India. Data on 1393 patients with hip fractures from 3 large Delhi hospitals indicated that hip fracture was common in both sexes with an average age of fracture 60-70 years⁴. It is likely that both the earlier peak age of fracture and male/female ratio in earlier reports may be misleading. As the population is living longer, the average age of fracture is also increasing, i.e, the so called earlier age at fractures could be just a reflection of poor longevity. The traditional belief that men are more commonly affected in India could be related to men seeking and getting better medical attention. This is brought out in the recent study on hip fractures in Delhi where 30% of hip fractures occurred between 60-69 years, 31% between 70-79 years, 9% between 80-89 years, and 4% over 90 years of age. The male/female ratio was 43:57. In this study the risk factors which had positive correlation with hip fracture were caffeine intake and decreased agility⁵.

A 2001 study on expatriate Indians in Singapore showed that the incidence of hip fracture was higher in women than in men; and the Indian population had higher incidence of hip fractures i.e. 361 women and 128 men per 100 000 population as compared to Malays but less than the Chinese population. The peak age of occurrence of fractures was over 70 years in all these populations⁶. If one were to extrapolate these numbers for the current Indian population as a whole, the number of hip fractures every year would be more than 440 000, with a female:male ratio of about 3:1. Following the same criterion the projections are more than 600 000 in 2020 and more than 1 million in 2050 (*figure 2*).

Figure 2 Estimated number of hip fractures projected for 2020 and 2050



A recently completed multicentre study by the Indian Council for Medical Research confirms data from smaller, single centre studies, which showed that In-

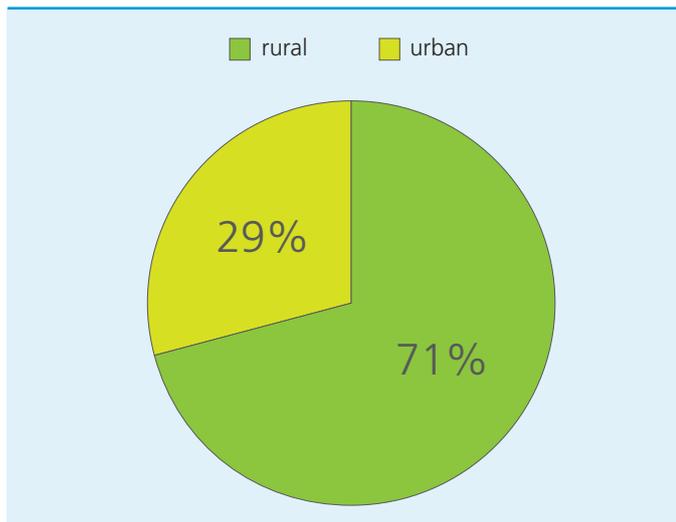
dians have lower BMD than their North American counterparts. The reason for the difference could be genetic, smaller skeletal size and most importantly, nutritional. A recent study on risk factors for low bone mass in Indians suggested lower education (defined less than class 12), duration of menopause greater than 5 years, menarche age (after 14 years), menopause age (before 45 years), parity more than 3, could be significantly correlated to low bone mass⁷. Whether this lower BMD translates into increased fracture risk is being investigated currently.

A survey carried out by the ISBMR among orthopaedic surgeons across the country, revealed that in government hospitals about 80-85% hip fractures are surgically treated whereas in private hospitals almost 100% receive surgical treatment. Direct cost for surgical treatment to the patient in government hospitals is approximately only 150 USD (the cost for the prosthesis), whereas in private hospitals the direct cost for surgical treatment is about 2500-3000 USD. There are no realistic estimates of indirect costs and burden to individuals, family or society. Costs of hospitalization are reimbursed to those who have private or government insurance, but they constitute a minority of the population.

Table 1 Hip fracture treatment - public/private hospital comparison

	% surgically treated	Direct hospital costs (USD)
public	80-85	150
private	100	2500-3000

There are approximately 250 DXA machines available in the country (about 0.2 DXA machines per million), but the number is growing rapidly. While a large proportion of DXA machines are available in the metropolitan areas, there is an increasing spread to middle sized towns all over the country, but only 29% of the Indian population is located in cities (*figure 3*). The number of ultrasound machines is several fold higher. The average cost for a DXA scan is 50-60 USD (average income per capita per month 205 USD) and for an ultrasound is 20 USD. There is no waiting for these tests, but issues of poor standardization, inaccurate technique and variations in reporting need to be addressed systematically on a national scale. Generally these are out patient procedures and do not get reimbursed by any government or private insurance policy. Vitamin D deficiency is widespread in India, despite abundant sunshine. This is due to factors such as skin pigmentation, clothing habits and absence of vitamin D fortification. A recent IOF report on the global status of Vitamin D nutrition highlights South Asia (especially India) as one of the most deficient regions⁸. Calcium intakes in India are also far below western recommendations⁹.

Figure 3 Repartition of the Indian population

Numerous varieties of calcium supplements are available over the counter: Calcium carbonate is the most popular salt. Citrate and citrate maleate are also commonly used. All calcium preparations contain some amount of vitamin D - between 200-400 IU. Vitamin D preparations like cholecalciferol (60 000 units/sachet) are also available separately and are widely used nowadays. The availability of fortified food is very limited. Recently certain types of dairy products as well as biscuits fortified with vitamin D or calcium have appeared in the market.

Virtually all approved drug therapies are available, as follows: Bisphosphonates (alendronate, risedronate, ibandronate (oral and IV), zoledronic acid), raloxifene, parathyroid hormone, HRT, calcitonin and strontium ranelate. These are available on prescription in branded and/or generic forms. There is also widespread use of unproven treatments like vitamin D analogs.

Although the overall level of awareness regarding osteoporosis is still below optimum, a series of education programs undertaken by ISBMR over the last few years is helping to change the scenario. The level of awareness among specialists - endocrinologists, rheumatologists is high. Considerable progress has been made in the level of awareness amongst gynaecologists and internists. However, most patients visit orthopaedic specialists for their bone related problems, hence the ISBMR launched an orthopaedic initiative last year, and a far greater number of orthopaedic surgeons, especially key opinion leaders, are now actively involved in spreading the message. Among allied health professionals, greater interest and participation is evident on the part of nutritionists, but

more effort is required for training nurses and physiotherapists. This is not an easy task as there are no national or health professional training programs in this area that are supported by the government.

The Government of India does not recognize osteoporosis as a major health problem. However, the ISBMR and some other societies like Arthritis Foundation of India are involved in conducting public programs for the prevention of osteoporosis. The ISBMR executive has regularly participated in programs on television and radio and has provided write ups in leading magazines and newspapers. Two monographs for the public – one on nutrition and the other on exercise have been recently bought out by the ISBMR, and a Women Leaders' Roundtable has also been organized. An IOF supported countrywide quiz organized for medical students in 2005 was a resounding success.

The Endocrine Society of India has issued guidelines on osteoporosis management. Active corporate partners like: Eli Lilly, GSK, Sanofi-Aventis, Ranbaxy, Eris Lifesciences and several others have played a major role in advertising, organizing public lectures/CMEs and increasing patient awareness.

Priority areas that require attention are as follows

- *Research*: establishing hip fracture incidence; using most recent data to generate India specific BMD standards; completing the study on vertebral fracture prevalence and BMD relationship in Indians; and developing pragmatic, effective strategies to overcome vitamin D insufficiency.
- *Physician education*: greater impetus to the orthopaedic initiative; better use of the web to disseminate information; more structured government supported programs to provide education on a national scale; more information about osteoporosis to be included in undergraduate medical curriculum.
- *Public awareness*: government agencies/ministry of health to take up bone health program as a priority; initiate a media campaign to spread awareness about lifestyle issues across the country; implement strategies to correct vitamin D nutrition, including fortification of milk and food.

Table 2 Diagnostic tools and cost

total DXA machines	DXA machine / 10 000	cost of DXA scan (USD)	cost of US (USD)	income per capita per month (USD)
250	0.002	50-60	20	205

References

1. U.S. Census Bureau, International Data Base
2. World Population Prospects: The 2008 Revision Population Database. United Nations Population Division
3. Action Plan Osteoporosis: Consensus Statement of an Expert Group, Osteoporosis Society of India, New Delhi, 2003
4. Sankaran B. Clinical studies: Incidence of fracture neck of femur and intertrochanteric fractures in three Delhi hospitals. Sankaran B, editor. Osteoporosis. New Delhi: South East Asia Regional Office, World Health Organisation; 2000; pp 9-18
5. Jha R, Mithal A, Brown EM. Pilot case control investigation of risk factors for hip fractures in the urban Indian population. 2nd Joint Meeting of the European Calcified Tissue Society and the International Bone and Mineral Society, Geneva; 2005
6. Koh L, Saw SM, Lee JM, Leong KH, Lee J. Hip fracture incidence rates in Singapore 1991-1998. *Osteoporos Int*, 2001;12:311-318
7. Keramat A, Patwardhan B, Larjani B, et al. The assessment of osteoporosis risk factors in Iranian women compared with Indian women. *BMC Musculoskeletal Disorders*, 2008; 9:28-32
8. Mithal A, Wahl DA, Bonjour J-P, et al. Global vitamin D status and determinants of hypovitaminosis D. *Osteoporos Int*, 2009, (Epub ahead of print)
9. Bhatia V. Dietary calcium intake- a critical reappraisal. *Indian J Med Res*, 2008; 127: 269-273
9. Bathia V. Dietary Calcium Intake - a critical appraisal, *Indian J Med Res*, 2008; 127: 269-273



Projections suggest that the number of people with osteoporosis in India will be more than 36 million by the year 2013.