

Actuality of Studying the Epidemiology of Osteoporosis and Bone Metabolism at the Regional Level

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ABSTRACT

We present the review of current literature on epidemiology and diagnostic challenges of osteoporosis in Russia and other countries. Abnormalities of peak bone mass formation are one of the risk factors of osteoporotic fractures. This review points out the importance of osteoporosis patient database creation, as well as reference database of mineral bone density on the regional level.

Keywords: osteoporosis, epidemiology, bone mineral density.

Osteoporosis it's a chronic systemic and progressive metabolic bone disease or clinical symptom at the other diseases, which is characterized by a decrease in bone density, violation of bone microarchitecture and increase of bone fragility due to imbalance in bone metabolism with predominance of destruction process over the formation process, decreasing bone strength and increasing risk of fractures [18].

THE ACTUALITY OF THE RESEARCH

Osteoporosis in Russia and in the world is a very prevalent disease. Every three woman and four men over 50 years old suffer from osteoporosis. Social significance of osteoporosis is determined by its consequences - bone fractures, which increase disability, mortality and large financial costs. Among urban population of Russia in 24% of woman and 13% of men aged 50 years and older at least one osteoporosis fracture is indicated [8].

Hip fractures have the most severe social and medical consequences. As shown by epidemiological research, the hip fractures among the Russian population in different age groups is on average 174.78 per 100 000 population (174.78 males and 275.92 for women), the frequency of the distal forearm fractures - 426.2 (201.1 in men and 563.8 for women) [1]. Frequency of osteoporotic fracture increases with age, and the frequency of hip fractures is growing exponentially [8].

In the USA hip fracture is more than 432 000 hospitalizations, 2.5 million visits to doctor per year. Cost of treatment of hip fracture in 2005 year was estimated in 17 milliards USD. Hip fracture is 14% of all fractures, arising in result of falling and 72% of all costs allocated to fractures treatment. According to opinion of American doctors due to the aging population the

number of hip fractures and associated with osteoporosis fractures could be doubled or tripled by 2040 year [19].

Cost of one year hip fracture treatment with rehabilitation in Belgium is 15000 EUR, in Britain 12000 GBP, in Canada 26.5 CAD. Cost of only hospital patient treatment with hip fractures in 2000 is 1 166 765 RUB per year [8].

According to the Department of Health of the Government of Moscow patient life duration with 40% risk of osteoporotic fracture is equal to patient life duration with cardiovascular disease [9].

In the regions of Russian Federation, particularly in Saratov region, Saratov city, according to the research [10], osteoporosis disease was increased per year. In 2006 with osteoporosis 255 people were revealed, in 2007 the number of patients with osteoporosis increased by 138.4% (353 patients). Further in 2008 the number of patients increases by 165.8% (423 patients). Hip fracture dynamic in Saratov region have undulant form, in 2007 compared with 2006 (4315 patient) number of patient with forearm fracture was decrease by 44% (2849 patient). In 2008 forearm fracture was increase by 4.3% in compared with 2006 (2907 patient).

In four Russian cities (Bryansk, Vladimir, Pervouralsk and Yaroslavl), who was participated in multicenter epidemiological hip fracture research [1] (including pertrochanteric and subtrochanteric fractures) compared with previous research is noted an hip fracture increase by 2.5 times.

According to A.N. Kommisarov and G.A. Pal'shin [11] research in Republic of Sakha (Yakutia) during 1995-2010 for 15 year research, hip fracture increases in 4.8 times. An increase of frequency of fractures with age was revealed. We marked increase rates of woman in age group over 65 and men over 75 years. Morbidity is increasing amid growing proportion of the number of older persons in the population with simultaneous reducing of population total number.

Russia's territory is located mostly to north of 55 parallel of north latitude, which is a significant risk factor in the population of vitamin D deficiency due to lack of sun exposure in the winter months.

Russia's population consumes not enough calcium from food, as demonstrated by various research groups. 10-15 years old children on the average consume less than a glass of milk or milk product a day [2]. In Moscow population only 6% boys have normal calcium level; there were no girls with normal level of calcium. Calcium level affected to bone mineral density [6]. Significant decrease of calcium consumption was noted among student [17], woman-doctors in

reproductive age [4] and postmenopausal woman [14]. Lowest level of calcium was in the days of the Orthodox Church fasting.

The Institute of Nutrition of Russian Academy of Medical Sciences analyzed the nutrition of Russia population (more than 9000 people) in different age groups during the 1994-2003. The lowest level of calcium consumption has been revealed in men and women over 55 years, and also in groups of 18-30 years [7].

Yakutsk is located on the 62 parallel of north latitude, where the winter duration reaches up to 7 months in the year, with short light day. Such climatic features do not contribute enough insolation and production of vitamin D that have a negative effect to the assimilation of consumed calcium [11]. Middle level of vitamin D in children and teenagers in Yakutia is 14 ng/ml. In winter 60% healthy children have vitamin D deficit, in summer – 10%. In 32.5% healthy children the secondary hyperparathyroidism was detected [3], which corresponds to the rachitis disease prevalence among young Russia children from 54 to 66%.

In Russia in 2010 the social program called “Osteoscreening Russia” started; the main premise for its start was a discrepancy of official statistics on the prevalence of osteoporosis and the results of epidemiological research. Risk factors for osteoporosis were studied, using a questionnaire; screening of bone mineral density was done. The analysis showed that 20% of the researched people had osteoporosis and 28% - osteopenia in forearm. The decreased bone density for 1 standard deviation increases the risk of vertebral fracture for 1.7 times, hip fracture for 1.8 times [20]. It was also found that among the population in different regions of Russia in 50 years and older have 3 and more risk factors of osteoporotic fracture. Furthermore, it was found that the majority of the surveyed consumed less than half of the required daily by age of calcium with food that needs diet correction or calcium prescription in the form of pharmacological supplements [12].

According to recommendation of Russia Association of Osteoporosis (2009) the standard method for bone density research is a dual energy x-ray absorptiometry (DXA) [16].

In Russian Federation there are 167 densitometers. The device was unevenly distributed in country: Half of devices (52%) were installed in Moscow and others – in central hospitals of region centers. Even in Moscow region only 63% of the doctors are able to guide the patients for densitometry [4]. In the Cities of Siberia and Far East are working only 16 devices. Equipment in Moscow densitometers is 8.6 in other Russia regions – 0.6 per 1 million of population [12].



In modern clinical practice the bone mineral density is compared with reference database which was installed by densitometer manufacturer (USA). Most acceptable method of the bone mineral density measurement is use of the T- and Z- parameters [5].

Use of U.S. database standards in other countries can be reason for distorting data of the epidemiology of osteoporosis (According to S.S. Rodionova and A.V. Krivova) [13].

According to Y.V. Khrapova results of research in 2007 [15] variability of mineral bone density middle value in different age and gender population groups of Novosibirsk, Moscow, St. Petersburg and white population of USA was revealed.

Thus, today in Russia is not enough objective data on the true prevalence of osteoporosis required for proper and thorough planning and organization of medical care.

There is a need to create a reference database of patients with osteoporosis at the regional level. Studying bone mineral density among the population of Republic of Sakha (Yakutia) by comparing it with standard values of the population of white USA citizens (Lunar database) can identify groups of risk and to develop a regional program for the prevention of osteoporosis and osteoporotic fractures.

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