

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Medical And Social Aspects Of Low-Energy Fractures Among Residents Of The Kabardino-Balkar Republic.

Rina Muhamedovna Aramisova<sup>1\*</sup>, Irina Salichovna Jetisheva<sup>1</sup>,  
Marina Tulevna Thazaplizheva<sup>2</sup>, Anzor Olegovich Balkarov<sup>3</sup>,  
Ibrahim Vladimirovich Kulaev<sup>4</sup>, Fatima Rashidovna Batyrbekova<sup>5</sup>,  
Larisa Vladimirovna Kardanova<sup>2</sup>.

<sup>1</sup>Department of Hospital Therapy of the Medical Faculty, Federal State Budgetary Educational Institution of Higher Education «Kabardino-Balkarian State University named after H.M. Berbekov».

<sup>2</sup>Candidate of Medical Sciences, Associate Professor, Head of the Department of Therapeutic Dentistry of the Medical Faculty, Federal State Budgetary Educational Institution of Higher Education «Kabardino-Balkarian State University named after H.M. Berbekov».

<sup>3</sup>Candidate of Medical Sciences, acting. Head of the Department of Orthopedic Dentistry of the Medical Faculty, Federal State Budgetary Educational Institution of Higher Education «Kabardino-Balkarian State University named after H.M. Berbekov».

<sup>4</sup>Candidate of Medical Sciences, Acting Head of the Department of Pediatric Dentistry of the Medical Faculty, Federal State Budgetary Educational Institution of Higher Education «Kabardino-Balkarian State University named after H.M. Berbekov».

<sup>5</sup>Candidate of Medical Sciences, associate professor of the Department of Surgical Dentistry and Maxillofacial Surgery of the Medical Faculty, Federal State Budgetary Educational Institution of Higher Education «Kabardino-Balkarian State University named after H.M. Berbekov».

### ABSTRACT

Osteoporosis is a serious problem for the Russian health care in connection with the trend of aging population and high prevalence of osteoporotic fractures among the elderly and senile age. The aim of the article was to study regional peculiarities of medico-social characteristic of patients with fragility fractures. The basis of the research was the traumatological station and the trauma center of State Budgetary Healthcare Institution (SBHI) "Republican clinical hospital". A retrospective analysis of ambulatory charts and histories of patients seeking medical care in 2016 was conducted to study the incidence of fractures. Authors studied the gender and age characteristics of the patients, the place of residence, the comorbid conditions and aid. The results of the study showed high incidence of fragility fractures among residents of the Republic. Analysis of the distribution of low-energy fractures according to age groups revealed the largest share of older persons and old age. Osteoporotic fractures of the femur are often observed among women of perimenopausal period. The analysis of comorbid conditions revealed a high proportion of cardiovascular diseases and their complications

**Keywords:** osteoporosis, incidence, low energy fractures

*\*Corresponding author*

## INTRODUCTION

Osteoporosis is one of the most common diseases along with myocardial infarction, stroke, oncological diseases and sudden death. Osteoporosis takes the leading place in the structure of morbidity and mortality of the population. Osteoporosis proceeds without clinical manifestations for many years and in many cases is manifested by severe fractures of bones [1, 10]. The prevalence of osteoporosis among the population is very high. Therefore, experts of the International Osteoporosis Foundation compare it with the epidemic. Every third woman and every fifth man, aged 45-50 years, suffers from osteoporosis in the world. It is predicted that by 2020, 50% of women in menopause will have a fracture due to osteoporosis, including 25% of these women may have a fracture of the spine, and 15% of women may have a hip fracture. The risk of osteoporotic fractures in women over the age of 50 is comparable to the risk of breast cancer and cardiovascular diseases (30-40%) [1, 10].

Osteoporosis is a serious problem for Russian healthcare due to its high prevalence and severe consequences. It is believed that about 24% of the country's population is at increased risk for osteoporosis and fractures. Moreover, about 14 million patients already have clinical symptoms of osteoporosis, and 9 million patients have already experienced osteoporotic fractures.

According to statistical data, in Russia more than 100 thousand fractures of the proximal femur are recorded annually. 7 vertebral fractures occur among people over 50 every minute, after which a third of patients become disabled, and one in five dies within a year of injury. Mortality within the first year after a fracture of the femoral neck can reach 45-52%. The consequences of osteoporosis can reduce the expected life expectancy by 12-20%. [7, 8, 10].

The following problems in the treatment of complications of osteoporosis in the RF were identified: low level of surgical treatment of elderly patients with fractures of the proximal femur due to osteoporosis; Only 9% of patients with a fracture of the femoral neck return to the level of physical activity that they had before the fracture; absence of dispensary observation and system of measures for early detection of mineralization disturbances, as well as provision of medicines for treatment of OP [1, 9].

However, despite the importance of the problem of early diagnosis and adequate therapy of osteoporosis, this issue is still not given enough attention. All patients with osteoporotic fractures are treated by traumatologists and orthopedists, whereas it is possible to prevent fractures by conducting prevention of osteoporosis. In this regard, there is an urgent need for general practitioners to deal with the problem of patients with osteoporosis as widely as possible [1, 5, 6].

The conducted researches in different cities and regions of Russia testify to differences in the frequency of low-energy fractures. Therefore, the conduct of regional studies is of importance.

**The purpose of the research** was to study the medical and social characteristics of patients with low-energy fractures, as well as to determine the incidence of fractures among residents of the Kabardino-Balkar Republic to develop a system of therapeutic and diagnostic and preventive measures, considering regional characteristics.

## MATERIAL AND METHODS

The study was conducted in 2 stages. The bases of the research are a traumatological station and a traumatological department of the State Clinical Hospital "Republican Clinical Hospital" of the Ministry of Health of the Kabardino-Balkar Republic. At the first stage, an analysis was made of the incidence of fractures among the population in attendance at the trauma clinic in Nalchik in 2016. The journals for recording traumatic injuries and outpatient maps of patients were studied. According to the modern age classification of WHO, the age from 60 to 74 years is recognized as elderly, from 75 to 89 years old age, and 90 years and older is the fifth age of longevity. Information on the population, sex and age distribution for the period studied is taken from the territorial body of the Federal State Statistics Service for the Kabardino-Balkar Republic.

Patients who were injured with minimal impact on the skeleton, or when falling from a height of their own height and below were isolated from the total number of patients with fractures of bones. The authors took into account both the total number of fractures and fractures with minimal trauma in men and women separately, and their number for each age group. Data processing for each patient was carried out according to a specially formulated questionnaire. The fracture registration card was filled in for all cases of fractures. The registration card for the fracture included passport data, the age of the patient at the time of injury, place of residence, date, location and level of injury. All injuries were confirmed radiologically.

Since the patients with fractures of the proximal femur (SWAP) entered the hospital immediately, bypassing the trauma station, in the second stage a complete study of the medical records of the patients hospitalized in the trauma department with various injuries was carried out. 143 case histories of patients on treatment in the traumatological department with low-energy fractures for the period from 01.01. 2016 to 30.12.2016 were selected for analysis.

Age, gender, women's menopause period, place of residence, localization and nature of injury, concomitant diseases were considered when analyzing the case histories. The authors studied the structure of medications taken for a long time in patients with comorbid conditions, since some drugs used in clinical practice for the treatment of comorbidities common among elderly and senile people can have a negative impact on the course of the post-traumatic period. Also, the authors evaluated the timely detection of risk factors for osteoporosis and the compliance of ongoing preventive measures with modern standards for the treatment of patients with osteoporotic fractures.

The information from the primary medical documentation was recorded in a specially developed "Traumatological Patient Data Card".

### THE RESULTS OF THE STUDY AND DISCUSSION

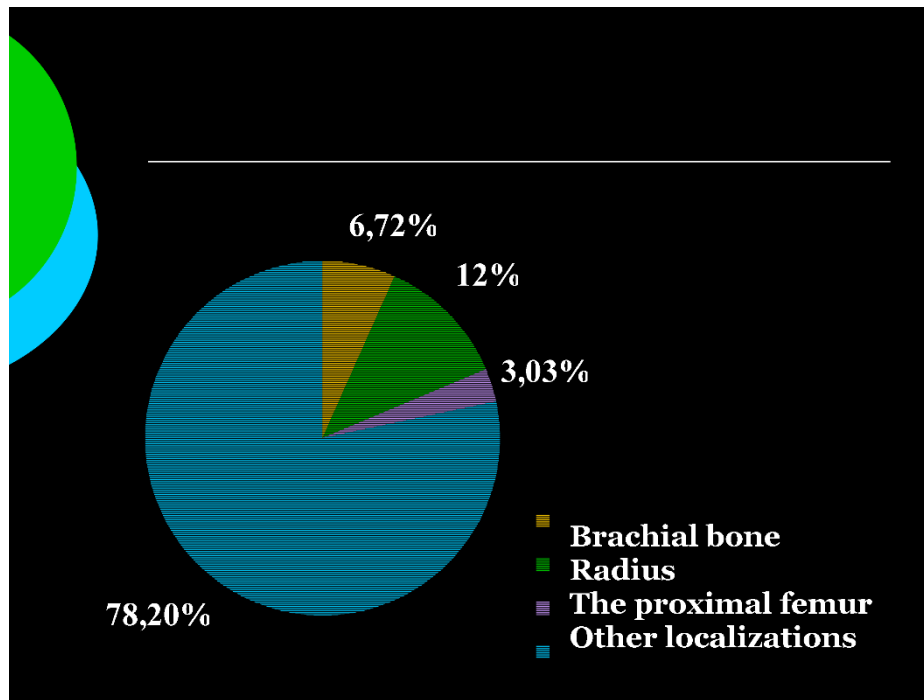
2 455 people turned to a trauma center because of fractures of various locations in 2016. The incidence of fractures in the general population was 315.8 per 100,000 (151 among men and 164 among women), which is slightly lower than the total for Russia (201 per 100,000 for men and 773 for 100,000 for women). The number of fractures of various localizations among persons aged 30 years and older was 758 (363 men, 395 women). The results of the analysis of the age distribution of patients with fractures are presented in Table 1.

**Table 1: Distribution of patients by age**

Age	Number of patients, %
30-35 yearsold	20,5%
36-45 yearsold	18,1%
46-55yearsold	19,7%
56-60 yearsold	13,7%
61-65 yearsold	12,4%
66-69 years	5,3
70 yearsandover	10,3%

As can be seen from the table, the greatest proportion among patients with fractures was a person of young age. A small proportion of elderly and senile patients is due to low level of treatment. Patients in this age group prefer home care and out-of-hospital medical care.

The structure of localization fractures is presented in Figure 1.



**Fig 1: Structure of fractures by localization**

Localization of bone fractures was as follows: fractures of small bones of the hand and foot (78.2%) were greatest, fracture of the distal radius of the radius (12.0%), fracture of the brachial bone was 6.72%, fracture of the proximal femur was 3.03%. Repeated fractures were noted in 6.5% of cases.

Osteoporosis, which develops during the postmenopause, belongs to the class of primary osteoporosis. Decreased secretion of sex hormones leads to a decrease in bone mineral density due to increased resorption processes [2, 12]. The results of this study showed that 70.1% (277) of women with low-energy fractures were in menopause.

35.7% were men and 64.3% were women (85.9% of women were in menopause) from 143 patients in the trauma department with low-energy fractures of various locations. In a number of Russian cities, epidemiological studies were conducted to study the frequency of osteoporotic fractures of the proximal femur, which showed a prevalence of 40% among men and 60% among women, i.e. the data obtained by authors are comparable with all-Russian data [1,4,5].

It should be noted that the population of the republic is characterized by a large proportion of out-of-hospital forms of treatment of fractures in elderly and senile individuals. Many patients with fractures do not apply for specialized trauma care, so the statistics on the number of fractures in elderly and senile people is not reliable. Therefore, we can assume that the true frequency of fracture of the proximal femur in the republic is much higher.

The available data of earlier studies in the country indicate that 33-40% of patients with a fracture of the proximal femur do not go to medical institutions throughout the Russian Federation [9,17]. It is assumed that the reason for this fact is the limited possibilities of surgical treatment in connection with the severity of the course of accompanying conditions in the elderly.

In the structure of patients with fractures of the proximal femur, the elderly (20.3%) and senile (46.2%) were the largest proportion. Analysis of low-energy fractures by their localization revealed the following pattern: 96.5% of patients had fractures of various parts of the femur, the rest had compression fractures of the vertebrae. Localization of femoral fractures was distributed as follows: femoral neck - 64.5%, intervertebral -13.8%, diaphysial -10.9%, overtone -5.8% and susceptible -5%.

Vertebral fractures from the total number of patients with low-energy fractures were found in 5 patients, in 8 thoracic-1, cervical-3, lumbar-1.

The study of the place of residence of patients revealed that the greatest number of patients are residents of urban areas (66.4%).

The results of the seasonal fracture study showed that 41.3% of fractures occur in the winter, 21.7% in the summer, 20.3% in the spring and 14% in the fall, which indicates the effect of weather conditions on the incidence of fractures.

The results of the study of comorbid conditions in patients with low-energy fractures revealed the presence of several diseases in one patient (Table 2).

**Table 2**

Concomitant pathologies	Number of patients	%
Arterial hypertension	76	53,1%
Chronic heart failure	13	9%
Diabetes	13	9%
Diseases of the gastrointestinal tract	8	5,6%
Bronchopulmonary diseases	7	4,9%
Kidney Diseases	4	2,8%
Rheumatic diseases	3	2%

The data of the table show that cardiovascular diseases accounted for the highest prevalence among comorbid conditions in patients with low-energy fractures (62.1%). It is believed that osteoporosis and cardiovascular diseases have close pathogenetic relationships. According to foreign publications, in patients who underwent an osteoporotic fracture of the femoral neck, 70% had a pathology of the cardiovascular system [2]. It should be emphasized that a number of authors refer to the loss of bone mineral density as a predictor of cardiovascular diseases, namely coronary artery lesions [13,14].

The wide use in the clinical practice of antihypertensive, antiischemic and cholesterol reducing drugs determines the need to know their effect on bone tissue exchange.

More recently, there is more evidence of the effect of beta-blockers, angiotensin-converting enzyme (ACE inhibitors), statins, thiazide diuretics on bone turnover and bone strength [21,24,25]. The structure of medications taken by patients with concomitant diseases is presented in Table 3.

**Table 3: Groups of drugs used by patients for concomitant conditions**

Medications	Number of patients, %
ACE inhibitors	87%
Calcium antagonists	76,5%
Beta-blockers	54,2%
Diuretics	16,3%
Proton Pump Inhibitors	34,2%

Data from the literature indicate that ACE inhibitors have an osteoprotective effect, suppressing the activity of angiotensin II, contribute to less resorption of osteoclasts of bone tissue, reducing losses of bone mineral density [15,16,18. 12]. Many studies have shown that blockade of  $\beta_2$ -adrenergic receptors in osteoblasts leads to an improvement in the structure of bone tissue [11, 20,22, 24,25].

A positive effect on bone density has also been shown for statins [12,17,19]. A number of clinical studies have confirmed the ability of statins to increase bone mass. The decrease in the incidence of fractures due to statin use has been shown in 2 large meta-analyses [13,16,23,26].

In addition, there are data from the literature, indicating a positive effect on the state of bone tissue drugs from other groups used to treat cardiovascular disease. This refers to quite often prescribed drugs in cardiology, like calcium antagonists, nitrates.

As the results of clinical studies have shown, loop diuretics, often used to treat chronic heart failure, reduce the level of calcium in the blood, inhibiting its reabsorption in the renal tubules. The risk of osteoporotic fractures with prolonged intake of loop diuretics is increasing especially in women in menopause.

Diseases of the gastrointestinal tract, including ulcerous lesions of the stomach and duodenum, gastropathies with the use of non-steroidal anti-inflammatory drugs with articular syndrome are quite common in elderly and senile people. Patients' treatment regimens for these conditions include proton pump inhibitors (PPI) in long courses, which can also lead to increased bone resorption [15, 16, 18].

Thus, knowledge about the additional effect on bone metabolism of drugs prescribed for diseases of the cardiovascular system will allow doctors to choose the optimal scheme for the treatment of arterial hypertension and lipid metabolism disorders, considering the state of bone tissue.

Important for the prevention of osteoporosis and subsequent complications are activities at the primary care level (general practitioners). In the out-patient polyclinic, in the context of clinical examination of the population, osteoporosis risk groups should be identified, especially among those over 50 years of age.

An analysis of the treatment of patients with low-energy fractures in the hospital showed the lack of necessary measures for the prevention of repeated fractures. Densitometry was not performed to determine the density of bone tissue in the skeletal areas most threatened by osteoporotic fractures. It is believed that densitometry for predicting the risk of bone fractures is as effective as determining blood pressure for predicting a stroke. In rare cases, preparations were given with long courses to improve the density of bone tissue for the prevention of repeated fractures. The volume of laboratory studies to exclude endocrine diseases accompanied by osteopathy was inadequate.

## CONCLUSIONS

1. The conducted research has revealed a high level of incidence of low-energy fractures among the inhabitants of the Kabardino-Balkarian republic.
2. The largest proportion of people with low-energy fractures were women aged 46-55 years. Strengthening of medical and diagnostic measures for the prevention of osteoporotic fractures at the level of primary health care is required.
3. Arterial hypertension and its complications are the most frequent comorbid conditions in patients with low-energy fractures, which should be taken into account when selecting a program of drug therapy in order to exclude the negative effect of drugs on bone metabolism.
4. The results of the study testify to the need for the introduction of preventive programs aimed at early diagnosis and treatment of osteoporosis, including Schools of Osteoporotic Patients with a view to increasing patient awareness.
5. Wide implementation of the set of recommendations by therapists and physicians of other medical specialties will make it possible to achieve significant progress in helping patients with low-energy fractures against osteoporosis.

## REFERENCES

- [1] Benevolensky L. I. Osteoporosis the problem of osteoporosis in modern medicine // Consiliummedicum. 2004, No. 6: No. 2.
- [2] Dedov I. I., Rozhinskaya L. J., Marova E. I. Primary and secondary osteoporosis: pathogenesis, diagnosis, principles of prevention and treatment. M.: 2002, 65
- [3] Ivanov S. N., Kocsis, A., Sannikova E. V. Experience of creation of service of secondary prevention of osteoporotic fractures in RNIITO them. R. R. Vreden. Farmateka. 2015.
- [4] Clinical practice guidelines for the prevention and management of patients with osteoporosis. Ed. 2-e additional. ed. by O. M. Lesnyak Russian Association on osteoporosis. Yaroslavl: Letter.

- [5] Kochish, A.Yu, Lesnyak O. M., Ivanov S. N. etc. the First experience of organizing in St. Petersburg the secondary prevention of recurrent osteoporotic fractures in the framework of the "Prometheus" of the Russian Association on osteoporosis. Farmateka. 2014.
- [6] Kochish, A.Yu., Ivanov S. N., Khrulev V. N. Commitment to patients with melanielynskey bone fractures to the diagnosis of systemic osteoporosis. Mater. scientific.-pract. Conf.: Actual problems of medicine and biology. SPb., 2010. P. 239-40.
- [7] Kochish, A.Yu., Lesnyak O. M. Prevention of re-fractures of the bones in patients with osteoporosis. In the book: Osteoporosis. Under the editorship of O. M. Lesnyak. M. : GEOTAR – Media.
- [8] Lesnyak O. M. the Modern model of medical care for osteoporosis, based on the secondary prevention of fractures. Effective pharmacotherapy: Rheumatology, traumatology and orthopedics. 2013.
- [9] Mikhailov, E. E., Benevolensky L. I. Epidemiology of osteoporosis and fractures. In the book: Guide on osteoporosis. Under the editorship of L. I. Benevolensky. M. : BINOM. Knowledge laboratory.
- [10] Bonnet N., Gadois C., McCloskey E., et.al. Protective effect of betablockers in postmenopausal women: influence on fractures, bone density, micro and macroarchitecture. Bone 2007; 40: 1209-1216.
- [11] Edwards C.J., Hart D.J., Spector TD. Oral statins and increased bone mineral density in postmenopausal women. Lancet 2000; 355: 221 8- 16 9.
- [12] Chan M.H., Mak T.W., Chiu R.W., et al. Simvastatin increases serum osteocalcin concentration in patients treated for hypercholesterolemia. J Clin Endocrinol Metab 2001; 86: 4556-9.
- [13] Grant F.D., Mandel S.J., Brown E.M., et al. Interrelationships between the renin-angiotensin-aldosterone and calcium homeostatic systems. J Clin Endocrinol Metab 1 992; 75: 988-992.
- [14] Hiruma H., Hiruma Y, Inoue F, et al. Deceleration by angiotensin II of the differentiation and bone formation of rat calvarial osteoblastic cells. J Endocrinol 1998; 1 56: 543-550.
- [15] Lynn H., Kwok T, Wong S.Y, et al. Angiotensin converting enzyme inhibitor use is associated with higher bone mineral density in elderly Chinese. Bone 2006;34(4).
- [16] Meisinger C., Heier M., Lang O., Doring A. Beta-blocker use and risk of fractures in men and women from the general population: the MONICA/KORA Ausburg study // Osteoporosint . 2007; 18 (9): 1189–1195.
- [17] Perez-Castrillon J.L., Justo I, et.al. Relationship between bone mineral density and angiotensin converting enzyme polymorphism in hypertensive postmenopausal women. AJH 2003; 1 6: 233-235.
- [18] Reid I. R., Gamble G. D., Grey A. B. et al. Beta-blockers use, BMD, and fractures in the study of osteoporotic fractures // J Bone Miner Res . 2005; 20: 613–618.
- [19] Rejnmark L, Vestergaard P Mosekilde L. Treatment with betablockers, ACE inhibitors, and calcium-channel blockers is associated with a reduced fracture risk: a nationwide case-control study. J Hypertens 2006; 24: 581-589.
- [20] Rejnmark L. Cardiovascular Drugs and Bone. Curr Drug Saf 2008; 3: 17 178-184. Rejnmark L, Vestergaard P., Mosekilde L. Statin but not non-statin lipid-lowering drugs decrease fracture risk: A nation-wide casecontrol study. Calcif Tissue Int 2006; 79: 27-36.
- [21] Schlienger R. G., Kraenzlin M. E., Jick S. S., Meier C. R. Use of beta blockers and risk of fractures // JAMA . 2004; 292: 1326–1332.
- [22] Sugiyama M., Kodama T, Konishi K., et al. Compactin and simvastatin, but not pravastatin, induce bone morphogenetic protein-2 in human osteosarcoma cells. BiochemBiophys Res Commun 2000; 271:688-92.
- [23] Toker A., Gulcan E., Toker S. et al. Nebivolol might be beneficial in osteoporosis treatment: a hypothesis // TJPR . 2009; 8 (2): 181–186.
- [24] Turker S., Karatosun V., Gunai I. Beta-blockers increase bone mineral density // ClinOrthop . 2006; 443: 73–74.
- [25] Weins M., Etmnan M., Gill S. S., Takkouche B. Effects of antihypertensive drug treatments on fractures outcomes: a metaanalysis of observational studies // Journal of international studies . 2006; 260: 350–362.