

# EVALUATION OF PHYSICAL DEVELOPMENT AND BONE MINERAL DENSITY IN CHILDREN WITH CHRONIC BRONCHITIS

Sharipova O.A.<sup>1</sup>, Mamatkulova F.H.<sup>2</sup>, Husenova F.A.<sup>3</sup>, Mamarizaev I.K.<sup>4</sup>  
(Republic of Uzbekistan)

Email: Sharipova535@scientifictext.ru

<sup>1</sup>Sharipova Oliya Askarovna - PhD, Associate professor,  
3 DEPARTMENT OF PEDIATRICS AND MEDICAL GENETICS;

<sup>2</sup>Mamatkulova Feruza Xamidovna – Assistant,  
DEPARTMENT OF PEDIATRICS № 1;

<sup>3</sup>Husenova Feruza Azgarovna – student;

<sup>4</sup>Mamarizaev Ibroxim Komiljonovich – student,  
PEDIATRIC FACULTET,

SAMARKAND MEDICAL INSTITUTE, SAMARKAND, REPUBLIC OF UZBEKISTAN

**Abstract:** the estimation of physical development, bone mineral density and the relationship between these parameters in patients with chronic bronchitis have been carried out. The study enrolled 84 children with chronic bronchitis aged 10 - 16 years. Of them, 37 (35.7%) - girls and 47 (64.3%) - boys. It was revealed that in children with chronic bronchitis there were significant adverse changes in the key somatometric indicators, bone mineral density and biochemical markers of bone formation, the extent of which was closely correlated from remoteness, severity of the disease, which necessitates the development of targeted interventions.

**Keywords:** chronic bronchitis, physical development, osteopenia.

## ОСОБЕННОСТИ ФИЗИЧЕСКОГО РАЗВИТИЯ И МИНЕРАЛЬНОЙ ПЛОТНОСТИ КОСТЕЙ У ДЕТЕЙ С ХРОНИЧЕСКИМ БРОНХИТОМ Шарипова О.А.<sup>1</sup>, Маматкулова Д.Х.<sup>2</sup>, Хусенова Ф.А.<sup>3</sup>, Мамаризаев И.К.<sup>4</sup> (Республика Узбекистан)

<sup>1</sup>Шарипова Олия Аскарровна – кандидат медицинских наук, доцент,  
кафедра 3-педиатрии и медицинской генетики;

<sup>2</sup>Маматкулова Феруза Хамидовна – ассистент,  
кафедры педиатрии №1;

<sup>3</sup>Хусенова Феруза Азгаровна – студент;

<sup>4</sup>Мамаризаев Иброхим Комилджонович – студент,  
педиатрический факультет,

Самаркандский медицинский институт, г. Самарканд, Республика Узбекистан

**Аннотация:** проведена оценка физического развития костной минеральной плотности и взаимосвязь между этими показателями у больных с хроническим бронхитом. В исследовании включено 84 ребенка с хроническим бронхитом в возрасте от 10 до 16 лет. Из них 37 (35,7%) - девочки и 47 (64,3%) - мальчики. Выявлено, что у детей с хроническим бронхитом, происходят существенные отрицательные изменения в главных соматометрических показателях минеральной плотности костной ткани и биохимических маркеров костного формирования, степень которых тесно коррелируют от давности, тяжести заболевания, что диктует необходимость разработки целенаправленных мероприятий.

**Ключевые слова:** хронический бронхит, физическое развитие, остеопения.

Epidemiological studies carried out in various countries of the world show a steady increase in the number of lower respiratory tract diseases, which have attracted attention due to a high prevalence, disability and mortality [4].

The delay of physical development often leads to difficulties in psychological and social adaptation, the consequences of which can persist even when they reach the normal physical development. The psychological effects of short stature have a negative impact on the social integration of children and adolescents and lead to the restriction of professional capacity [1; 2; 3; 5; 6].

**Objective:** To study the features of physical development, bone mineral density and the relationship between these parameters in patients with chronic bronchitis.

**Materials and methods.** A total of 84 (46 obstructive, 38 nonobstructive) children with chronic bronchitis at the age of 10 to 16 years were studied. Of them, 37 (35,7%) - girls and 47 (64.3%) - boys. According to duration of the disease, the patients were distributed as follows: 5-6 years old 32 (38%), 7 years old 14 (16,7%), 8 years old 13 (15,5%), 9 years old 12 (14,3%), 10 years old and more 13 (15,5%) children. By the degree of severity of the condition, the patients were divided as follows: moderately severe course of the disease was revealed in 48

(51,1%) children, severe - in 46 (48.9%). Indicators of physical development were evaluated by the absolute values of length, weight and chest circumference. Body mass index was calculated using the formula  $BMI = \text{weight} / \text{height}^2$ . The received data were compared for children's growth and development of the standards recommended by WHO (2007). Bone mineral density was measured by osteodensitometry on the unit «SONOST 3000», equipped with a children's program (South Korea). The results of ultrasound osteometry in chronic bronchitis patients were compared with those of the control group of healthy children ( $n = 42$ ). Measurement of the bone strength was carried out on the heel bone. The criterion of osteopenia was considered to be the decline in BMD from - 1 to -2,5 SD for Z- criterion, and SD decrease to more than -2,5 was classified as osteoporosis.

**Results of the research and their discussion.** Harmonious physical development was determined in 14,3% of patients. These patients were mainly with disease duration of 5 years, and whose, exacerbation of the disease was observed infrequently and had a mild course. Delayed physical development was revealed in 72 patients, accounting for 85,7% of the total number of examined patients, 32 of them (44.4%) - were girls and 40 (55,6%) - were boys. Individual analysis of anthropometric data showed: 61 (84,7%) patients had a delay of average growth in 69 (95,8%) loss of body weight. In 11 (15,3%) patients aged 15-16 years, body length was above average and significantly ( $P < 0,05$ ) different from the group of healthy peers. Differential analysis by age showed that the maximum frequency of FR disturbances in boys accounted for 12,13, 14 and 15 years old whose indicators were in -3SD zone ( $P < 0,001$ ), 16-year-olds were in -2SD zone - 3SD ( $P < 0,05$ ), and the most rare in the group of 10,11 years old - in 4 (10%) patients with  $P > 0,1$ . In patients of both genders with a delay of physical development a decrease in weight and growth index occurred, which was in -2SD - -3SD zone. This points to a significant underweight. When comparing the data of the physical development of children with severity and duration of chronic bronchitis, we noted a clear link between them. The more severe and prolonged the illness proceeded, the more often the children's physical development was delayed  $r = 0,50$ ;  $r = 0,39$  ( $P < 0,05$ ). When studying capillary blood oxygen saturation, we have found the oxygen reduction to  $80,2 \pm 4,2\%$  with chronic bronchitis, whereas in healthy children, this index was equal to  $98,5 \pm 1,5\%$ . Reduced bone mineral density (BMD) was diagnosed in 74 (88%) children with chronic bronchitis. The frequency of osteopenia was determined in 46 (62,2%) children, osteoporosis in 28 (37,8%) patients. It was revealed that bone mineral density (BMD) is closely related to the length ( $r = 0,80$ ), body weight ( $r = 0,88$ ), BMI ( $r = 0,65$ ).

Overall, our findings suggest a significant negative impact of chronic bronchitis on bone mineral density, the cause of which is likely associated with chronic hypoxemia, adversely affecting the harmonious development. Patients with osteoporosis differed with severe underlying disease, early onset of clinical symptoms, frequent exacerbations of chronic bronchopulmonary process, resistant hypoxemia and marked impairments of bronchial patency.

When studying the effect of disease duration on bone mineral density of the interrelation between them has been established. So when the disease duration is more than 9 years the majority of patients 26 (35,1%) had osteoporosis  $r = 0,45$  ( $P < 0,05$ ). In the study based on gender significant differences were not observed.

Thus, our findings suggest a significant negative impact of chronic bronchitis on bone mineral density, the cause of which is likely associated with chronic hypoxemia, adversely affecting the harmonious development. Patients with osteoporosis differed with severe underlying disease, early onset of clinical symptoms, frequent exacerbations of chronic bronchopulmonary process, resistant hypoxemia and marked impairments of bronchial patency.

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