In children with bronchial asthma due to lifestyles restrictions (elimination diet, reducing of the natural insolation) reduced of vitamin D sufficiency on the background of bronchi chronic allergic inflammation with negative effect on bone formation. This requires an additional calcium and vitamin D application in children with asthma. In order to monitor the state of calcium-phosphorus metabolism in children with medical and prophylactic use of vitamin D and calcium may use the study markers of bone metabolism (calcium, phosphorus, alkaline phosphatase, parathyroid hormone, osteocalcin, C-telopeptide of type 1 collagen, 25(OH)D). But it is necessary to clearly define the terms under which these laboratory markers are informative to assess the metabolic status of bone formation in children with bronchial asthma.

The aim: optimization the diagnosis of the calcium-phosphorus metabolism status and monitoring the effectiveness of vitamin D and calcium use in children with bronchial asthma.

Materials and methods

The study included two groups of 60 children aged 4 to 10 years old: 1) children with bronchial asthma; 2) children without bronchial asthma. The vitamin D and calcium dietary supplement used in that scheme: vitamin D3 2,000 IU per day for 4 weeks followed by maintenance therapy 1,000 IU per day for 8 weeks with a repeat of the course; calcium carbonate and calcium citrate in an amount of 1,000 mg of elemental calcium daily for 4 weeks followed by maintenance therapy with 500 mg of elemental calcium daily for 8 weeks with a repeat of the course. Monitoring of serum levels of total calcium, phosphorus, parathyroid hormone, osteocalcin, C-telopeptide of type 1 collagen, 25(OH)D, alkaline phosphatase activity was carried out after 4, 12 and 24 weeks of supplement. In order to monitor the state of calcium-phosphorus metabolism in children with medical and prophylactic use of vitamin D and calcium may use the study markers of bone metabolism (calcium, phosphorus, alkaline phosphatase, parathyroid hormone, osteocalcin, C-telopeptide of type 1 collagen, 25(OH)D). Statistical analysis of the results obtained corner Fisher criterion \( \varphi \) and relativity risk after 4, 12 and 24 weeks of supplement.
Results

The reduction of the quantity of children with bronchial asthma who have reached the serum minimum target content of total calcium, osteocalcin, parathyroid hormone, C-telopeptide of type 1 collagen, 25(OH)D, alkaline phosphatase activity were established. An examination of children with bronchial asthma, after 1 month from the start of vitamin D3 and calcium supplementation demonstrate the quantity of children who achieved of serum minimum target content of alkaline phosphatase activity (P<0,05), osteocalcin (P<0,05), C-telopeptide of type 1 collagen (P<0,05). After 3 months from the start of vitamin D3 and calcium supplementation marked increase of the quantity of children who achieved of serum minimum target content of all investigated markers – alkaline phosphatase activity (P<0,05), osteocalcin (P<0,05), total calcium (P<0,05), C-telopeptide of type 1 collagen (P<0,05), 25(OH)D (P<0,05). So the optimal time control metabolic characteristics of calcium phosphorus software osteogenesis in children with bronchial asthma, equal to 3 months with the possibility of preliminary information within 1 month. The likelihood of achieving the bone metabolism markers minimum target range in children with bronchial asthma increases in the proposed preventive measures. The use of vitamin D3 and calcium children with bronchial asthma for 6 months significantly increases their likelihood of achieving the minimum target range of bone metabolism markers.

Conclusions

Metabolic processes of bone formation in children with bronchial asthma, characterized by increased serum alkaline phosphatase activity, osteocalcin concentration and degradation products of collagen type 1 on the background of 25(OH)D insufficiency. The earliest and dynamic indicators of the vitamin D3 and calcium supplementation effectiveness should be used alkaline phosphatase activity, serum osteocalcin and C-telopeptide of type 1 collagen. Use of vitamin D3 and carbonate / calcium citrate reduces the relative risk of osteogenesis disorders in children with bronchial asthma.