Osteocalcin As A Marker Of Bone Metabolism Disorders In Children With Juvenile Idiopathic Arthritis

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ABSTRACT

To determine the relationship between osteocalcin and markers of inflammation and bone metabolism in children with juvenile idiopathic arthritis (JIA).

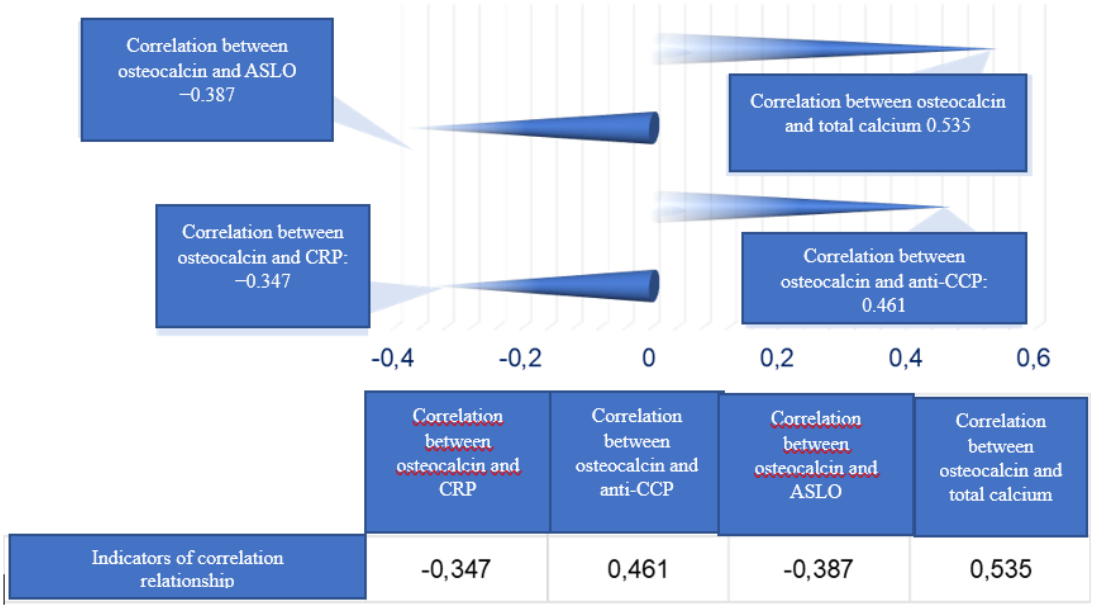
Keywords:

Relevance of the problem. Juvenile idiopathic arthritis (JIA) is the most common chronic rheumatic disease in children. According to various studies, juvenile idiopathic arthritis (JIA) is among the most prevalent chronic conditions in childhood, with an annual incidence ranging from 1.6 to 23 new cases per 100,000 adolescents. Approximately 1 in every 1,000 children develops JIA [1]. In Europe and North America, JIA occurs more frequently than in Asia, with higher rates observed in northern than in southern Europe. According to a 2014 systematic review, the incidence of JIA ranges from 1.6 to 2,338 cases per 100,000 people, and its prevalence varies between 3.8 and 400 cases per 100,000 people [2]. JIA is characterized by joint inflammation, pronounced articular and extra-articular manifestations, disturbances in bone tissue metabolism, and a high risk of disability. Disorders of calcium-phosphorus metabolism are particularly significant in patients with the polyarticular form of JIA who receive long-term glucocorticoid therapy [3]. Osteocalcin is considered a marker of bone metabolism and a potential predictor of therapeutic efficacy [4].

Objective. To determine the relationship between osteocalcin and markers of inflammation and bone metabolism in children with juvenile idiopathic arthritis (JIA).

Materials and Methods. The study was conducted at the Multidisciplinary Clinic of the Tashkent Medical Academy. A total of 100 children with JIA were examined. Clinical, laboratory, immunological, and statistical methods were applied, including measurements of osteocalcin, anti-cyclic citrullinated peptide antibodies (anti-CCP), C-reactive protein (CRP), antistreptolysin O (ASLO), and total calcium levels.

Results.



The presented graph visualizes the correlations between the level of osteocalcin and several biochemical markers of inflammation and mineral metabolism in patients with juvenile idiopathic arthritis (JIA): Correlation between osteocalcin and total calcium (r = 0.535). A moderately positive correlation indicates that an increase in osteocalcin level is accompanied by an increase in the concentration of total calcium in the blood serum. This is logical, since osteocalcin is a non-collagenous protein of the bone matrix synthesized by osteoblasts, and its level may reflect the activity of bone formation and calcium metabolism. Correlation between osteocalcin and anti-CCP (anti-cyclic citrullinated peptide antibodies) (r = 0.461). The positive correlation between osteocalcin and anti-CCP represents an interesting observation. Although anti-CCP is traditionally considered a marker of autoimmune activity in rheumatoid arthritis, its relationship with osteocalcin may indicate reactive activation of osteoblasts in response to bone tissue destruction or remodeling during autoimmune inflammation. Correlation between osteocalcin and ASLO (anti-streptolysin O) (r = -0.387). The negative correlation may reflect suppression of osteoblastic activity in the presence of post-streptococcal sensitization and chronic inflammation, which may contribute to impaired bone metabolism in children with JIA. Correlation between osteocalcin and CRP (C-reactive protein) (r = -0.347). Similarly, the negative correlation with CRP level indicates that with increased systemic inflammatory activity, the level of osteocalcin decreases. This confirms the concept that the inflammatory process suppresses osteogenesis, probably through pro-inflammatory cytokines (for example, IL-6, TNF-α) affecting osteoblast differentiation. Osteocalcin can be considered an additional marker for assessing bone metabolism in patients with JIA. The relationship with anti-CCP requires further study in the context of bone remodeling and autoimmune activity. The integration of osteocalcin into the diagnostic and prognostic algorithm of JIA may be promising for therapy individualization.

Conclusions:

1. The level of osteocalcin correlates with inflammation markers and calcium metabolism, which allows its use as a prognostic biomarker.

2. The level of osteocalcin shows an association with indicators of the inflammatory process and inflammation markers such as CRP, anti-CCP, and ASLO, which justifies its application as a prognostic biomarker.
3. It is proposed to include osteocalcin in the diagnostic minimum for JIA to select the optimal therapeutic strategy.

References

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