9. THE IMPORTANCE OF MELATONIN IN THE DEVELOPMENT OF IDIOPATHIC SCOLIOSIS

Author: Robu Daniela

Scientific advisor: Vovc Victor, MD, PhD, Professor, Department of Human Physiology and Biophysics, *Nicolae Testemitanu* State University of Medicine and Pharmacy, Chisinau, Republic of Moldova; Lupușor Adrian, PhD, Assistant Professor, Department of Human Physiology and Biophysics, *Nicolae Testemitanu* State University of Medicine and Pharmacy, Chisinau, Republic of Moldova

Introduction. Adolescent idiopathic scoliosis is a common disease, with a 0.47–5.2% prevalence. The female-to-male ratio ranges from 1.5:1 to 3:1 and is increasing with age. Untreated scoliosis can cause muscle imbalances, back pain, reduced mobility and respiratory or cardiovascular issues. This review aimed to assess the current information regarding the impact of melatonin on scoliosis pathogenesis by integrating specific genetic markers, molecular pathways, and clinical data.

Aim of study. Various hypotheses of idiopathic scoliosis's etiology have been put forth, such as neuromuscular dynamics, connective tissue structure, vestibular dysfunction, platelet microstructure, mechanical influences, growth-related and developmental aspects, asymmetry in the brainstem, genetic factors, equilibrium dysfunction, and impaired proprioception. Despite the conventional focus, recent research suggests a potential influence of melatonin on idiopathic scoliosis.

Methods and materials. A broad English search was undertaken of the Pubmed and Scopus databases for the terms" idiopathic scoliosis, circadian rhythm, melatonin." Articles from the period 2010-2023 were chosen.

Results. Melatonin may play a role in the pathogenesis of scoliosis through the neuroendocrine hypothesis, influencing muscle strength, which decreases at night and gradually increases in the morning. The physiological function of melatonin is to inhibit the intracellular Ca2+ receptor calmodulin, regulating actin-myosin interactions in skeletal muscle contraction. Studies have found that individuals with idiopathic scoliosis have higher levels of serum melatonin compared to controls matched for weight, age, and height, and the MT2 receptor has lower expression and is asymmetrically distributed in paravertebral muscles, with higher levels on the concave side of the spinal curve compared to the convex side. These modifications could lead to weakness and shortening of the muscles on the concave side, while on the convex side, there may be lengthening and hypertrophy of the muscles due to compensation.

Conclusion. The study provides evidence for melatonin's role in scoliosis development by inhibiting calmodulin because of its high serum levels and demonstrating asymmetrical receptor expression in paravertebral muscles, collectively indicating its potential contribution to scoliosis pathogenesis and providing insights for targeted therapeutic interventions and enhancing patient outcomes. And because melatonin is an essential factor involved in circadian rhythm regulation, further studies are needed to analyze the influence of circadian rhythm disorders in scoliosis etiology.