



## 10. THE IMPORTANCE OF THE CIRCADIAN RHYTHM IN THE MUSCULOSKELETAL DEVELOPMENT OF CHILDREN

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**Introduction.** Bone and muscle cells have the same circadian rhythm as the rest of the body's cells, with 24-hour oscillations governed by the primary clock. This review aimed to determine if there is a correlation between circadian rhythm disturbances and musculoskeletal development during childhood.

**Aim of study.** The increasing use of blue-light-based devices amongst children increases the prevalence of circadian disruptions, leading to perturbed peripheral clocks.

**Methods and materials.** A comprehensive search of the Google Academic and PubMed databases was undertaken for the words "pediatric circadian rhythm", "circadian rhythm and muscle", and "circadian rhythm and bones"; publications from 2013-2023 were selected.

**Results.** Studies have shown that the circadian clock, primary and peripheral, is entrained by exercise, diet and sleep quality. Disruptions can lead to decreased muscle mass, reduced muscle strength, and increased osteoclast differentiation, leading to bone loss and tendon calcification. Other factors involved in circadian rhythm regulation like melatonin (stimulates osteoblastogenesis, inhibits osteoclastogenesis, promotes skeletal muscle growth, decreases muscle damage), growth hormone, estrogen, testosterone (increases bone and muscle mass and strength), calcium, vitamin D (increases bone mineral density, muscle strength) and their misalignment because of circadian rhythm dysregulation have been researched as potentiators of the musculoskeletal dyshomeostasis.

**Conclusion.** To understand in what way circadian misalignment affects the development of muscle and bones in children, further research should be done considering factors like circadian rhythm, sleep patterns, nutrition, physical activity, levels of hormones, and geographical regions. Also, future research should include development assessment methods like anthropometry, somatoscopy, spirometry, dynamometry and osteodensitometry correlated with circadian rhythm disruption.