Screen time affects bone mass and bone quality but not body composition in male adolescent basketball athletes

Autor: Maurício Camargo Etchebehere

Orientador: Gil Guerra Júnior

Introduction: Childhood and adolescence are periods with a significant change in bone tissue. These changes happen mainly due to bone growth. This growth shows the relationship between calcium resorption and deposition. The structure of bones depends on factors, such as bone mass density, properties of bone tissue (mineral content), and bone geometry. Bone tissue changes are influenced by genetic factors, hormonal *status*, exposure to sunlight and diet. In addition, regular physical and sports activity, especially with body overload, plays a vital role in making the bone more resistant to impact and fractures. The effects of different sports activities on bone mass are still not fully understood since they vary according to the intensity of the activity and its physical impact. Sports with body overload or physical impact (e.g., gymnastics, soccer, basketball) will increase the bone mass as opposed to sports without body overload (ex: swimming, running). These findings have significant clinical repercussions, as it provides essential data for a better understanding of the benefits of sports with body overload on the quantity, quality of determinants of bone strength. So, the aim of this study was to verify the relationship between sedentary lifestyle on body composition, bone mass, and bone quality parameters in male adolescent basketball players.

Materials and methods: Thirty male adolescent basketball athletes were enrolled and nine were excluded due to recent injuries. Therefore, 21 male athletes (ages 15-17 years-old) were evaluated. All athletes signed an informed consent (CAAE: 79718417.0.0000.5404 UNICAMP) prior to initiating the study. The body composition was evaluated measuring height (m), weight (kg) and body mass index (kg/m^2) under standardized conditions. The bone mass was evaluated by bone mineral density (BMD) (cm^2) and bone mineral content (BMC) (g) in total body less head (TBLH), in the lumbar spine (L1-L4) and in the neck of the femur using DXA equipment (iDXA – GE Healthcare). The bone quality was measured by obtaining the bone geometry using the Advanced Hip Assessment software. The bone geometry was evaluated by hips axis length (HAL) (cm), femur strength index (FSI), section modulus (Z) (cm^3), cross-sectional moment of inertia (CSMI) (mm^4) and cross-sectional area (CSA) (mm^2). A sedentary lifestyle was evaluated using a questionnaire on sedentary behavior (Adolescent Sedentary Activity Questionnaire: ASAQ) adapted to the Brazilian population. Athletes were then grouped into four quartiles representing the index of sedentary lifestyle (Q1 = less sedentary up until Q4 = most sedentary lifestyle). The statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS) version 20.0 for Windows. Comparisons between groups and multivariate analyses were performed using an ANOVA model. Correlations were evaluated using the Pearson correlation coefficient.

Results: There was no difference between the four groups of lifestyle according to body composition. It was observed significant differences between Q1 and Q4 groups for Z (1,425 and 1,092 cm^3; $p<0.05$), CSMI (25,970 and 18,622 mm^4; $p<0.05$) and BMC in the neck of the femur (8.9

and 7.23 g; $p<0.05$). It was also observed a significant inverse correlation between the four groups of lifestyle in the bone mass evaluated by BMC in the neck of the femur ($r=-0.482$; $p=0.027$) and bone quality evaluated by Z ($r=-0.513$; $p=0.017$) and CSMI ($r=-0.538$; $p=0.012$). Conclusion: Male adolescent basketball athletes with less sedentary habits present better bone mass and bone quality, even though there are no differences in their body composition. These results reinforce that sedentary habitus in athletes may not modify body composition but may compromise bone mass and bone quality with future risk of injuries and fractures.