The aims of the present study were to: 1) assess the influence of regular physical activity on ghrelin concentration in prepubertal and pubertal boys; and 2) examine the impact of ghrelin and insulin-like growth factor-I (IGF-I) concentrations on bone mineral density (BMD) in boys with different physical activity patterns at different pubertal stages. In total, 56 healthy schoolboys aged between 10 and 16 years were divided into the swimming (n=28) and the control (n=28) groups. The subjects were matched by age and body mass index (BMI), generating 9 matches pairs in pubertal group I (Tanner stage 1), 11 pairs in group II (pubertal stages 2&3) and 8 pairs in group III (pubertal stages 4&5). To reduce the effect of body size on BMD values, apparent volumetric bone mineral density (BMAD) of the lumbar spine was calculated. Swimmers in pubertal groups II and III had significantly (both P < 0.05) higher mean plasma ghrelin levels than the controls (group II: 1126.8 ± 406.0 vs 868.3 ± 411.2 pg/ml; group III: 1105.5 ± 337.5 vs 850.8 ± 306.0 pg/ml, respectively), whereas no such a difference was seen in pubertal group I (1230.8 ± 386.0 vs 1272.7 ± 424.4 pg/ml). In swimmers, plasma ghrelin concentration was negatively correlated to both total BMD (r = -0.51; P < 0.05) and lumbar BMAD (r = -0.54; P < 0.05). Plasma ghrelin was the most important hormonal determinant for total BMD and lumbar BMAD (R² = 27.2% and R² = 19.8%, respectively) in swimmers, whereas in control boys, plasma IGF-I was the most important hormonal predictor accounting for 41.8% of the variability of total BMD and 20.4% for the variability of lumbar BMAD. In conclusion, plasma ghrelin concentration decreased during puberty in physically inactive boys, while in regularly physically active boys it remained relatively unchanged.

Keywords: Bone Mineral Density, Growth and Development, Physical Activity