25-Hydroxyvitamin D concentrations in pubertal children with obesity

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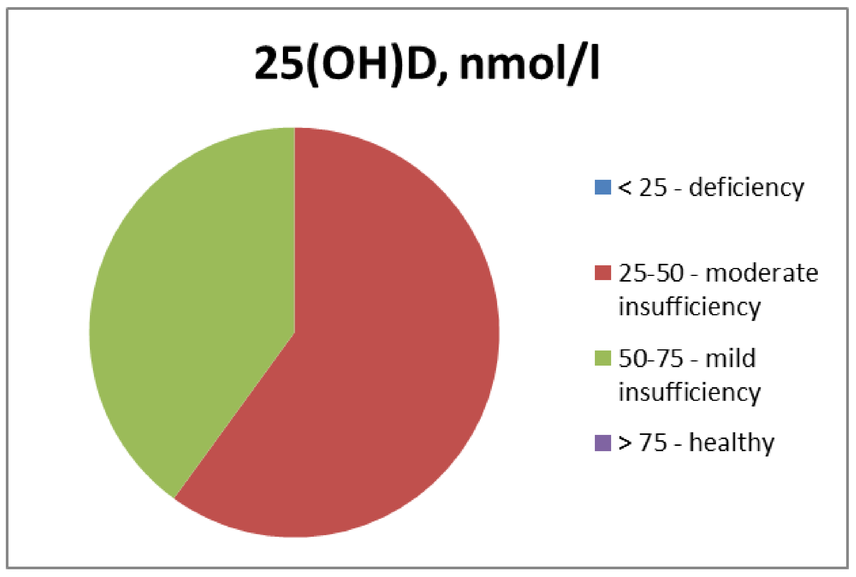
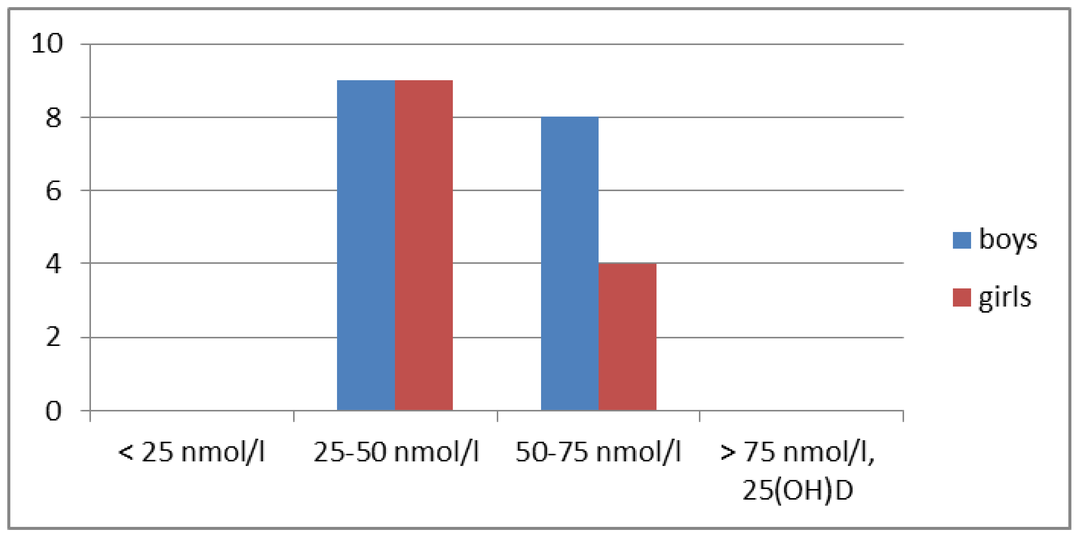
- **Background:** The prevalence of childhood obesity has been rapidly increasing worldwide and the last report of World Health Organisation define it as epidemic and one of the most serious global public health challenges for the 21st century. Obese children and adolescents are at an increased risk of developing various health problems including type 2 diabetes mellitus, hypertension, osteoarthritis, cardiovascular disease. Obesity and puberty are important factors for the development of insulin resistance (IR). Decreased insulin sensitivity in the pubertal period causes a compensatory increase in insulin secretion. A transient physiological insulin resistance develops in children during puberty due to increased GH/IGF-1 activity. Obesity is a risk factor for vitamin D deficiency. Subjects with low vitamin D are at higher risk of insulin resistance and metabolic syndrome. Vitamin D enhances the endocrine function of the pancreas and can keep insulin reserves.

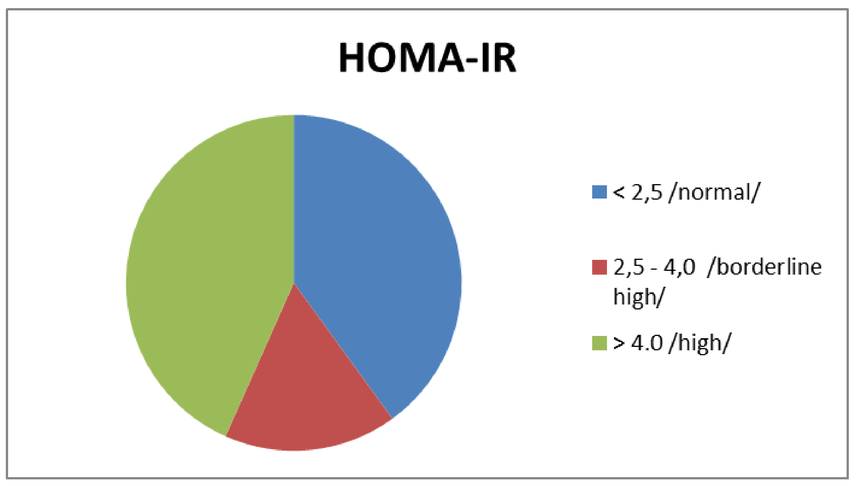
- **Objective and hypothesis:** The aim of the study is to assess the relation between IR and vitamin D status in obese pubertal children.

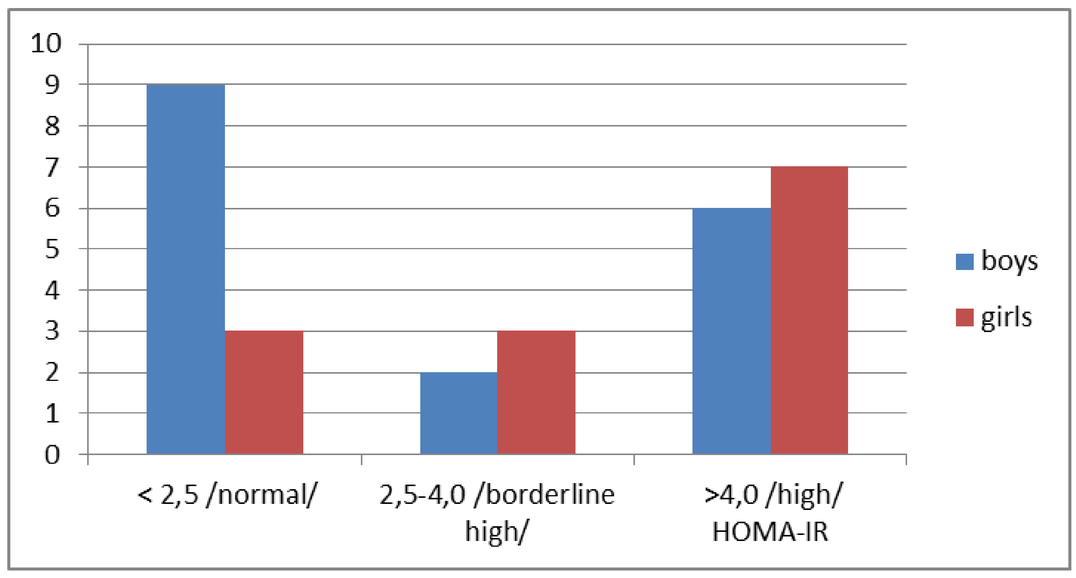
- **Method:** We studied 30 children (17 male and 13 female, aged 10-17 years) with body mass index above the 97th centile and no other co-morbidities and without vitamin D supplementation and calcium intake. We used serum 25-Hydroxyvitamin D (25(OH)D) as known to be the better marker of vitamin D status. Serum 25(OH)D levels were determined by the electrochemiluminescence enzyme immunoassay method (ECLIA). All obese children underwent an oral glucose tolerance test with glucose and insulin measurements. The insulin resistance was measured with the homeostatic model assessment (HOMA) as a method for assessing IR from basal (fasting) glucose and insulin concentrations.

- **Results**: The results showed vitamin D insufficiency in all patients. Twelve children (8 male and 4 female) had mild and 18 children (9 male and 9 female) had moderate vitamin D insufficiency. There were no vitamin D deficient patients. Increased insulin resistance as HOMA-IR >2.5 we found in 18 patients, the majority of which (13 children) showed significant IR with HOMA-IR >4,0.









- **Conclusion:** In the analysed cohort we found lower level of the serum 25(OH)D as confirmed in many studies. Our results did not confirm insulin resistance in all patients but in the majority the high levels of HOMA-IR correlated with low levels of 25(OH)D as per the moderate vitamin D insufficiency. Prospective studies on a large group of individuals need to be done to confirm the findings. It may be possible to reverse the increasing prevalence of obesity and decrease the risk of type 2 diabetes mellitus, cardiovascular disease by improving vitamin D status

- **References:** 1. A Kelly, LJ Brooks, S Dougherty, et al. A cross-sectional study of vitamin D and insulin resistance in children, Arch Dis Child April, 2011. 2. S Kurtoğlu, N Hatipoğlu, J Clin Res Pediatr Endocrinol 2010. 3. Wortsman J, Matsuoka LY, Chen TC et al. Decreased bioavailability of vitamin D in obesity. Am J Clin Nutr 2007; 72: 690–693. 4. Chiu KC, Chu A, et al. Hypovitaminosis D is associated with insulin resistance and beta cell dysfunction. Am J Clin Nutr 2004;79:820–5.

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