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Assessment of the association between neurocognitive functions and childhood obesity

Abstract

Obesity is a chronic disease, increasingly prevalent in adults, children and adolescents. The aim of the present doctoral project was to assess the association between neurocognitive functions and childhood obesity. The study included 540 children aged 6 to 12. The neurocognitive functions were defined as "cold" and "hot" executive functions (EF), that are mental processes controlling goal-oriented behaviors. The Continuous Performance Task, the Stroop Color-Word Interference Test, the Trail Making Test A and B were applied to assess cold EF, which are activated when critical thinking is involved in solving new problems. The Hungry Donkey Task and the Delayed Gratification Task were used to assess hot EF, which are activated in states characterized by emotional arousal and increased motivation. To assess children's nutritional status, their body weight and height were measured, and body composition was analyzed using the bioelectrical impedance analysis (TANITA-MC 780 P MA). Overweight and obesity were diagnosed on the basis of BMI using International Obesity Task Force (IOTF) criteria. Excessive body fatness was diagnosed on the basis of Fat Mass Index (FMI) using the McCarthy criteria. Additionally, family socioeconomic status and genetic determinants of childhood obesity, in the form of the single nucleotide rs9936909 polymorphism of the FTO gene were assessed. The study did not confirm the association between hot EF and childhood obesity in adjusted analyses. Furthermore, there has been found no association between cool EF and childhood obesity, except for the association of error interference, which is the indicator of inhibitory control, with excessive body fatness ina children. There was no association of the rs9936909 polymorphism with the assessable cool EF, although children with the obesity risk allele were characterized by higher risk of lower overall cool EF scores. However, the studied polymorphism has not been revealed to be significantly involved in determining the association between cool EF and child obesity. The children's family environment, particularly the mothers' education, turned out to be the most relevant in the context of children obesity.

Key words: obesity, body fat, BMI, neurocognitive functions, executive functions