Association between biomarkers of redox status and cytokines with different patterns of habitual physical activity in eutrophic and overweight/obese preschoolers: multivariate analysis of a cross-sectional study.

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Background**:** although it is well known that obesity is frequently associated with reduced levels of habitual physical activity (HPA), which contributes to determining severe oxidative stress and inflammatory state, this association is however unknown in preschoolers so far. This study aimed to investigate the association between biomarkers of redox status and cytokines with different patterns of HPA according to the adiposity of preschoolers.

Methods: a cross-sectional study was conducted in 50 preschoolers (25 overweight/obese, OW/OB and 25 eutrophic, EU), matched for age, sex, economic level, and maternal education. Total antioxidant capacity (TAC), superoxide dismutase (SOD) and catalase (CAT) activities, substances reactive to thiobarbituric acid (TBARS), soluble tumor necrosis factor receptors (sTNFRs), and leptin levels were evaluated. HPA levels were evaluated by accelerometry (ActiGraph GT9X accelerometer). Correlation, multiple linear regression, and partial least squares regression analysis were used to determine the association between redox status biomarkers and cytokines with different patterns of HPA (HPA level, bouts of moderate to vigorous physical activity [MVPA], and multivariate pattern of HPA) in EU and OW/OB preschoolers.

Results: OW/OB preschoolers had lower CAT activity, higher levels of TAC, TBARS, and cytokines, and similar levels of HPA to EU preschoolers. In EU preschoolers, SOD activity exhibited a stronger negative association with moderate intensity ranges of HPA (R2 = 0.18), and negative correlation with sTNFRs (r = -0.40 to -0.46). TBARS had a stronger positive association with ranges of light intensity in the multivariate pattern of HPA (R^2 = 0.10). In OW/OB preschoolers, the HPA multivariate associative pattern was predominantly from vigorous intensity ranges. Thus, SOD activity had a positive association with the multivariate pattern of HPA (R^2 = 0.38) and MVPA bouts (β [95% CI] = 0.457 [0.0026. 0.0576]). TAC had a negative association with the multivariate pattern of HPA (R^2 = 0.38) and MVPA bouts (β [95% CI] = -0.718 [-0.0025. -0.0003]). Additionally, leptin levels were lower in OW/OB preschoolers engaged in vigorous physical activity (VPA) (8000-9999 counts/min) for longer periods of time.

Conclusion: the results of this study indicate that OW/OB preschoolers have higher levels of oxidative stress biomarkers and pro-inflammatory cytokines compared to EU preschoolers. Moreover, VPA may exert antioxidative and anti-inflammatory effects in OW/OB preschoolers.