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Physical Activity and 1-hr Glycemic Status on Pancreatic β -cell Function (β CF) in Youth

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Physical activity (PA) has been shown to moderate the relationship between 1-hr glucose concentration (1HGC) and insulinogenic index (IGI) in Latino adults, reducing type 2 diabetes (T2D) risk. However, it is unknown if PA applies similar effects on pancreatic β CF and/or insulin sensitivity (IS), two key pathophysiological parameters of T2D, in Latino youth. Given that clinical evidence indicates youth-adults contrast in therapeutic outcomes of T2D treatment, suggesting recovery of β CF is less efficacious in youth vs. equally obese adults. This suggests that PA may not have the similar reduction of T2D risk in youth vs. adults. **PURPOSE:** To examine the interactive effects between PA and 1HGC on IS and β CF measured by oral glucose tolerance test (OGTT)-derived indices in Latino youth. **METHODS:** A total of 143 Latino youth (age 16.3 ± 0.2 [SEM] years; 77F/66M; BMI: 25.8 ± 0.6 kg/m²) underwent a 2-hr OGTT, and venous blood samples were obtained at -15, 0, 30, 60, 90, and 120 minutes for glucose and insulin concentrations. Participants who completed a PA screener (to assess whether they engaged in regular PA; “yes”; n=98 vs. “no”; n=45) were divided into two groups based on 1HGC with a cut-off of 155 mg/dL (above155 vs. below155). Matsuda index was calculated as $10,000/\sqrt{((\text{fasting glucose} \times \text{fasting insulin}) \times (\text{mean OGTT glucose} \times \text{mean OGTT insulin}))}$, and IGI as $(\Delta\text{Ins}_{0-30})/(\Delta\text{Glu}_{0-30})$. Two-way ANOVA was used to examine the effects of 1HGC (above155 vs. below155) and PA (“yes” vs. “no”) on Matsuda index and IGI. **RESULTS:** The below155 phenotype had a higher IGI than the above155 phenotype (1.9 ± 0.1 vs. 1.5 ± 0.2 , $p < 0.05$), while there was no difference in IGI between the PA “yes” vs. “no” responders (1.8 ± 0.1 vs. 1.8 ± 0.3 , $p = 0.9$). When 1HGC and PA were examined as interactive terms, PA significantly moderated the relationship between 1HGC and IGI (interaction $p = 0.05$). The change in IGI from below155 to above155 was greater in those with PA “yes” (40% decrease) vs. “no” (19% increase) responders. No significant interactive effects on Matsuda index were observed. **CONCLUSION:** Our data suggest that PA can moderate the relationship between 1HGC and β CF in Latino youth, potentially reducing the T2D risk. Studies with objectively measured PA should be warranted to confirm whether those relationships can be enhanced by PA.

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