Circulating 3-hydroxyisobutyrate Level is Negatively Related to Physical Activity Time in Adult Men

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Abstract

Introduction: Recent studies have suggested that circulating 3-hydroxyisobutyrate (3-HIB; a catabolic intermediate of valine) levels were associated with insulin resistance. On the other hand, high physical activity levels have been recognized as one of the main strategy for preventing insulin resistance. However, the association between circulating 3-HIB level and physical activity has not been clarified yet. Thus, the aim of this study was to investigate the association between circulating 3-HIB level and physical activity.

Methods: One hundred fifty-one adult men (age; 57 ± 15 [range: 23-83] years, BMI; 23.3 ± 3.3 [range: 17.9-35.9] kg/m^2; mean±SD [range]) participated in a cross-sectional study. Plasma 3-HIB concentration was measured by HPLC-MS/MS. Total, moderate, vigorous, and walking physical activity times were assessed using International Physical Activity Questionnaire (IPAQ).

Results: Plasma 3-HIB concentration was significantly correlated to walking physical activity time (r_s = -0.311, $p < 0.001$) and total physical activity time (r_s = -0.165, $p = 0.045$), but not to moderate (r_s = -0.043, $p = 0.598$) or vigorous (r_s = 0.021, $p = 0.802$) physical activity time.

Conclusions: We suggest that an increase in walking time reduces circulating 3-HIB levels in adult men. In addition, it is possible that 3-HIB is one of the candidate linking between higher physical activity levels and lower prevalence of type 2 diabetes mellitus.

Keywords: 3-hydroxyisobutyrate, Physical activity, Insulin resistance