INCREASED ENERGY EXPENDITURE AND REDUCED EXERCISE CAPACITY IN CELIAC DISEASE PATIENTS ON A GLUTEN-FREE DIET


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Background: Celiac disease (CeD) patients often exhibit impaired nutritional status due to nutrient malabsorption and altered metabolism. Accurate clinical assessment of malnutrition, muscle function and energy requirements are thus essential to prevent and treat malnutrition. Indirect calorimetry (IC) is the most accurate method to measure energy needs, but it is underutilized in outpatient settings.

Aims: To assess the use of IC testing in estimating the resting energy expenditure and exercise-related energy utilization in treated CeD patients compared to patients with other gastrointestinal (GI) conditions.

Methods: Adult patients attending the Celiac and Nutrition Clinic at McMaster University that underwent rest and exercise testing as a part of their nutritional assessment were enrolled. CeD diagnosis was based on positive CeD serology and confirmed by biopsy, and all of them were on a GFD for at least 6 months. Patients with inflammatory bowel disease (IBD), functional gastrointestinal disorders (FGID) and undernutrition due to other causes (UN) were included as controls. Resting energy expenditure was assessed using 3 methods: 1) predictive formula (25kcal/kg), 2) Harris Benedict and 3) estimation of VO2 by IC. Exercise capacity and energy expenditure (EE) during exercise was estimated at baseline, moderate and maximum exercise. Statistical analysis was performed using SPSS. ANOVA with Bonferroni corrections and Chi2 test were used to assess differences between continuous and categorical variables, respectively.

Results: A total of 66 patients (CeD n=24; IBD n=15; FGID n=17; UN n=10) were included in the analysis. The REE of GI patients measured using the HB equation and the predictive formula were significantly underestimated compared to IC [Mean Difference (MD)=229 kcal/day p=0.03 and MD=365 kcal/day p<0.001, respectively]. The EE during exercise increased with intensity of exercise. CeD patients had the highest EE during moderate and strenuous exercise (Mean EE = 286 kcal/h and 494 kcal/h respectively) compared to patients with other GI conditions (Moderate and Strenuous for IBD= 218kcal/h and 373kcal/h; for FGIDs 296kcal/hand 467kcal/h, for UN, Mean EE = 181kcal/h and 294kcal/h). Exercise capacity was reduced in CeD compared to predicted exercise capacity (Mean = 86% predicted work capacity, range 72.5-107%), but was significantly higher than IBD (86% vs 73%; p=0.65) and UN patients (86% vs 46%; p=0.004).

Conclusions: Increased energy consumption and reduced exercise capacity is suggestive of chronic impaired nutritional status in treated CeD patients. Future studies with larger sample sizes are needed to understand whether incorporating accurate estimations of energy expenditure in nutritional practices can improve CeD outcomes.

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