



ORIGINAL ARTICLE

Glucose metabolism disorders and vestibular manifestations: evaluation through computerized dynamic posturography[☆]



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KEYWORDS

Dizziness;
Glucose metabolism disorders;
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Abstract

Introduction: Global sugar consumption has increased in the past 50 years; its abusive intake is responsible for peripheral insulin resistance, which causes the metabolic syndrome – obesity, diabetes mellitus, hypertension, and coronary heart disease.

Objective: To evaluate the effect of a fractionated diet without glucose as treatment for labyrinthine disorders associated with glucose–insulin index.

Methods: The study design was a prospective randomized controlled trial. Fifty-one patients were divided into two groups: the diet group (DG), which comprised subjects treated with a fractionated diet with glucose restriction, and the control group (CG), in which individuals were not counseled regarding diet. Patients underwent computerized dynamic posturography (CDP) and visual analog scale (VAS) on the first and 30th days of the study.

Results: There was improvement in the assessed posturographic conditions and VAS self-assessment in the DG group after 30 days when compared to the control group.

Conclusion: The fractionated diet with glucose restriction was effective for the treatment of vestibular dysfunction associated with glucose metabolism disorders.

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PALAVRAS-CHAVE

Tontura;
Transtornos do
metabolismo de
glicose;
Dieta com restrição
de carboidratos

Distúrbios do metabolismo da glicose e manifestações vestibulares: avaliação pela posturografia dinâmica computadorizada

Resumo

Introdução: O consumo mundial de açúcar triplicou nos últimos 50 anos e a sua ingestão abusiva é responsável pela resistência periférica à insulina que origina a síndrome metabólica – obesidade, *diabetes mellitus*, hipertensão arterial e doenças coronarianas.

Objetivo: Avaliar de forma objetiva o efeito da dieta fracionada e sem glicose como forma de tratamento dos distúrbios labirínticos associados às alterações da curva glicoinsulínica.

Método: Trata-se de um ensaio clínico controlado randomizado prospectivo. Estudo realizado com 51 pacientes divididos em dois grupos: Grupo Dieta composto por indivíduos tratados com dieta fracionada com restrição de glicose e Grupo Controle no qual os indivíduos não foram orientados em relação à dieta. Os pacientes realizaram Posturografia Dinâmica Computadorizada e Escala Análogo Visual no primeiro e trigésimo dias do estudo.

Resultados: Foi observada melhora nas condições posturográficas avaliadas e melhora clínica do grupo dieta na análise da escala análogo visual quando comparados grupo dieta e grupo controle.

Conclusão: A dieta fracionada e restritiva de glicose mostrou-se eficaz no tratamento das disfunções vestibulares associadas aos distúrbios do metabolismo da glicose.

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Introduction

Global sugar consumption has tripled in the past 50 years, and its abusive intake is responsible for peripheral insulin resistance, which leads to the metabolic syndrome – obesity, diabetes mellitus, hypertension, and coronary heart disease.^{1,2} An estimated 40% of individuals with weight considered normal develop some form of metabolic syndrome, as a result of glucose consumption.³ According to the same authors, in the United States the situation has become a matter of national security, as young individuals are becoming increasingly obese and unfit for military service.

The significance of glucose metabolism disorders (GMD) can be observed in otoneurology when their high prevalence is observed in patients with labyrinth disorders.⁴ It is estimated that between 30% and 90% of patients with dizziness have altered levels of blood glucose and insulin.^{5–8} In recent years, several authors have investigated GMD as a cause of inner ear dysfunctions.^{4,5,7,9,10} Moreover, vestibular dysfunction has been described as a new complication of diabetes and acts as a potentiating risk factor for falls in these patients.¹¹

Based on the above observations, it was decided to assess the postural performance of patients with dizziness and a clinical history of GMD after a fractionated diet with glucose restriction, in order to test the hypothesis that this diet is effective in the treatment of vestibular dysfunctions associated with this condition. The aims of this study included:

1. Assess the posturography conditions on a moving platform (conditions 4, 5, 6) and the composite score in patients with body balance disorders and glucose metabolism alterations before and after a fractionated diet with glucose restriction for 30 days.

2. Assess the impact of the fractionated diet with carbohydrate restriction on the quality of life of patients with body balance disorders and glucose metabolism alterations using the visual analog scale (VAS).

Methods

This was a prospective, randomized, controlled clinical trial, previously approved by the Research Ethics Committee of the institution (No. 482/05) and registered in the Clinical Trial Protocol Registration System (NTC 02,226,536). All participants in the study signed the informed consent.

The study subjects were adults older than 18 years. They underwent all the necessary examinations to attain a final diagnosis of vestibular disorder: audiometry, videonystagmography, electrophysiological tests, and imaging tests when needed. Among these, individuals with dizziness related to food (fasting and/or after sugar intake) and who had an altered three-hour glucose tolerance test, namely: blood glucose ≤ 55 mg/dL; and/or blood glucose between 145 and 199 mg/dL in the second hour of the test and/or; sum of insulin levels of the second and third hours >60 U/mL were selected for study.^{12–15}

Patients with complaints non-attributable to the vestibular system, orthopedic or neurological disorders that might interfere with the computerized dynamic posturography (CDP), and diabetic patients according to the American Diabetes Association (2010 and 2011) were not included in the study.^{13,14}

Patients diagnosed with vestibular disorders such as Meniere's disease (anamnesis supported by the American Academy criteria) were also not included in the study.

Non-vestibular dizziness symptoms are those without labyrinthine characteristics (such as those related to

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