Determination of Glycemic Index Value of Naturo Fruit Bars

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Abstract

Aim and Objective: The glycemic response to Naturo fruit bar that is commercially available in India was determined against a glucose standard in a non-blind, repeated measure, crossover design trial.

Methods: Eleven healthy subjects (mean age 37.3 (SD 5.5) years and mean BMI 21·3 (SD 3·6) kg/m2) were recruited to the study. Subjects were given Naturo fruit bar and a standard food (glucose), on separate occasions, each containing 50 grams carbohydrate. Blood glucose was determined after overnight fasting (0 hours) and at 30, 60, 90 and 120 min after the consumption of each test food. For Naturo fruit bar, the glycemic index (GI) value was calculated geometrically by expressing the incremental area under the blood glucose curve (iAUC) as a percentage of each subject’s average iAUC for the standard food.

Results: The GI value of Naturo fruit bar was found to be 38.50. As per the Food and Agriculture Organization, GI cut-off values are as follows: low &lt;55; medium 56–69 inclusive; high &gt;70. Therefore Naturo fruit bar could be classified under low glycemic food/nutrient.

Conclusion: Considering the widespread consumption of fruits/bars in India, this information is valuable for people who prefer to use low glycemic food which offer many beneficial effects because their consumption significantly reduces the GI of the diets of the Indian population.

Introduction

Diabetes is a major public health problem globally and also in developing countries like India (diabetesindia.com). In India, the crude prevalence rate of diabetes in urban areas is about 9% and that the prevalence in rural areas is about 3% of the total population. Taking an overall crude prevalence rate of around 4%, at a conservative estimate, there are about 40 million diabetes cases in India making it the largest number of diabetics in any one country. Hence, there is a need to formulate comprehensive diabetic care programmes. This should not only confine to the standards of diabetes care, but dietary interventions are important in managing diseases that arise due to complications of the disease.

Dietary manipulations are important in the management of type 2 diabetes, coronary heart disease (CHD) and obesity. Prospective studies support the therapeutic potential of low glycemic index (GI) diets for patients with hyperglycemia, improved insulin sensitivity and hyperlipidaemia. A food with a high GI number raises blood glucose more than a food with a medium or low GI. A GI value &gt;70 is considered high, a GI value 56–69 is considered medium and a GI value &lt;55 is considered as a low GI food, whereas GI value of glucose was considered as 100. Food industries and pharmaceutical companies are paying attention to the GI of their foods and beverages.

Glycemic index typically analyzes carbohydrates on a GI scale of 0 to 100, according to the extent to which they raise blood sugar (glucose) levels after consumption of a known quantity of any food item. It is defined as the incremental area under the blood glucose curve (iAUC) of a 50 g carbohydrate portion of a test food expressed as a percentage of the response to 50 g carbohydrate of a standard (reference) food taken by the same subject, on a different day. Results of many randomized clinical trials performed in recent years provide new insights in the management of type 2 diabetes with low GI foods.

Given the rising obesity and diabetes rates in developing countries like India, an understanding of the GI values of food or beverage can help dieticians to create and direct consumers to choose sensible, low GI foods that are believed to “reduce the risk of developing type 2 diabetes, CHD and obesity. Among the very limited number of snacks/foods available in the Indian market for diabetic patients, their effect on blood glucose levels in diabetes has not been examined systematically. If a low-GI snack/food can be identified, it could be used to lower the overall GI and glycemic load, and thus decrease the risk of type 2 diabetes, CHD and obesity. The data on the GI values of different varieties of commercially available snacks/fruit bars/foods within India is very limited. In view of this background, the current study was undertaken to determine the GI value of Naturo Fruit bar (apple flavor) that is commercially available in India.

Naturo fruit bars are prepared from fresh fruits by a unique process without any artificial supplementary additives and available in different flavors (apple, mango, grape and other) containing with or without added sugars. Nutritional information of the test material (100% Naturo Natural fruit bar-Apple) is: Serving Size: 1 Bar (20g). Serving per container/package: calories: 65.48 K Cal, proteins (0.35 g), carbohydrates (15.73 g), sugars (13.48 g), total fat (0.15 g), saturated fat (0.4 g).
**Methods**

**Subjects:** Eleven healthy subjects (male) were recruited for the study. Subjects were moderately active, non-smoking and non-alcoholics. Exclusion criteria were as follows: age, <18 or >55 years; BMI >25 kg/m²; fasting blood glucose value >120 mg%. Mean age of the subjects was 37.3 (SD 5.5) years and mean BMI was 21.3 (SD 3.6) kg/m².

Ethical approval for the study was obtained from the Snehal Hospital Ethics Committee Mumbai. Subjects were given full details of the study protocol and the opportunity to ask questions. All subjects gave written informed consent prior to participation in the study.

**Study Design**

Non-blind, repeated measure, crossover design trial.

**Study protocol**

The protocol used was in line with the procedures recommended by the Food and Agriculture Organization/World Health Organization (1998). To determine the GI of a food, tests should be repeated in six or more subjects, thus in the present study eleven subjects were recruited to determine the GI of the Naturo Natural fruit bar. On the day prior to a test, subjects were asked to restrict their activities and not to eat or drink after 21.00 hours the night before a test, although water was allowed.

Test food: Naturo Natural (apple flavor) fruit bar containing 50 grams of carbohydrate (a total of 64 grams of Naturo Natural fruit bar was taken so that the total carbohydrate is reached to 50g, wherein each 20g container consists of 15.73g of carbohydrate). The standard food consisted of 50g of glucose.

Glucose tolerance test (GTT) was performed as follows. After an overnight fasting (12) the blood sample was collected and the subjects were asked to consume the standard food/ or test food in a crossover model on a different day. A fasting intravenous blood sample was taken at 0 min and the standard food/ or test food was consumed immediately after this. Further blood samples were taken at 30, 60, 90 and 120 min for estimation of the blood glucose by glucose oxidase method.

Calculation of GI

The incremental Area Under the Curve (iAUC), ignoring the area beneath the baseline, was calculated geometrically for each food. The iAUC for each subject was expressed as a percentage of the mean iAUC for the standard food taken by the same subject. The GI of Naturo fruit bar was taken as the mean for the whole group. Statistical analysis was performed using SPSS. Statistical significance was set at p<0.05.

**Results**

The mean blood glucose values upon the consumption of test and standard food are given in Table 1 and Fig. 1. There was a significant elevation in the post-prandial blood glucose levels upon the consumption of standard glucose (F value: 10.114; p<0.0001) as well as Naturo fruit bar (F value: 6.444; p<0.0001), but the elevation was more pronounced with the administration of standard glucose when compared to Naturo fruit bar. Further the post-prandial blood glucose levels were lower in different time intervals with the administration of Naturo fruit bar (p<0.05). Thus the mean iAUC of Naturo fruit bar (13.78) was found to be lower when compared to standard food (36.64). The GI value of the Naturo fruit bar was found to be 38.50.

Incremental area under the curve for test product is presented in Fig. 2. The changes in blood glucose levels were lower upon the administration of Naturo fruit bar when compared to standard glucose. For practical measures, GI values are often grouped into categories as producing either a low, medium or high glycemic response. The cut-off values are as follows: low <55; medium 56–69 inclusive; high >70. Thus the Naturo fruit bar can be grouped under low glycemic food.

**Discussion**

Naturo Natural fruit bar contains 15.73 g of carbohydrates per 20g of serving size. International table of glycemic index and glycemic load values, mentioned wide variety of foods with different GI values. A comparison of the test product with a standard carbohydrate indicates that the Naturo Natural fruit bar exhibits low-glycemic response.

**Conclusion**

The results presented in the current report provide the scientific basis of the glycemic response of Naturo fruit bars. Considering the widespread consumption of snacks in India, it is useful to have information regarding the glycemic response.
of Naturo fruit bar. Identification of fruit bars and other foods with lower glycemic responses will have practical applications because such information will be useful for diabetes patients. The availability of low GI foods / snacks in the Indian market is anticipated to benefit many diabetes patients and also in better management/prevention of chronic diseases like obesity and CHD.

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References


