



GLYCEMIC INDEX PROFILING OF SELECTED NEWLY RELEASED RICE VARIETIES OF CENTRAL TELANGANA ZONE

Home Science

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ABSTRACT

Rice is a major staple food in Asian countries especially in India and it is a rich source of carbohydrate. The glycemic index is one of the popular issues in the world and people are rethinking whether to consume rice or not. Hence, Glycemic index (GI) profiling of in newly released rice varieties of Central Tealngana zone (CTZ) was carried out. Two newly released rice varieties siddi (WGL44) and sheetal (WGL283) were selected for this study. Twenty healthy subjects (for each variety 10no) in the age group of 18-24 years were selected and tested for glycemic response. Subjects were served equivalent available carbohydrate amounts (50 g) of test foods and a reference food (glucose), on separate occasions. Capillary blood glucose was measured from finger-prick samples in fasted subjects (0 min) and at 15, 30, 45, 60, 90 and 120 min after ingestion of the reference food as well as test food. For each test food, the incremental area under the curve (IAUC) and GI values were determined. The results showed significant difference ($p < 0.01$) between two test foods and reference food. Since the glycemic index of WGL283 (53.7), WGL44 (55) was low and may help the rice consumers to make appropriate choice of rice variety, which is suitable for health.

KEYWORDS:

Glycemic Index (GI), Incremental area under the curve (IAUC) Siddi (WGL44), Sheetal (WGL283) Central Telangana Zone (CTZ).

INTRODUCTION:

Rice (*Oryza sativa*) is a dietary staple food and one of the most important cereal crops, especially for people in Asia. India is one of the world's largest producers of white rice and brown rice accounting to 20% of world rice production, but the consumption outside Asia has increased, recently (Orthofer, 2005). It provides the bulk of daily calories for many companion animals and humans (Ryan, 2011). The glycemic index is one of the popular issues in the world, and people are rethinking whether consume rice or not. Research findings showed that rice consumption is related to the higher risk of diabetes mellitus (McKeown et al., 2002; Hu et al., 2002). The other studies showed the inverse one. In fact, rice has greater variability of the glycemic index depending on type, cooking method, etc. The unique taste of rice provides easy way to combine with the other foods to achieve better taste and nutritional balance.

The concept of glycemic index (GI) was first developed by Jenkins and colleagues over a quarter of a century ago and has proven to be an important and innovative concept in nutritional science. There is an important body of evidence to support the use and application of low GI diets, not only in the management or prevention of diabetes (Brand et al., 1991) but also in CVD (jenkin et al., 2002). In addition, low GI foods have been associated with improved insulin sensitivity and increased colonic fermentation.

Foods with a high glycemic index (GI) have been associated with increased risk of type-2 diabetes, because they are rapidly digested and can cause dramatic increase in blood sugar levels. GI is a widely accepted measure of the effect of carbohydrate foods including rice on human health (Jenkins et al., 2002).

Glycemic index predicts the ranking of the glycemic potential of different meals in individual subjects. Low-GI diets result in modest improvements in overall blood glucose control in patients with insulin-dependent diabetes (type I) and non-insulin dependent diabetes (type II). The mechanism may through the ability of low-GI diets to reduce insulin secretion and by lowering blood lipid concentrations in patients with hyper triglyceride (Wolever et al., 1991).

Hence, a study was carried out to investigate the GI profile of selected newly released rice varieties of Central Telangana Zone.

MATERIALS AND METHODS:

The study was conducted at Post Graduate and Research Centre (PG&RC), Professor JayaShankar Telangana State Agricultural University, Rajendranagar, Hyderabad.

Central Telangana Zone (Khammam, Warangal, Medak) was selected for the study. Central Telangana Zone includes three districts of Telangana namely Khammam, Warangal, and Medak. Having good water supply from Canal it forms a fertile base for rice production. Two varieties (30kg each) of newly released rice i.e. WGL283 (Sheetal) and WGL44 (Siddi), were procured from the Krishi Vigyan Kendra, Wyr, Khammam Dist.

Initially twenty five members were selected from Post Graduate and Research centre at PJTSAU campus with the age group of 18-24 years. Subjects were excluded if they reported a history of gastrointestinal disorders, suffered from diabetes, were taking medication for any chronic disease conditions, or intolerant or allergic to any of the foods. Finally, twenty healthy subjects were identified for the study and taken consent letter from them.

Glycemic Index i.e. blood glucose levels (before and after feeding of rice containing 50g carbohydrates) was determined by Wolever et al. (1991) method. The rice was cooked freshly in the morning on the day of the test using the same batch of raw ingredients following a standardized procedure.

The results were statistically analysed to test the significance of the results using percentages, means, standard deviations and analysis of variance (ANOVA) technique. (Snedecor and Cochran 1983).

RESULTS AND DISCUSSION

Eighty five percent of the subjects were females and the remaining 15% were male subjects. Among 20 subjects, 75 per cent belonged to the age group of 19-21 years and 15 per cent were between 22-24 years. Graduates and post graduates were 75 per cent and 25 per cent

respectively. All the selected subjects were students (100%). With regard to dietary pattern 40% of subjects were vegetarians where as 25% and 35% were non-vegetarians and ovo- vegetarians respectively.

The finding of blood glucose response of the rice samples is given in table 1 and fig 1.

The difference between blood glucose response to reference food and test food (Siddi) at regular time intervals is presented in table 1. The initial blood glucose response of reference food was 95.8 while that of test food siddi was 65.1 indicating a significant difference between these two foods. The reference food response to blood glucose was found to be more than the siddi rice at regular intervals of time, hence a significant difference between the test and reference food was found at each time intervals at 1% level of significance.

Table 1: Blood glucose response to reference and test food (WGL44)

Interval	Blood Glucose Response to Reference Food(Glucose)(n=10) (mmol/L)	Blood Glucose Response to Test Food (WGL44) (n=10) (mmol/L)	f-value	Blood Glucose Response to Test Food (WGL283) (n=10) (mmol/L)	f-value
0 min (Fasting)	95.8±4.89	65.1±3.66	15.89**	64.2±5.64	13.38**
15	120.4±4.42	70.2±6.49	20.2**	69.1±7.80	18.09**
30	149.4±6.56	80.5±9.91	18.3**	81.2±9.49	18.69**
45	149.0±4.67	85.2±10.2	17.97**	91.1±12.2	14.01**
60	139.6±4.76	70.5±7.64	24.27**	63.4±3.46	40.90**
90	125.3±7.62	65.4±4.98	20.8**	61.2±2.39	25.38**
120	100.1±7.53	60.1±1.48	16.48**	60±2.10	16.20**

Values are expressed as mean ± SD; *Significant at 5% level; **Significant at 1% level; NS- Not significant

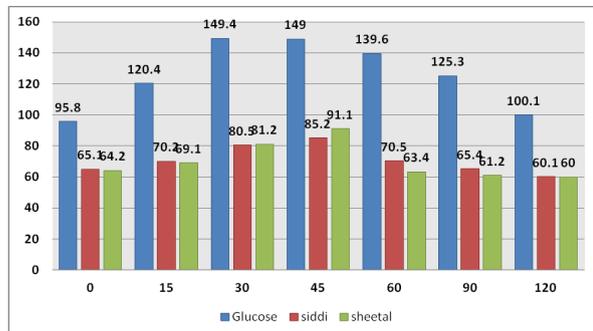


Fig 1 : Blood glucose response of siddi (WGL44) and Sheetal varieties

The difference between the test food (Sheetal rice variety) and reference food with respect to blood glucose response is presented in table 1 The blood glucose showed significant difference between the subjects who were given the test and reference food at 0.01 significance level at each time interval. The initial glucose level was 95.8 for reference food and 64.2 for test food. After 15mins the blood glucose of reference food was 120.4 while test found was 69.1 indicating a significant difference at 0.01 level. The mean difference between the reference and test food at time intervals of 30minutes, 45 minutes, 60mins, 90 and 120 minutes showed significant difference at 0.01%.

Table 2 : Blood glucose response to reference food and newly released rice varieties

	Mean blood glucose (mg/dl) at 15 min intervals						
	0M	15M	30M	45M	60M	90M	120M
Glucose	95.8	120.4	149.4	149	139.6	125.3	100.1
Siddi (WGL44)	65.1	70.2	80.5	85.2	70.5	65.4	60.1
Sheetal (WGL283)	64.2	69.1	81.2	91.1	63.4	61.2	60

C.V	39.5	209.1	202.9	134.9	570.4	434.6	253.11
C.D. at 1 % level	0.0001**	0.0001**	0.0001**	0.0001**	0.00001**	0.00001**	0.00001**

Values are expressed as mean; *Significant at 5% level; **Significant at 1% level; NS- Not significant

The difference between the test food (Siddi and Sheetal rice varieties) and reference food with respect to blood glucose response is presented in table 4. When the mean difference between the two test foods and reference food was compared a significant difference between the three food groups was found at regular time intervals at 0.01 significant level. It was observed that rice varieties Siddi (WGL44) and Sheetal (WGL283) had glycemic index level of 55 and 53.7 respectively (Jenkins et al.,1981). Therefore, they could be categorized as low GI varieties. Rice exhibits a wide range of GI values from as low as 54 to as high as 121.

The variation in Glycemic Index depends on many factors such gelatinization of starches, particle size, processing, chemical composition of starch, fibre(type and content) sugar, protein, fat, anti nutrients, acidity, cooking, resistant starch and speed of eating. (Gabisteenkamp2014; Eleazu2016)

From the study it can be concluded, that the two newly released rice varieties (WGL283 and WGL44) of CTZ could be categorized as low GI foods.

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