

Diet Oriented Safety of Pakistani Biryani with reference to Glycemic Response in Healthy Human Subjects

Asif Ahmed¹, Shaikh Nadeem Ahmed¹, Sara Sadiq², Lubna Farooq^{1*}, Humaira Arif¹, Sumreen Mujahid¹

¹Baqai Medical University, Karachi, Pakistan; ²CMH Institute of Medical sciences, Bahawalpur, Pakistan

ABSTRACT

Introduction: Traditional Pakistani Biryani is popular food particularly among Asian population. The objective of this study was to evaluate glycemic response of compound test food in conjunction with Food Oriented Diet Safety in healthy human subjects.

Material and methods: This Quasi-Interventional Study was conducted in research unit of Baqai medical university. This study was conducted in period of two days and twenty healthy volunteers were enrolled. On day 1; fasting blood sugars were checked. Subsequently on day 2 participants were instructed to report with 12 hr. fasting, Later Compound test food was offered according to Health Body Mass Index (BMI) and Calories Calculator. Sequential plasma glycemic response was recorded on 0, 30, 60, 90 and 120 minutes.

Results: Day 1, Glycemic response of study subjects showed mean glycemic value of 104 mg/dl. Day 2, glycemic response of 0, 30, 60, 90 and 120 minutes showed of 118,130, 121,109, 106 mg/dl respectively. This study highlights desirable incremental and decremented glycemic response after 30 & 120 mins respectively.

Conclusion: This study concludes; that consumption of tested compound food according to BMI expected to have physiological mean peak glycemic response. Therefore this study identifies that consumption of beef biryani is safe; as study population never showed abnormal mean glycemic peak.

Keywords: Glycemic response and index; Food safety; Fasting blood sugar; Acceptable glycemic dynamics

INTRODUCTION

Traditional Pakistani Biryani (Mixture of Rice & Beef) is a high ranked compound food, rich in carbohydrate and protein; known for high nutritional and taste value. Human corpus is highly dependent on carbohydrate and protein metabolism [1]. Food that have high in carbohydrates as well as raised glycemic index (GI) is directly linked with metabolic, vascular and malignant derangements [2,3]. Carbohydrate (CHO) digestion gets complex after the addition of other nutrients such as protein, yogurt and vegetable etc. thus causes undesirable effects on GI value [1,4]. These changes may be because of change in CHO hydrolysis rate and delaying Gastric emptying time etc. Many dietary trials clearly indicate that food with Low Glycemic Index have more desirable health responses [5]. Previous researches indicates that consumption of rice lowers cholesterol levels, reducing blood pressure, preventing colorectal cancer & Cardiovascular diseases [6,7]. It's hypothesized that consumption of combination of rice & beef (Biryani) would be beneficial for health. The aim of this research was to estimate glycemic burden of blood plasma glucose value in healthy volunteer after ingestion of compound test meal that contain rice, meat, yogurt, spices etc.

MATERIAL AND METHODS

A total of 30 subjects were enrolled and 10 were excluded from the study. Twenty healthy volunteers' male (55%) and females (45%) with mean age of 32.7 were recruited from Baqai Medical University.

Inclusion criteria

All study subjects were recruited after the announcement of study and were enrolled consecutively as they appeared for enrollment.

Exclusion criteria

All smokers, Diabetes Mellitus and pregnant ladies who were taken any medicine were excluded from the study. Written informed consent was taken from all subjects.

Study protocol

This study was conducted over the period of two days. On day 1st, all subjects were requested to observe with 12 hr fasting and requested to have

Correspondence to: Lubna Farooq, Assistant Professor, Baqai Medical University, Karachi, Pakistan, Tel: +03332303941; E-mail: Jlubna85@gmail.com

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breakfast at home around 8 a.m. in the morning and requested to reach at study center around 9:30 a.m. They were requested to sit comfortably in chair with temperature control environment At 10 a.m. first blood glucose level were estimated by using Rosche Diagnostics Ltd., Mannheim, Germany. This glucose sample record is considered as 2 hr pass prandial glucose level. The aim of this research is to validate the claim of healthy subjects on non-diabetics. The other objective of glucose estimation is to obtain a release of blood glucose value for comparison with 2nd day blood glucose response; blood sugars were recorded after 2 hr of meal research calculation by using standard glucometer (Rosche Diagnostics Ltd., Mannheim, Germany). The glucometer is auto-calibrated and there is no need to calibrate it again. Day 2, detail preparation of study subjects was observed; subjects were requested to refrain from unusual type and amount of eating, exercise, alcohol, protein and carbohydrate intake. A day before the study subjects were requested to consume carbohydrate 7 gram/kg over the period of 24 hours [8]. Night before test session study participants were instructed to finish their regular meals between 8:30-9 p.m. Next Morning subjects were requested to report in study center with 12 hours fasting. The participants were requested to sit in temperature control environment (25°C) and requested to remain seated throughout the study and were refrain from eating and drinking extra meal except the test meal.

Meal preparation

Freshly prepared standard compound test food-Pakistani Biryani were prepared and cooked according to standard recipe over the period of 3hrs (cooking temperature value between 80-140°C) by Trained Professional. The biryani contained rice, beef, spices, yogurt, green chili, red chili, water, garam masala, salt as needed, cooking oil, ginger garlic paste, meat yogurt, red chili powder, green coriander powder, cumin powder, turmeric, tomatoes for paste, potatoes, brown onions, garnish (green chili, green coriander, mint, lemon slices), chicken soup etc. Procedure: Add water in a bowl, then add rice and soak them for 20-25 minutes in water. In a bowl, add some water. Then add garam masala, salt cooking oil in this water and cook then strain and separate. Then add rice and cook for a while. In a pan, add cooking oil, ginger garlic paste, cumin, meat, garam masala, yogurt, salt, red chili powder, green coriander powder, cumin powder, tomato paste, turmeric and cook then add potatoes and simmer it for 5-7 minutes. Fry it for 2 minutes than take a bowl and add prepared masala in it then add garnish (lemon slices, tomato slices, green chilies, Chopped Ginger, Brown Onions, Crushed green coriander, Mint). Then add boiled rice and repeat this process. Now add yellow food color and simmer it for 8-10 minutes. Pakistani Biryani is ready to serve.

Meal administration

Food Dosage Criteria was based on human calorie requirement. Serving of compound test food calculation was made according to Body Mass Index by using Food, Health BMI & Calories Calculator. Approximately average food dosage-carbohydrate and protein 2.5/0.5 gram/kg respectively). Test Meal was served along with 250 ml of drinking water. All subjects were requested to finish test meals within 10 min and requested to consume 250 ml of water during whole study period.

Glycemic response estimation

Sequential plasma glycemic response was recorded at 0, 30, 60, 90 & 120 minutes.

STATISTICAL ANALYSIS

Data is analyzed by obtaining the Mean, Standard deviation, Percentage and One Way Repeated ANOVA, Paired T Test & Multi Variant Test done by using Statistical Package for the Social Sciences (SPSS) version-21.

RESULTS

Day 1; The first sample i.e., 2 hr past prandial blood glucose level mean

value of 104 ± 6.6 mg/dl; whereas Gender based distribution showed minimum variation (Male, Female ± 7.7 & 5.3 mg/dl respectively). On day 2; 0 time value of mean glycemic response showed Cumulative mean of 118.16 ± 25.1 mg/dl (M, F) 114.18 ± 19.3 & 113.5 ± 17.2 mg/dl respectively). Whereas Glycemic Response 30 minutes showed Expected Incremental Response as it is expected to have incremental response of plasma glucose level after 30 minutes of ingestion of test meal due to digestion of CHO with cumulative mean of 130 ± 17.1 mg/dl. Furthermore; glycemic response at 60 minutes showed decremented response of 121.37 ± 18.2 mg/dl. Glycemic response at 90 minutes showed decremented response as depicted by cumulative mean of 109 ± 11.8 mg/dl. Finally at 120 minutes the Mean Glycemic Response Value dropped to 106.32 ± 13.98 mg/dl (Figure 1) peak value after 30 minutes and decline in the value after 90 minutes. Comparative percentage analysis of glycemic response showed 10% increase after 30 minutes as compare with zero time value; whereas after 60 minute, 7% increase has been recorded. Interestingly, because of body's utilization of Sugars, when a comparison is conducted between 30 minute and 60 minute, 3% of decremented glycemic response was noted. Similarly decremented response remains continued with value of 5% & 2.7% as compare to 30 minutes response. Further evaluation of statistical power was carried out by One Way Repeated ANOVA, Paired T Test & Multi Variant Test & Found Significant (Table 1).

DISCUSSION

In the last 10 years the culture of Global Food Ingestion is markedly changed. Presently the global human population has shifted from consumption of simple food to the compound food [9]. One of such Asian Popular Compound Food is Beef Biryani. The biryani (rice & beef) is good source of carbohydrate and protein. There is common perception that consumption of this compound food may play hazardous role in health status; therefore this study was conducted to evaluate immediate short term glycemic response after consumption of test meal. This study clearly unfolded the dynamics of glycemic response after the consumption of standard quantity of compound food. Serial changes in Glycemic response established a pattern of glucose response after test compound of the popular compound food. Nature has given a separate system responsible for smart handling of glucose load delivered to individual cell. Effect of Plasma Glycemic Response is directly linked with Cellular Metabolic Activity such as Generation of Energy Molecules & Proteins Production etc. [10-12]. Abnormal Glycemic Response & Glucose Handling may manifest as Metabolic Stress & Modification of Hormonal Responses [13]. Such abnormal responses are directly linked with deleterious and debilitating pathologies like Diabetes mellitus, Ischemic Heart Diseases and Cancer [14-16]. As fast and short term changes in Glycemic response is directly linked with pathogenic and perform of various metabolic and malignant disorder [17,18].



Figure 1: Glycemic control with area under the curve.

Table 1: Paired t-test for intra group variation.

		Paired t-test for intragroup variation						
		Paired Differences					t	p-value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	RBS ₀ - RBS ₃₀	-20.105	15.191	3.485	-27.427	-12.783	-5.769	0.000
Pair 2	RBS ₃₀ - RBS ₆₀	12.632	22.993	5.275	1.549	23.714	2.395	0.028
Pair 3	RBS ₆₀ - RBS ₉₀	12.368	14.419	3.308	5.419	19.318	3.739	0.002
Pair 4	RBS ₉₀ - RBS ₁₂₀	2.684	8.641	1.982	-1.481	6.849	1.354	0.192

The ideal compound food must be able to Stimulate Physical Insulin Release by Beta-Cell of Langerhans to protect for Secondary Injuries related with high Glycemic Index food [19,20]. As the digestive time of protein (beef) is much longer than complex carbohydrates; therefore it is prudent to subtract the effect protein metabolism in the initial 2 hours post prandial time. Normally digestive time of CHO is different from protein [20]. This study support identify that consumption of beef biryani is limited use (7gm/kg) did not raise plasma glucose level at any pathological level is particularly safe; as Study Population Never Showed Abnormal Mean Glycemic Peak the expected normal Glycemic Peak for compound-foods at 30, 60 and 120 minutes using the international peak table [21]. The highest recorded cumulative mean peak was 130 mg/dl that subsequently showed Desirable Decrement Response noted up to 2.7% as compare to 30 minutes [15].

CONCLUSION

Finally this study also conclude that as long as consumption of compound food is done with Physiological Dietary Window (The body tolerate different foods related glycemic response) chances of Abnormal Glycemic Response can be minimized. The study clearly identifies that consumption of compound food according to BMI expected to have Peak Glycemic Response within Physiological Limit.

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LIMITATION OF THE STUDY

Small sample size.

CONFLICT OF INTEREST

None.

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