

## Glycaemic index variability of indigenous cereal crops in perspective of blood glycaemic control

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Rice and wheat are by far the most important staple crops in Pakistan. Previously published studies report that crops are significantly contributing to the agricultural Gross Domestic Product (GDP) of Pakistan.<sup>1,2</sup> Almost entire population eats rice and wheat as their principal cereals in meals.<sup>3</sup> Starch in cereals crops is important because it constitutes the largest portion of the diet and is the major blood glucose generating component in humans.<sup>2</sup> Starch is composed of amylose and amylopectin. An alteration in amylose and amylopectin ratio leads to change in the quality of starch.<sup>4</sup> An increased amount of amylose content causes starch compactness.<sup>5</sup> In addition to this, arabinoxylan (AX) and beta glucan (BG) present in endosperm and outer layer of the grains, may interact with starch, reducing its degradation and absorption in the gut.<sup>6,7</sup> Additionally, bioactive compounds/antioxidants in crops/plants are promising to reduce dietary carbohydrates conversion into blood glucose and successive prevention of oxidative stress and glycation processes in diabetic patients.<sup>8</sup> Briefly, due to influence of various factors such differences in varieties, degree of processing, amylose content, variations in antioxidative properties such as total phenolic, flavonoids etc., fluctuations in seasonal and climatic conditions crops behave differently to be converted into blood glucose.<sup>9</sup>

Glycaemic index (GI) is a tool which is used to assess the rate of carbohydrate degradation in digestive tract with successive elevation of glucose into the blood circulation. Globally, people used glycaemic index (GI) values to evaluate foods so that obese, prediabetic and diabetic patients can selectively ingest such type of carbohydrates which slightly raise blood sugar level. Through this GI parameter various dietary carbohydrates are classified as high ( $GI \geq 70$ ), moderate ( $GI = 55-69$ ) and low ( $GI < 55$ ) glycaemic indexed foods.<sup>10</sup> Foods with low and high GI values are termed as starchy and sugary, respectively. In the gut, sugary foods are rapidly converted into blood glucose than starchy ones.<sup>11</sup> Dietary starch restriction is

regarded as the first approach to prevent overwhelming effects of increased blood glucose level during hyperglycaemic state in diabetic patients.<sup>12</sup> Previously published studies from India and Bangladesh reported glycaemic indices of basmati rice, white rice and brown rice i.e.  $GI = 50-60$ ,  $GI = 72-83$  and  $GI = 48-62$ , respectively.<sup>13-16</sup> Similarly, a study from Thailand reported a rice variety (PK+4#20A09) that showed significant blood glucose lowering effect in prediabetic subjects.<sup>17</sup> So far no study has been conducted/published on glycaemic indices (glycaemic index and glycaemic load (GL)) of indigenous crops including rice, wheat and maize etc. varieties in Pakistan. Therefore, evaluation and rating of Pakistani crop varieties (rice, wheat and maize) on the basis of their GI and GL values may become useful to provide clues about their slow and fast blood glucose responses. In the light of above described facts, prospective studies are required to explore and identify low glycaemic rice, wheat and maize varieties locally grown in different seasonal and climatic regions of Pakistan.

Through futuristic research Pakistani rice, wheat and maize varieties can be classified/ranked as high, medium and low glycaemic indexed crops. These will also lead to increase trust of consumers/users within country and abroad as well. Resulting in export and consumption of low glycaemic crops will be increased. Screening of low glycaemic rice, wheat and maize varieties may become fruitful to manage overwhelming consequences of increased blood glucose level during insulin resistance/prediabetic or diabetic conditions in humans. Besides this, such kind of research will provide guidelines for policy makers, farmers, researchers and implementation of findings will surely benefit all the people.

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