

The Glycaemic Index of Dried Dates in Healthy Subjects

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ABSTRACT

The Glycaemic index was developed to predict the effect of carbohydrate containing foods on blood glucose. To determine the glycaemic index of dried dates, a 50 grams oral glucose tolerance test (OGTT) and oral dried dates tolerance test were performed in 7 healthy volunteers. The glycaemic index (GI) of dried dates was calculated and found to be 72%. When the amount of dried dates was reduced to half, the GI was 89%. From the limited data, we conclude that dried dates has a high glycaemic index even when a small portion is eaten.

Dried dates are a delicious food-stuff to many people, particularly to the native people of the Middle East. Our clinical experience has been that some diabetics are also interested to learn whether they can include dried dates in their meal list.

Dried dates contains 63-73% carbohydrates,^{1,2} of which 45.4% is sucrose.³ This however, does not necessarily imply that its consumption will result in elevated blood sugar out of proportion to other common food-stuff that have lower sugar content. This fact was realised by Moskowitz in 1937 when he noticed that the analysed carbohydrate content of a food did not correspond with subsequent blood sugar responses. For that reason he advised that dietary recommendations be based on biologic responses to foods rather on their chemical content.

It may be expected that since dried dates are rich in fibers, this would blunt the glycaemic response, as 100 grams of dried dates contains around 7.5 grams of fibers.^{2,5} However, Jenkins et al,^{6,7} showed that some high fiber diets may not lead to lower GI.

Many studies were undertaken during the last ten

years, in order to develop food content tables that illustrate the physiologic effects of carbohydrate containing foods.^{6,7} The GI was developed to predict the effect of carbohydrate containing foods on blood glucose. So far, from the review of the literature available to us, there is no report of the GI of dried dates.

METHODS

Informed consents were obtained from 10 volunteers not known to have any chronic disease, or any acute illness at the time of the study. The volunteers were 6 females, and 4 males. On the first day of the research only 8 volunteers showed up, 5 women and 3 men; one man had a fasting blood sugar (FBS) of 168 mg/dl, so he was not included in the study.

The mean age of the volunteers was 34 years (range, 29 to 39); the mean body mass index, as determined from a normogram,¹² was 25 (range, 23 to 29).

The subjects were asked to fast overnight and report to the clinic at 7:15 am for two days; the 21st and 23rd of May, 1990. They were randomly divided into 2 groups; one group consisted of 3 members and received dried dates on the 1st day and 50 grams of glucose dissolved in water on the other day, the other group (4 members) received the same amount of glucose and dates on the 21st and 23rd of May 1990, respectively.

The dried dates portion, 91 grams with stones, contained 50 grams carbohydrate as determined from food tables.² The type of dried dates consumed was Bishi.

The blood samples were obtained by finger prick using an Autoclix(R), and the blood sugar levels were measured by a Reflolux(R) S reflectance meter using a Haemo-Glucotest(R) 20-800 R strips; all these instruments are produced by Boehringer Mannheim GmbH

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(Mannheim, W. Germany). After getting a FBS on all the volunteers, the dried dates were ingested over 3 to 5 minutes and the glucose over 1-2 minutes. Blood sugar was measured at 30, 60, 90 and 120 minutes after the beginning of ingestion of each item.

The accuracy of the reflectance meter was ensured by comparing two blood results on every day of the study with that obtained by Beckman glucose autoanalyser; the 4 samples compared favourably ($\pm 4\%$).

To examine the effect of a smaller portion of dried dates on the blood glucose the same volunteers were asked to repeat the same process mentioned above, but this time after ingesting 25 grams of glucose and 45.5 grams of the same type of dried dates. This time, only 3 of the 7 volunteers showed up. The mean body mass index of the 3 volunteers were 24 (range, 23 to 26).

The mean blood sugar values were plotted, and the GI was determined using the following equation:

$$GI = \frac{\text{Blood glucose area of test food}}{\text{Blood glucose area of reference food}} \times 100^{3,7}$$

where the available carbohydrate content of tests and reference foods is the same.

RESULTS

The meals were well received by all the volunteers. In the case where 50 grams of glucose, and 91 grams of dried dates were used; the mean glycaemic index of dried dates was 72%. The maximum mean blood glucose level obtained after ingestion of dates was 112 mg/dl, this was reached after one hour; in the case of glucose this was 160 mg/dl and was again reached after one hour (Fig 1).

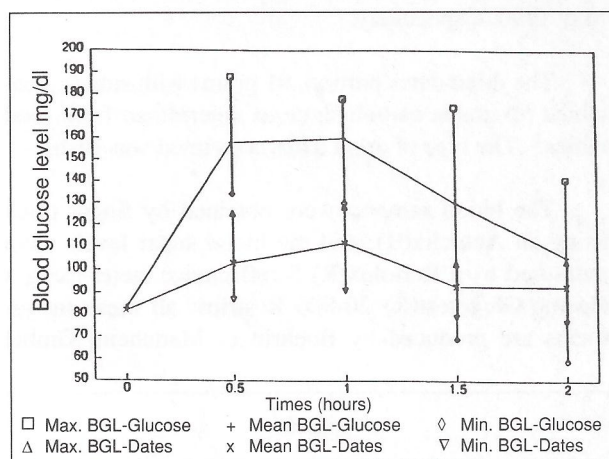


Figure 1 Mean blood glucose levels (BGL) before and after ingestion of 50 gms of glucose and 91 gms of dates in 7 healthy volunteers

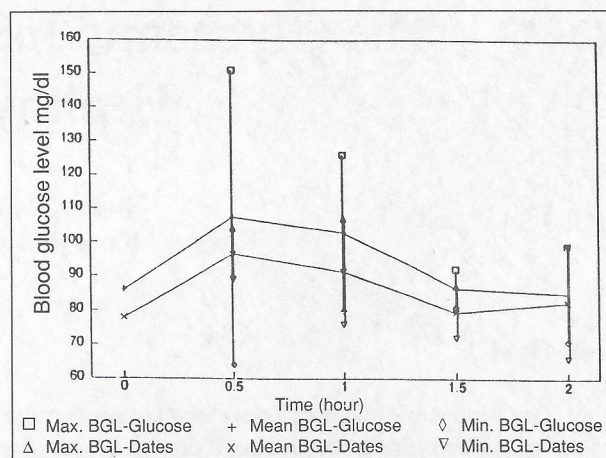


Figure 2 Mean blood glucose levels (BGL) before and after ingestion of 25 gms of glucose and 45.5 gms of dried dates in 3 healthy volunteers

When 25 grams of glucose and 45.5 grams of dates were consumed by 3 volunteers the mean GI was 89%. In each of the 3 cases, the GI was higher than that obtained when 50 grams of glucose and 91 grams of dried dates were ingested by the same volunteers. The maximum mean blood glucose level was 97 mg/dl and 117 mg/dl for dried dates and glucose respectively. In both cases these levels were reached after 30 minutes of ingestion of the meals (Fig 2).

DISCUSSION

We elected to use dried dates rather than the fresh form, because the former is available all year round, and hence, it is consumed more than the latter. The type of the dried dates ingested was Bishi. This type seems to be the most common type consumed by the general population of Bahrain.

Jenkins et al, has shown that glycaemic indices in normal and diabetic subjects are significantly related.⁷ Moreover, Famuyiwa et al, found the glycaemic index of semi-dried sukkari dates in mature colour stage to be 67.7% in non insulin dependent diabetic patients and 68.6% in healthy controls.¹³ The results of this study may be applicable to diabetics as well as healthy subjects, however, further investigation is required.

Some may question if dried dates is a high fiber food item. So far there is no definite definition for a high fiber diet;¹⁴ yet, patients who need a high fiber diet are advised to add the equivalent of 10 grams of crude fiber or more to the diet per day.³ A hundred grams of dried dates contains 7.5 grams of fibers, on the average this is equivalent to 8 pieces.

The fiber content of dates was expected to blunt the effect of its carbohydrate content; however, we found a GI of 72%; this is even higher than that of sucrose alone - 59%.¹¹ Some high fiber products such as wheat products have no remarkable effect on the glycaemic response;^{6,7,11} while others like Guar, which is derived from the cluster bean, is 230% more effective than wheat bran in flattening the peak rise in glucose concentration when added to 50 g glucose loads.¹⁵

Jenkins et al have demonstrated that differences in glycaemic response at high dosage levels may not be seen when foods are tested at low dosage.^{4,11} This was not the case in dried dates as a low dosage produced a higher GI in the 3 volunteers who constituted the second sample group. The cause of this findings are not clear, but it may be related to the marked flattening of the 25 grams OGTT curve by 28% when compared to 50 grams OGTT (measured by determining the areas below the 25 & 50 grams OGTT). However, when the 45.5 grams and 91 grams dried dates tolerance curves were compared, the former was more flat by 10% only.

Bantle et al¹⁶ showed that dietary sucrose, when consumed as part of a meal, does not aggravate postprandial hyperglycaemia. This may apply to dried dates. The GI of a particular food stuff is affected by factors other than the simple process of digestion, content, and absorption of the food item in question; the fat, protein and fiber content may attenuate the blood glucose response to a particular carbohydrate.^{11,16,17} This is due to the delayed gastric emptying by fat, and possibly by fibers, as well as the stimulation of insulin release by proteins which may apply to dried dates.

CONCLUSION

Dried dates has a high glycaemic index of 72% in healthy subjects which may be also true in diabetic patients. When the amount of dates ingested was halved, the GI increased. These information suggests that diabetics should avoid eating dried dates. Further studies using larger samples to confirm these findings in diabetic patients are needed.

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