

## Dietary habits and practices of type-2 diabetic patients in a tertiary care centre of Islamabad, Pakistan

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### Abstract

**Objectives:** To determine the relation between food intake and diabetes control.

**Methods:** This cross-sectional study was carried out at Department of Medicine and Endocrinology, Shifa International Hospital, Islamabad, Pakistan, from July 2016 to February 2017, during which type-2 diabetes patients were interviewed using a structured questionnaire. Demographics, intake of high glycaemic index foods consumed in each food group, and general dietary practices were assessed by means of number of meals per day and adherence to the dietary plan. Glycated haemoglobin A1c values were recorded as well. SPSS 21 was used for data analysis.

**Results:** Of the 180 patients, 100(55.6%) were taking three meals a day. Besides, 108(60%) had an income >Rs50,000. Moreover, 127(70.6%) patients were not aware of the type of diabetes, while 117(65%) patients had high glycated haemoglobin levels. Furthermore, 148(82.2%) made a change in diet following diabetes diagnosis, while 168(93.3%) had recommended food available in their house, and 65(36.1%) followed a strictly-recommended dietary schedule. A statistically significant association was found between the consumption of different desserts/sweets and glycated haemoglobin levels ( $p=0.008$ ) followed by fruit intake like mangoes ( $p=0.004$ ) and grapes ( $p=0.02$ ).

**Conclusion:** There is a need to educate diabetics regarding diet management in terms of glycaemic index of foods.

**Keywords:** Diabetes, Dietary habits, Dietary practices, Glycaemic index, Glycaemic control. (JPMA 68: 825; 2018)

### Introduction

Diabetes Mellitus (DM) is one of the greatest challenges to healthcare in the 21st century, affecting 415 million people globally and around 35.4 million people in the Middle East and Non-African (MENA) Region.<sup>1</sup>

Pakistan, among the 19 countries of the International Diabetes Federation (IDF) MENA region, is currently host to around 7 million diabetics. By 2040, it is expected that this figure will rise to 14.4 million, making Pakistan 8th largest diabetic population (20-79 years old) in the world.<sup>1</sup> In Pakistan, 9.4% of the rural and 9.5% of the urban population have diabetes. Total glucose intolerance (impaired glucose tolerance [IGT] and DM) is 17.15% in rural and 22.04% in urban areas.<sup>2</sup>

One of the most common non-communicable diseases, DM has become one of the primary causes of morbidity and mortality across the globe. It is

associated with large varieties of complications like retinopathy, chronic kidney disease and non-traumatic lower limb amputation. Congestive heart failure is more common in type-II diabetics as compared to a non-diabetic population.<sup>3</sup> Recent studies in Pakistan revealed that 41.8% of a sample of Chronic Kidney Disease patients also had DM,<sup>4</sup> whereas 58.94% patients in the age group of 40-60 years had diabetic retinopathy.<sup>5</sup> 50% of the non-traumatic amputations are due to DM.<sup>6</sup>

Diabetes imposes a significant economic burden, with 12% of global health budget dedicated to its treatment and related complications. According to IDF, diabetes cost between \$673 billion and \$1,197 billion in healthcare spending by the end of year 2015.<sup>1</sup> In Pakistan, mean annual direct cost per diabetic patient is \$197.<sup>7</sup>

To maintain good glycaemic control and to prevent diabetes-associated health complications, diet management plays an indispensable role as a therapeutic strategy. Dietary modifications have been an imperative constituent of therapy since before the use of Insulin.<sup>8</sup> It is of immense value to conduct large-scale awareness programmes for diabetics on diet intervention plans.<sup>9</sup>

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Since diabetes is one of the major metabolic disorders prevalent globally, it is important to explore all avenues of therapeutic strategy; balanced diet being one of them. This study will emphasise strictly on some carbohydrate-rich foods that can influence post prandial glycaemia in diabetics, and consumption of which need to be strictly limited. Statistics gathered through this research will enable health-care professionals to guide patients based on glycaemic index of different foods and also provide for effective diet counselling. The data collected may also encourage diabetics and potential diabetics to adopt a healthy lifestyle, thus reducing the chance of complications and the risk of onset of diabetes.

The current study was planned to determine the dietary habits and practices of patients suffering from type-II diabetes mellitus (T2DM) in Pakistan. The secondary objective was to determine the relation between food intake and diabetes control.

### Patients and Methods

This cross-sectional study was carried out at the Department of Medicine and Endocrinology, Shifa International Hospital (SIH), Islamabad, Pakistan, from July 2016 to February 2017. The sample size was calculated using World Health Organisation (WHO) sample size calculator: keeping confidence level 95%, anticipated population proportion 13%,<sup>10</sup> and absolute precision required 5%. Sampling method used was consecutive non-probability. Those included were T2DM patients <65 years of age of either gender with at least a year of diagnosed diabetes and taking regular medication. Patients who were not willing to give consent and diabetics with nephropathy confirmed through medical history were excluded.

Institutional ethics review board granted approval to the study prior to data collection. Data was collected from patients via face-to-face interview using a questionnaire designed by students of Shifa College of Medicine. The questionnaire was not pilot-tested or validated. Informed verbal consent was taken from patients presenting at the SIH. First demographics, then eating practices and then eating habits were asked which took approximately 15-20 minutes per patient. Diabetes control was assessed on the basis of glycated haemoglobin (HbA1c) reading checked from the patient's record in the last three months. The consent form and questionnaire was translated into Urdu for patients who could only understand English language.

Following data collection, patients were educated regarding the foods to be consumed with low glycaemic indices.

Dietary habits were assessed by means of high glycaemic index (GI) foods consumed in each food group, in the past one week. For this purpose, food groups were divided according to the food pyramid guide.<sup>11</sup> Dietary practices were assessed by means of number of meals per day, timings of the meals, diet change following diagnosis, availability of right type of food available in house and adherence to a strictly recommended dietary schedule. Relationship of control of diabetes with food intake was assessed by finding an association between consumption of high GI food items in different food groups and HbA1c levels. Patients with HbA1c level of 7% or less were considered to have controlled blood sugar levels, while those with HbA1c >7% were considered to have uncontrolled blood sugar levels.

GI is defined as a relative ranking of carbohydrate content in foods in accordance with their effect on blood glucose levels.<sup>12</sup> According to International Glycaemic Index database, foods with GI >55 are labelled as high GI foods.<sup>13</sup>

Data was entered and analysed using SPSS 21. Descriptive statistics were calculated. For qualitative variables like demographics, eating practices and eating habits and percentages were calculated. The blood sugar control in terms of HbA1c was compared with the consumption of high GI foods using chi square test.  $P < 0.05$  was considered statistically significant. The variables modelled for this statistical test included: food intake in terms of yes/no, and blood sugar control in terms of yes/no, with cut-off HbA1c value at 7%. Association between financial conditions and glycaemic control was also assessed with Chi square test, using the three categories of income: <Rs20,000, Rs20,000-Rs50,000, Rs>50,000 for monthly income, and blood sugar control in terms of yes/no as the variables.

### Results

Of the 180 patients, 82(45.6%) were male and 98(54.4 %) were females. The mean age of the subjects was  $50.3 \pm 11.2$  years (range: 17-65 years). Besides, 108(60%) people had a monthly income of more than Rs50,000, 56(31.1%) had it between Rs20,000 and Rs50,000, and 16(8.9%) had an income of less than Rs20,000.

The mean duration of DM was  $8 \pm 6.2$  years. Moreover,

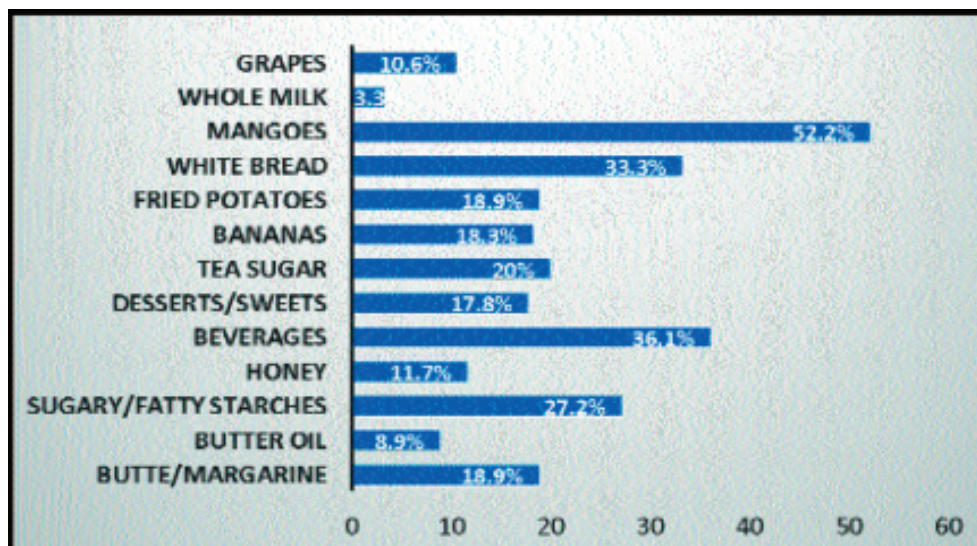


Figure-1: Percentage of people consuming different high glycaemic index foods.

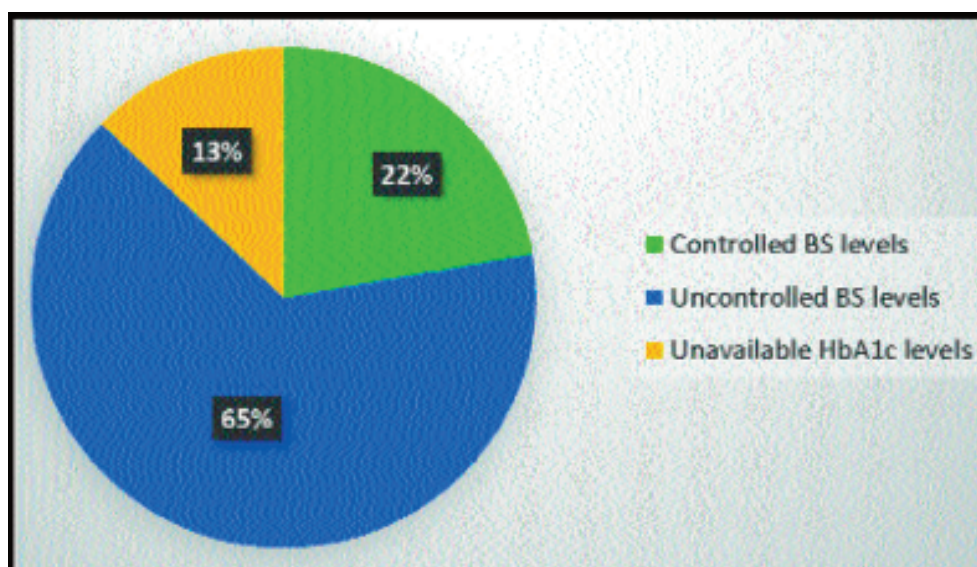


Figure-2: Glycaemic control of patients.

127(70.6%) subjects were not aware of the type of diabetes, 8(4.4%) knew they had Type-1 DM, while 45(25%) knew they had Type-2 DM.

Mean fasting blood glucose was 155±72.5 mg/dl and mean random blood glucose was 195±95 mg/dl. When asked about how frequently do they check their blood glucose, 9(5%) subjects said they did not check blood glucose, 24(13.3%) said they checked it once a day, 68(37.8%) said they checked it 2 times a day, 58(32.2%) checked it once a week, and 21(11.7%) checked once a month. Eating practices of DM patients were also

noted (Table).

Potatoes were being consumed by 83(46.1%) people as per last week recall any time during the week, out of which 29(34.9%) people reported eating fried potatoes and 54(65.1%) ate cooked potatoes either alone or mixed with vegetables and meat. Besides, 106(58.9%) people said they drank milk last week, out of which 100(94.3%) reported taking low-fat or skimmed milk. Moreover, 88(48.8%) patients reported taking bread out of which 60(68.2%) specifically took white bread. When asked about the type of oil used for cooking food, 164 (91.1%) patients said they use cooking oil. When asked to recall frequency of fast food consumption in a week, 44(24.4%) patients said they ate fast food twice a week, while 7(3.9%) reported taking fast food approximately five times a week (Figure-1).

A statistically significant association was found between the consumption of different desserts/sweets and high

HbA1c levels ( $p= 0.008$ ), followed by fruit intake like mangoes ( $p = 0.004$ ) and grapes ( $p = 0.02$ ). The rest of the foods tested included butter/margarine, butter oil, sugary/fatty starches, honey, beverages, tea sugar, desserts, whole milk, fried potatoes, white bread and bananas. However, no significant association with high HbA1c levels could be established ( $p>0.05$  each).

A significant association was noted between high HbA1c levels and a monthly income <Rs20,000 ( $p= 0.00037$ ). Figure-2 shows the glycaemic control of patients.

**Table-1:** DM patients' eating practices.

	Yes (No. of patients)	% of patients
Did you make any change in diet following diagnosis?	148	82.2
Do you eat the same meal as your family?	143	79.4
Is the recommended food available in your house?	168	93.3
Do you follow a strictly recommended dietary schedule?	65	36.1

Number of meals per day	No. of patients	% of patients
2	18	10
3	100	55.6
4	34	18.9
5	28	15.6

Meal timings	Yes (No. of patients)	% of patients
Breakfast	179	99.4
Morning snack	48	26.7
Lunch	155	86.1
Evening tea +snack	53	29.4
Dinner	177	98.3

## Discussion

Diabetes has emerged as a major public health problem in Pakistan. This study evaluated dietary habits among diabetic patients for planning a successful nutritional intervention. 54.4% of the patients that presented with diabetes were female, and these findings are consistent with an earlier study.<sup>14</sup> The mean age of our patients was  $50.3 \pm 11.2$  years with a mean duration of DM as  $8 \pm 6.2$  years, which is comparable to statistics of a study.<sup>9</sup> HbA1c value of less than 7% indicates good glycaemic control in diabetics, and studies show that most of the people did not fall into this category and had higher HbA1c values.<sup>14</sup> Similarly, our study also shows that around 65% of the patients had HbA1c greater than 7%.

Respondents believed that their disease demanded self-management activities to lower the risk of long term complications including retinopathy, neuropathy and nephropathy. Hence majority of the patients did fasting and random blood glucose testing on a regular basis. Only 9(5%) of them did not keep a record of their blood glucose. This is in contrast to a study of UAE conducted in 2008, in which around 60% of the patients did not perform self-monitoring of blood glucose.<sup>14</sup>

Diabetes remains an incurable lifelong disease which

can be kept in control by diet and lifestyle modifications. Appropriate diet can control disease progression and limit health complications. Diet change following diagnosis was found to be a common practice in our sample of patients. This is consistent with a study in 2006, which concluded that 57.4% of the DM patients with poor dietary habits and high body mass index (BMI) values prior to the disease diagnosis had a decrease in BMI after implementing recommended changes in meal selection and preparation.<sup>8</sup> It is vital for diabetics to consume foods with low glycaemic index and avoid sugary drinks, saturated fats etc.<sup>15</sup>

Regarding diet control, 94% of the patients in our study consumed low fat or skimmed milk. In comparison, one study showed 75.7% patients consumed skimmed dairy products,<sup>8</sup> while another study reported 51% subjects consuming skimmed milk.<sup>14</sup> Dietary practices in our study were judged according to the timings and frequency of meals consumed. Observational trials in the past have found that eating more than three meals a day may contribute towards becoming overweight or obese.<sup>16</sup> However, this totally depends on the caloric content of each meal and the physical activity and metabolic rates of the individual. For diabetics, it is generally recommended to eat 5-6 smaller meals spaced evenly throughout the day to prevent elevated blood sugars at one time. In our study, 100(55.6%) of the patients were taking three regular meals a day, with 62(34.5%) people taking snacks in between meals. These findings are similar to those from a study in Saudi Arabia where 63.9% of subjects ate three regular meals daily and 23.3% took snacks between meals.<sup>17</sup> Only 18(10%) subjects in our study were taking two meals a day.

Inability to afford safe food is a major risk factor contributing towards poor glycaemic control as concluded by previous studies.<sup>18,19</sup> Our study showed that individuals belonging to the low monthly income group had significantly poor glycaemic control as compared to the middle and higher income groups.

Education, awareness and social support are imperative in disease management. A recent study in Pakistan concluded that only 58% were aware that blood sugar could be controlled by proper diet, oral hypoglycaemic drugs and insulin, while a significant 42% of the patients did not know about the drug Insulin. A mere 18% patients considered that their diet should contain less sugar/sweet to control diabetes while 52% thought that they should only stop taking

sweets. Around 60% diabetics ate bitter edibles to lower their blood sugar levels.<sup>9</sup> Adequate knowledge regarding the disease itself is rare in Pakistan.<sup>10</sup> In our study, 127(70.6%) patients were not aware of the type of diabetes they had, and also few of them 67(36.1%) followed a strict diet schedule. Previous studies from Asia and Middle East also revealed that the knowledge related to diabetes was poor among people with diabetes.<sup>20-22</sup>

The ultimate dilemma for diabetics is to devise a balance between affording to eat small quantities of sweet foods while at the same time keeping blood sugar levels within close to normal range. This can only be possible if they perform regular exercise, burning surplus calories and keeping a healthy BMI along with their routine medication. However, it can be safely concluded through trials that diabetic patients who only consume low GI starchy foods have a relatively better blood sugar control and lipid profile.<sup>23</sup> In a country like Pakistan, no standard guidelines related to diet are available that can be followed upon strictly by the masses. Caloric values of the foods are not well defined and mostly not read before consumption.

The current study had its limitations such as the patient's dietary habits instrument was based on self-report and there is possibility that results might not have contributed to exact estimate. All confounding factors which might play a role in reporting the dietary habits were not considered. Daily exercise duration which should ideally be thirty minutes brisk walk for diabetics was not considered in the study as it only focused on food consumption. Exercise is as important as limitation of high GI foods to control blood sugar. The study design and sampling technique we used could not establish valid causality of association among other variables. Our study setting was institution-based therefore findings may not be generalised to other diabetic population. The study was only confined to fruits in summer season such as mango, grapes, and peaches. Data collection was based on patient recalling their diet in the last week. This way the data collected had errors relating to how accurate the patient could recall. Inaccuracy regarding the quantity of fruits such as grapes and mangoes also created a disparity in the results. Since the foods could not be quantified due to recall bias, the total caloric intake of patients could not be estimated in the results and compared with the required standards. These limitations can be overcome if patient's keep a

record of daily dietary intake in terms of GI. In our study we could only find a positive association between consumption of three foods and high HbA1c levels, including mangoes, grapes and desserts. This may be attributed to the increased frequency and quantity of consumption of these particular foods, an aspect which was excluded from the study protocol due to a recall bias and an attempt to make results as accurate as possible.

## Conclusion

Majority of the patients had high HbA1c levels, which can either be attributed to a sedentary lifestyle, non-compliance to medication, or presence of comorbidities. In our study we found association of high HbA1c levels only with consumption of specific high GI foods. The study also showed that glycaemic control was influenced by poor financial conditions. Thus, efforts should be made to create awareness regarding the correct choice of foods in terms of low glycaemic index for all diabetic patients.

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**Conflict of Interest:** None.

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