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Dietary Practices Observed by Type 1 Diabetic Subjects Reporting at a Tertiary Care Unit of Karachi, Pakistan

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Abstract: This study was conducted to assess the common dietary practices among children with Type 1 Diabetes Mellitus (T1 DM). This is a sub study of another study conducted among type 1 diabetic subjects from July 2011-June 2012 at Baqai Institute of Diabetology and Endocrinology (BIDE) and Diabetic Association of Pakistan (DAP). Children with Type 1 DM aged 10-20 yrs registered in these centers were selected to record their dietary intake through pre-designed questionnaire based on the 24 h dietary recall interview. Food Guide Pyramid was used to assess and compare the dietary intake of these patients with recommendations. The dietary record showed that all 103 Type 1 DM subjects were consuming bread and cereal in which 53.9% were taking recommended servings. Seventy nine were taking meat group in which 44.3% were taking recommended serving, Fifty Nine were consuming milk group in which only 11.9% consumed recommended servings of milk daily. Fifty two patients were taking vegetable group in which only 11.5% were taking recommended serving. Twenty eight patients were consuming fruits in which 25% were taking recommended servings of fruits while rests of them were taking below the recommendations. Majority of type 1 DM patients were taking the bread and cereals group according to the recommended servings while meat, milk, fruits and vegetable groups were not consumed according to the recommended guidelines of Food Guide Pyramid. Mothers need to concentrate on planning for their children's meals and snacks and they must encourage their child in making the healthy food choices.

Key words: Type 1 diabetes, dietary intake, food guide pyramid, recommended servings, children and young adults, glycemic control

INTRODUCTION

Diabetes is a chronic and progressive disease which leads to many complications if not treated properly (Rafique *et al.*, 2006). It is estimated that there are 6.76 million people in Pakistan with diabetes according to International Diabetes Federation (IDF) in which T1DM recorded less than 2% of the total diabetic population (IDF Atlas, 2013; Shera *et al.*, 2008). Management of diabetes requires multi disciplinary team approach and good glycemic control can be achieved by life style modification along with dietary adjustment (Mir, 2014; Riaz *et al.*, 2014; Hakeem *et al.*, 2008).

Healthy diet is a balanced diet which can not only improve glycemic control may also prevent many other complication related to diabetes (Silverstein *et al.*, 2005). Adequate intake of carbohydrate may prevent hypoglycemia and hyperglycemia (Mehta *et al.*, 2008; Mayer *et al.*, 2006).

Food is the main source of energy. Children and young adults being in the developmental stage needs more energy to cope with the physical changes taking place at

this crucial stage (ADA, 2010; Larson and Sztainer, 2009). As Type 1 Diabetes Mellitus usually affects children and young adults they need a balanced and healthy diet for their growth and development (ADA, 2014; Irwin, 2002).

Food guide pyramid provides general guidelines for daily consumption of different food groups which promotes healthy eating habits. It is based on six groups, bread and cereals, fruits, vegetables, meat and poultry, dairy products and sweets and fats, all are essential for body to function its mechanism. Every group has its own importance and role in our body so it is necessary to take recommended serving from each group (Food Guide, 2014; Insel *et al.*, 2004; Ensminger and Ensminger, 1993).

The dietary practices vary from country to country and various factors influence the food habits of patients. Studies related to dietary practices were mostly conducted in European countries (Muntoni *et al.*, 2000). Pakistan has a distinct social and cultural background which may influence the dietary practices of

T1DM patients (Hakeem *et al.*, 2008, Khalil, 2000). Data from Pakistan in this regard is scarce, hence the present study was planned to evaluate the dietary practices in T1DM patients which may contribute to overall glycemic control (Hakeem and Fawwad, 2010).

MATERIALS AND METHODS

This study was conducted among patients with type 1 diabetes who were registered at "Baqai Institute of Diabetology and Endocrinology (BIDE), a tertiary care diabetes center and Diabetes Association of Pakistan (DAP) from Oct 2011-June 2012. Institutional review board of BIDE has given formal approval for the study.

Inclusion criteria: Patient with type 1 diabetes aged 10-21 years, who were registered at Baqai Institute of Diabetology and Endocrinology and Diabetic Association of Pakistan were selected for the study.

Exclusion criteria: Those patients who were newly diagnosed (less than one month) and who were very ill were excluded from the study.

Patients were registered at two centers and their information were saved in an electronic hospital data base called Health Management Information System (HMS) according to their code number. Height, weight and BMI of patient were retrieved from the HMS. Information regarding dietary intake and food practices was collected on one to one basis by a trained dietitian on a predesigned questionnaire.

A simple food frequency questionnaire was specially designed for this study to assess their dietary patterns in which all the food intake was obtained from breakfast to bedtime with number of servings consumed and they were categorized into different food groups like bread and cereal group, fruit group, vegetable group, meat and poultry group and milk group according to the food guide pyramid.

Statistical analysis: SPSS 13 were used to analyze data. Percentages of number of servings consumed by patient were taken to analyze their dietary intake and compared it with recommended servings of food guide pyramid by USDA (United States Department of Agriculture) whether they were taking below, average or above from the recommended servings.

RESULTS

The dietary record showed that all 103 Type 1 DM patients were consuming bread and cereal in which 53.9% were taking recommended servings while 7.8% were taking below recommended and 38.8% were taking above recommended servings.

Seventy nine patients out of 103 patients were taking meat group in which 44.3% were taking recommended serving, 22.8% were taking below recommendation and

32.9% were taking above recommended servings. Fifty nine patients were consuming milk group in which only 11.9% consumed recommended servings of milk daily, while 86.9 T1 DM patients consumed below recommended serving and 1.7% above than the recommended servings.

Fifty two patients were taking vegetable group in which 11.5% were taking recommended serving and 88.5% were taking below the recommendations.

Twenty eight patients were consuming fruits in which 25% were taking recommended servings of fruits while rest of them was taking below the recommendation as shown in Fig. 1.

According to gender results showed that 58.82% females were taking cereals, 51.22% were taking meat group, 11.11% were consuming milk group, 16.67% were using fruit group and 9.52% were taken vegetable group. Thirty one percent females were taking cereal above the recommendation and 31.71% were taking meat group above recommendations. Milk group, fruit group and vegetable group show the less consumption and their intake was mostly below the recommendations (Fig. 2a).

Fifty percent males were taking cereal group, 38.46% were taking meat group, 12.5% milk group, 31.25% fruit group and 12.5% vegetable group according to the recommendations. 44.23% males were taking cereal above the recommendations, 33.33% were taken meat group and 3.13% males were taken mil group above the recommendations (Fig. 2b).

A total 103 patients (52 male, 51 female) were included in the study, in which 52 were males and 51 were females. Mean age of patients was 15.76 years. The mean duration of diabetes was 4.05 years. Patients mean weight was 46.04 kg, height was 149.41 cm and BMI was 20.32 as shown in Table 1.

DISCUSSION

This study provides information regarding dietary intake of patients with type 1 diabetes according to the recommended servings of food guide pyramid. Diet plays an important role in growth and development. Children and adolescents health is determined from the food that is usually consumed by them. Children and young adults who do not consume appropriate diet usually do not grow well and can develop many other diseases (Hydrie *et al.*, 2010; Laakso and Pyorala, 1985; Gortmaker and Sappenfield, 1984; Onkamo *et al.*, 1999). Early morbidities and mortalities can occur in type 1 diabetes mellitus as it is an auto immune disorder (Badruddin *et al.*, 2002; Patton *et al.*, 2007; Mayer *et al.*, 2006; Kylberg *et al.*, 1985). Dietary intervention is an important part of the management of diabetes to achieve good glycemic control along with proper growth and development. Understanding nutrition and food groups is essential for making the healthy choices (Hydrie *et al.*, 2010; Nuttall, 1993).

Table 1: Baseline characteristics of the participants

Variables	Male	Female	Overall
n	50.5%	49.5%	103
Age (years)	15.88±3.05	15.63±3.13	15.76±3.08
Duration of diabetes (years)	3.90±3.50	4.19±3.38	4.05±3.43
Weight (kg)	46.02±12.97	46.07±12.10	46.04±12.49
Height (cm)	152.53±15.10	146.23±12.00	149.41±13.95
Body mass index (kg/m ²)	19.34±3.68	21.31±4.08	20.32±3.98

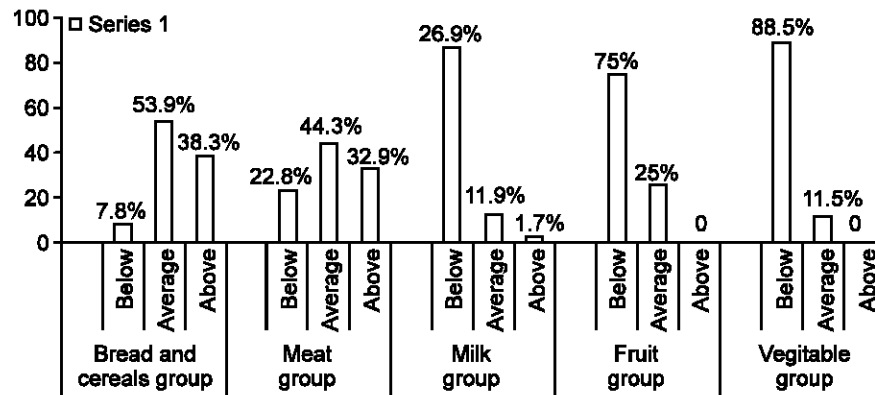


Fig. 1: Consumption of different food groups by the study participants

Food guide pyramid consists of six groups; it provides basic guidelines about consumption of balanced diet from different food groups. Recommended serving of different food groups include bread and cereal 6-11 serving, vegetable 3-5 servings, fruit group 2-4 servings, meat group is 2-3 servings and milk group 2-3 serving while fats and sugars are recommended to use sparingly (Food Guide, 2014; Insel *et al.*, 2004; Ensminger and Ensminger, 1993). Bread and cereal group is the main sources of carbohydrates which provides energy and mostly influence our blood glucose levels. Fruits and Vegetables group also contain carbohydrate along with many vitamins mineral with fiber. Milk group is a good source of calcium, carbohydrate and protein which is important for our bones. Meat and poultry group is the best source of protein which is required for development and maintenance of muscles and tissues.

In our culture people focuses on the bread and cereal group mostly. Majority of the respondents in this study were not taking balanced diet according to the recommended serving in food guide pyramid. Bread and cereal group was consumed by all the patients while consumption of other groups such as milk, meat, fruits and vegetables were observed to be below the recommended servings according to food guide pyramid. Similar findings were observed in the study conducted by US Department of agriculture 1989-1991, Maryland in which 30% of youth meet the recommendation for fruit, grain, meat and dairy group while 36% of youths consume vegetables. 16% of youth did not meet any recommendation and only 1% met all

recommendations. This study also concluded that children and teen with type 1 diabetes in US are not consuming balanced diet according to their national recommendation (Munoz *et al.*, 1998).

Study conducted in Columbia among youth age 10-22 years showed that less than 50% of the youth were consuming recommended serving of fruit, vegetables and grains. Results revealed that youth with diabetes failed to meet the nutritional recommendations (Pinelli *et al.*, 1998).

Another study conducted in Italy showed that the intake of starchy foods was common in the patients with type 1 diabetes while consumption of vegetable group was very poor (Magrath and Harlan, 1993).

Research study of Finland also proves that patients with type 1 diabetes mellitus do not consume a balanced diet. In their study diet was based on low carbohydrate and low fiber but high in fat (Ahola *et al.*, 2012).

Children and young adults usually avoid fruit and vegetable and give preference to junk food as seen in another study where 40% of children were taking fast food daily (Brown and Pollit, 1996).

Medical nutrition therapy is the main key to control diabetes while consuming adequate amount of energy from various food groups is essential. Study conducted in 20 Brazilian cities during Dec 2008-Dec 2010 reported that patients who were adherent to diet had lower BMI, HBA1c and LDL cholesterol (CDC Recommendations, 1998).

A similar study was conducted in Pakistan among people with type 2 diabetes; to compare dietary intake of male and female with recommended servings of food

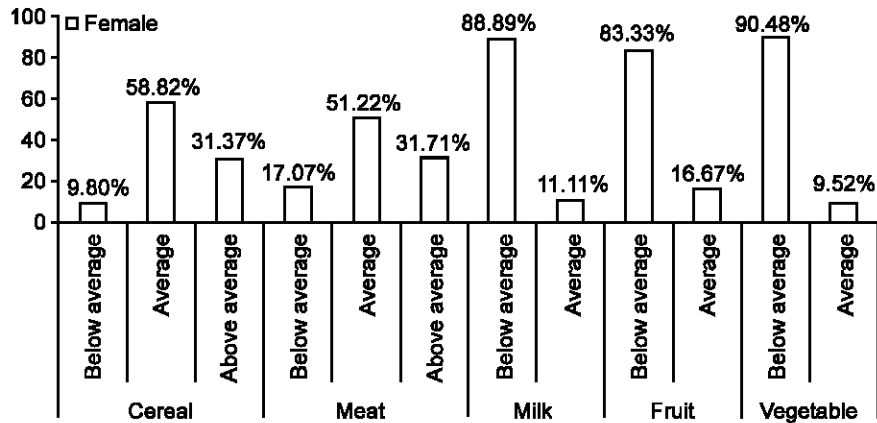


Fig. 2(a): Food intake among females

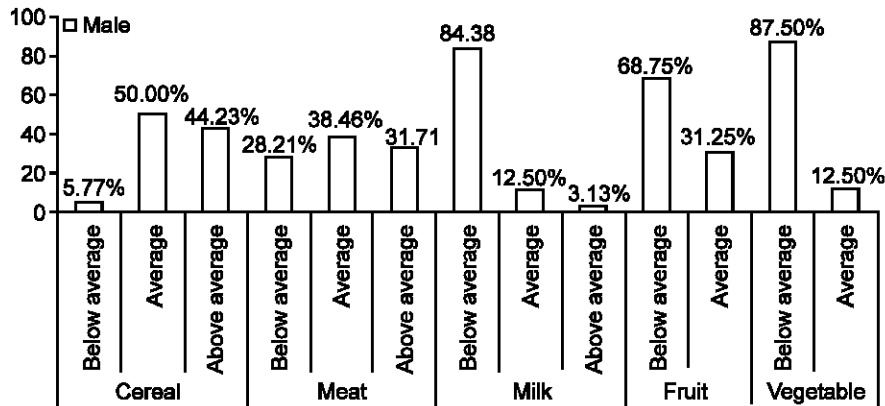


Fig. 2(b): Food intake among males

guide pyramid by USDA. Results showed that consumption of vegetable, fruits and milk was below recommendation among both males and females while meat intake was below the recommendation in females only. Bread and cereal was the only group which was adequately consumed by both groups (Hakeem *et al.*, 2008).

People with type 1 diabetes usually do not consume balanced diet. Improper dietary intake may affect the health of the person. All groups are essential for proper growth development, maintenance of body and its function. We could not find any study which compares the dietary intake of people with type 1 diabetes according to the servings of food guide pyramid. Further studies are needed to find out dietary issues of patients with type 1 diabetes, their food choices and barriers to follow a healthy meal plan.

Limitation of our study is that it is a hospital based study. Data was collected from two tertiary care hospitals only and the number of patients was very small. Dietary intake was recorded through interview from patient on their usual dietary habits so whatever patients told was kept for the study. Most of the type 1 patients were unable to interpret their diet, so there can be a chance of biased dietary recall.

Conclusion: People with type 1 diabetes do not consume balanced diet and not taking recommended serving according to the recommended guidelines of Food Guide Pyramid. Further large scale studies are needed to validate our findings. Mothers need to concentrate on planning for their children's meals and snacks and they must encourage their child in making the healthy food choices.

Declaration of competing interests: Nothing to declare.

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