

# Dietary Habits of Patients with Type 2 Diabetes Mellitus-An Exploratory Study in a Tertiary Care Hospital of Eastern India

LIPILEKHA PATNAIK<sup>1</sup>, ANIL KUMAR MUDULI<sup>2</sup>, ABHAY KUMAR SAHOO<sup>3</sup>, SASWATIKA BEURA<sup>4</sup>, SANDEEP KUMAR PANIGRAHI<sup>5</sup>



## ABSTRACT

**Introduction:** Diabetes Mellitus (DM) is a medical condition that is caused by insufficient production and/or secretion of insulin from the pancreas. Type 2 Diabetes Mellitus (T2DM) accounts for 90 to 95% of all diagnosed cases of diabetes and is the most common form. Diet plays an important role in T2DM.

**Aim:** To explore the dietary habits of patients with T2DM.

**Materials and Methods:** It was a hospital-based exploratory study and cross-sectional in nature done to provide inputs for the interventions and the informatics tool in the clinical trial of the researchers. A total of 100 consecutive OPD patients with T2DM were included. Dietary habits were explored using 72-hour recall method and analysed using SPSS. Results were expressed as proportions for categorical data and mean with standard deviation.

**Results:** Out of 100 participants, 58% were male with mean age of 54.25±12.03 years. The mean BMI was 23.99±4.36 kg/m<sup>2</sup>.

Overweight and obesity was seen in 48% and 17%, respectively. Recall bias was 28% for dietary intake in past 24-48 hours and 48% for intake 48-72 hours. A 77% of patients told that they could follow the advice of their doctor or dietician, but 67% were taking the recommended diet. Out of study subjects, 51% told that they face difficulties in obeying the diet advice and the difficulties listed were food craving, traveling, nature of job, etc. More than 20% patients were not taking food on time and the reasons quoted were nature of the job, carelessness, etc. A 62% of patients were avoiding sweets but 77% were found taking foods with high glycaemic index.

**Conclusion:** Intervention in the form of intensive diet education including behaviour change and communication activities during hospital visits may be needed regarding the role of various food items (with emphasis to high glycaemic index) in controlling diabetes and preventing complications, and has to be captured in the tool planned for public health informatics trial.

**Keywords:** Diabetic, Diet, Glycaemic index, Life style, Obesity

## INTRODUCTION

Diabetes Mellitus (DM) is a medical condition that is caused by insufficient production and/or secretion of insulin from the pancreas. It is a very old disease reported around 3000 years ago [1]. T2DM accounts for 90 to 95% of all diagnosed cases of diabetes and is the commonest form. Increased blood glucose, resistance to insulin and a relative deficiency in insulin are characteristics of this form [2].

Middle income and low income countries are reporting a rapid rise in the levels of diabetic population. In India, it has become an epidemic, with almost 62 million diabetic people on board [3].

Diabetes as a direct cause of death was seen in an estimated 1.5 million people in 2012. High blood glucose levels, by increasing cardiovascular diseases, was found to cause 2.2 million deaths in 2014, most of which occurred before 70 years of age [4]. Diabetes will become the 7<sup>th</sup> leading cause of death by 2030 (WHO estimates) [5]. Diabetic population has increased from 108 million in 1980 to 422 million in 2014 [6]. Diabetes among adults has risen globally from 4.3% in 1980 to 9.0% in 2014 for males, and from 5.0% levels to 7.9% in females [6].

The risk factors for this disease include genetic and environmental factors, like family history, older age, obesity and physical inactivity. The propensity to develop T2DM may be influenced by sedentary lifestyle and prolonged obesity [7]. Delay in the onset of T2DM can be made by the use of healthy diet, having regular physical activity, and also through the avoidance of tobacco [4]. Lifestyle modification, healthy diet and promotion of physical activity are accepted components of diabetes management [8]. However, nutrition therapy is a crucial part of T2DM management. Evidence

suggests that improved dietary intake can decrease the glycated haemoglobin levels (HbA1c) [9].

In India patients with diabetes generally do not follow advice about recommended changes in diet and physical activity, and therefore do not achieve optimal control of risk factors. Reasons for this poor compliance are multiple, including psychological, social, and health care related factors [10]. Major deviations in the dietary pattern are found due to rapid urbanisation, vast economic growth, and varied cultural customs. There are limited studies about the dietary habits of patients with T2DM in eastern India [11]. This study was a part of formative research undertaken prior to a study so as to explore the dietary habits, along with reasons for adopting such dietary practices, among T2DM patients attending a tertiary care hospital of eastern India. This would enable the investigators to develop the public health informatics tool for the granted and approved randomised control trial.

## MATERIALS AND METHODS

The present study was a hospital based exploratory study and cross-sectional in nature. It was carried out in a tertiary care hospital (IMS and SUM Hospital, Siksha 'O' Anusandhan Deemed to be University) of eastern India over a period of two months from October to November 2017. This exploratory study had a purpose to identify the nature of dietary intake of the newly diagnosed diabetic cases, and based on the findings; develop a public health informatics tool. Hence a purposive consecutive 100 samples (patients with T2DM attending the out patient Department of Endocrinology) were included in this study after taking their written informed consent, senior expert in the field consider any sample above 30 to be sufficient for the purpose for which the study was undertaken.

Patients with complications of diabetes and pregnant women were excluded from this study. Study was approved by institutional Ethics Committee of the Hospital prior to conducting the study (Letter no. DMR/IMS-SH/SOA/16006 dt. 13.05.2016).

Details of this study were explained to the participants. Dietary intake/habit of study subjects was assessed using a predesigned and pretested schedule consisting of general and sociodemographic data (age, gender, education, caste, religion, type of family, marital status, occupation, etc.), anthropometric data (weight, height, BMI as per WHO Asian Classification [12,13]), details of diabetes profile, food frequency using 24-hour recall method, with adherence to dietary recommendations. Socio-demographic parameters like education and occupation were assessed in line with Modified Kuppaswamy scale [5]; for e.g., an occupation requiring advanced knowledge and skills but is not widely regarded as true profession, such as social work, journalism, nursing, etc., was considered as semi-profession. A professional whereas is a member belonging to any particular profession and who earns his livelihood from this professional activity for e.g., Doctor, Chartered accountant, advocate, etc. The schedule was finally validated by experts working in the field of public health, endocrinology and nutrition from the hospital (investigators and team).

## STATISTICAL ANALYSIS

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 20.0 licensed to the Institute. Since this was an exploratory study, descriptive statistics were used to summarise demographic data and arrive at the conclusion. Categorical data were summarised using proportions and continuous data were summarised using mean and standard deviation.

## RESULTS

### Socio-Demographic Data

The current study population included T2DM patients (n=100), aged 14-79 years. The mean age of the patients was 54.25±12.03 years. The results of the socio-demographic study are represented in [Table/Fig-1].

### Body Mass Index

The mean Body Mass Index (BMI) of the study participants was 23.99±4.36 kg/m<sup>2</sup>. Forty-two (42%) patients were overweight and 17% were found to be obese, thus a total of 59% falling under overweight/obese category. BMI of patients are represented in [Table/Fig-2].

### Consumption of Major and Other Meals

Recollecting all food items consumed more than a day was a problem that was observed among 28 (28%) and consuming food items for more than two days was a problem for forty-eight participants 48 (48%). Dietary habits among diabetic patients are represented in [Table/Fig-3]. Everyone in the study population used to consume food four times a day. Among them, 79 (79%) consume their everyday meal on time and 21 (21%) can't take a meal on time due to the nature of the job and heavy workload. Among 100 patients, 19 (19%) were taking food outside of their home at least one day in a week due to the nature of the job. Fifty-one (51%) patients were facing difficulties in complying with the dietary advice.

A total of 86% cases (86 out of 100) were found to be non-vegetarian and consumed non-veg foods at least once in a week. Fish was the non-veg food item that was taken predominantly (82 people out of 87 non-veg preferring cases, 94%). Few patients (2 cases, 2.3%) had discontinued meat consumption. High glycaemic indexed foods like bread and rice were consumed by 77% (77 of the 100 cases) patients of the study population, of which 74 (96%) took bread (either in breakfast or in evening snack) and 35 (46%) patients took

Socio-demographic characteristics	Percentage
Age (Mean±SD)	54.25±12.033
<b>Gender</b>	
Male	58
Female	42
<b>Religion</b>	
Hindu	97
Muslim	01
Christian	02
<b>Caste</b>	
General	97
SC	03
<b>Type of family</b>	
Joint	42
Nuclear	58
<b>Occupation</b>	
Professional and semi-professional	29
Skilled worker and farmer	33
Semi and unskilled	02
Unemployed including homemakers	34
Student	02
<b>Education</b>	
Illiterate	02
Primary and secondary	44
Higher secondary and above	54
<b>Marital status</b>	
Married	89
Unmarried	06
Divorcee/Widow/Widower	05

[Table/Fig-1]: Socio-demographic factors (n=100).

BMI (kg/m <sup>2</sup> )	Percent (%)
<18.5	6
18.5-23	35
23-27	42
>27	17

[Table/Fig-2]: BMI of participants (WHO Classification modified for SE Asia) (n=100).

Dietary habit	Percentage
Planning their meals	35
Following dietary advice <sup>1</sup>	77
Taking recommended diet at home <sup>2</sup>	67
Following dietary advice when taking food outside	41
Follow time schedule for diet	79
Taking diet outside home	19
Taking non-vegetarian food	86
Taking sweets	38
Taking high glycaemic food <sup>3</sup>	77
Facing difficulties in obeying diet advice	51

[Table/Fig-3]: Dietary habits among diabetic patients (n=100).

<sup>1</sup>Follow instructions of physician to avoid certain food groups; <sup>2</sup>Follow instructions of physicians and take the recommended amount of diet; <sup>3</sup>Having glycaemic index ≥70

rice (majority during lunch). The consumption of milk was restricted to once a week among 33 patients (33%).

### Consumption of Vegetables and Fruits

All the diabetic patients consumed vegetables on all the days of

the week in all three major meals. Only 23 (23%) cases consumed fruits at least once a day (16% ate apple, 4% ate banana and 3% ate orange).

### Consumption of Sweets and Artificial Sweeteners

The majority (62 cases, 62%) of the study population didn't consume sweets, but 38 cases (38%) consumed sweets at least once in a week even after diagnosis of diabetes and 7 (7%) patients were found to be consuming sweets 3-4 times in a week.

## DISCUSSION

There is a rising trend in the prevalence of T2DM in India, as seen from several studies. This increase is also seen with increasing age [14,15]. Developed countries have diabetic population who are more than 65 years usually. [14] Developing countries like India whereas have more number of diabetics in the age group of 52-66 years due to early onset of diabetes, which was also seen in current study [16].

People suffering from diabetes and belonging to lower socio-economic strata often neglect management of diabetes due to the high cost involved with it and often land up with complications, not knowing that diet management can be an effective strategy early in the course of the disease, and also during drug management [17].

As rice is the staple food of India, most people consume rice mixed meals as the main energy source and it enhances a medium glycaemic response. It was seen that majority were facing difficulties in obeying diet advice of doctor due to the nature of the job and heavy workload leading to take fast foods that are easily available. The fast food is a major driver of disease as it is rich in fat and calorie. With rapid modernisation, the easily available higher fat diets, increased physical inactivity and sedentary occupational habits have resulted in the increased prevalence of T2DM. Studies show that compliance was good when the dietary advice to these patients come from family physicians or their treating doctors, hence an emphasis on diet need to be given by these treating doctors [18-20].

According to a study increase in consumption of green vegetables everyday modestly lower the hazard of diabetes. Eating green leafy vegetables increases the intake of vitamins and antioxidants and thus fighting the deficiencies that could arise by diabetes [21].

Only five patients (5%) were found to be taking more than 1500 Kcal of the daily diet. Among 100 patients 27%, 6% and 5% patients were found to be taking more carbohydrate, protein and fat respectively than the recommended [22,23]. So, patients should choose foods of low carbohydrate and rich fibre content. For nutrition self-management and monitoring, patients should check their total carbohydrate intake either through carbohydrate counting method [20].

Higher BMI, hypertension and hyperlipidemia are strong and independent risk factors of T2DM [24]. In this study mean (n=100) BMI was 23.99±4.36 kg/m<sup>2</sup> which shows similarities with the findings of other studies [15,25], and 40% were found to be overweight and obese. About 60% diabetes patients were having increased Coronary Heart Disease (CHD) risk (due to high BMI) [26]. Reports from similar studies showed that the level of BMI to develop diabetes is lower for Asian people than the people of European origin [12,13]. The reason behind the increasing BMI could be the lack of knowledge on diet control, consumption of high glycaemic food which may be easily available, lack of physical activity and increased sedentary activities.

High blood sugar levels lead to the formation of glycated end products responsible for diabetes related complications. Excess glucose is deposited as fat in adipose tissue which causes overweight and obesity [27]. Thus, the limitation of sweetened foods or drinks consumption is a key to control T2DM. Though sugar consumption was initially high, most tend to reduce sugar consumption after being diagnosed with diabetes. The consumption of sweets and

sweetened food or beverage once or more than once in a week was rare. However, 38% patients were found to consume sugar once in a week because of craving for sweets, attending functions, parties and lack of knowledge on food types which increases blood glucose. Artificial caloric sweetener usage was also found to be popular among diabetes patients. Even most of the DM population has been found to be unaware of noncaloric sweeteners, while some not satisfied about their safety and others disliked the taste. Educating them on noncaloric sweeteners may help reduce the sugar intake and increase the quality of life [21].

This study showed that the satisfaction of the diabetic patients regarding their quality of life was poor mainly because of the uncontrolled blood sugar levels as a result of poor diet management [28]. In the study conducted by ICMR on 14,274 subjects (including general and diabetic population), it was seen that 43.2% had heard about diabetes. 41.5% (5726/13,794) among general population knew about diabetes. 56.3% and 63.4% respectively from general and diabetic population respectively, were aware that diabetes could be prevented. 51.5% of the general population and 72.7% diabetic population knew that diabetes could affect other organs [29].

Most importantly, specific dietary recommendations should be individualised to accommodate the person's preferences and lifestyle to enhance the acceptance and adherence to the diet plan. Quality of life of the diabetic patients can simply be enhanced by increasing awareness of the patients regarding diabetes and its management.

### Limitation(s)

It is an exploratory study for developing a relevant tool for the RCT that would follow, and hence generalisation of the findings is to be done with care. Though the study deals with newly diagnosed cases of T2DM, yet these cases do not qualify as newly developed ones. The cases may be present without diagnosis for years before being identified. Interpretation of results has to be done accordingly.

## CONCLUSION(S)

Nutrition is often challenging due to a variety of individual, environmental, physiologic, cultural, and social factors and most families need assistance in overcoming these barriers to dietary change. Patient education and adherence to the core foundational nutrition principles are one of the most important aspects of diabetes management. The metabolic profile along with the long-term complication in a diabetes case can be improved through strict dietary goals along with other lifestyle changes. The meal planning methods are useful for people with T2DM to lose weight. Knowledge regarding a number of total calories in a given food can help promote weight loss when incorporated into other lifestyle changes. All these important interventions needed to be incorporated in the tool planned for the public health informatics trial. This study thus provided a base for the randomised clinical trial.

### Acknowledgement

The authors acknowledge that the study was supported by funding for the randomised clinical trial by Department of Health Research, MoHFW, Government of India No. V.25011/282-HRD/201 6- HR/dt 26.08.16.

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#### PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.
2. Research Associate, Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.
3. Associate Professor, Department of Endocrinology and Metabolism, IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.
4. Junior Research Fellow, Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.
5. Assistant Professor, Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India.

#### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sandeep Kumar Panigrahi,  
Department of Community Medicine, IMS and SUM Hospital, Siksha 'O' Anusandhan  
(Deemed to be University), Bhubaneswar, Odisha, India.  
E-mail: [dr.sandeepvss@gmail.com](mailto:dr.sandeepvss@gmail.com)

#### PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jun 04, 2018
- Manual Googling: Dec 07, 2019
- iThenticate Software: Jan 23, 2020 (13%)

#### ETYMOLOGY: Author Origin

#### AUTHOR DECLARATION:

- Financial or Other Competing Interests: As declared above
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **May 22, 2018**  
Date of Peer Review: **Jul 18, 2018**  
Date of Acceptance: **Dec 10, 2019**  
Date of Publishing: **Feb 01, 2020**