



ASSESSMENT OF FOOD HABITS OF THE DIABETIC PERSON RESIDING IN RURAL AREAS OF MUZAFFARPUR, BIHAR.

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BACKGROUND: Rural India is seeing an enormous rise in the prevalence of diabetes, making it even more crucial to gain insight into the specific cultural and regional variables affecting dietary choices there.

OBJECTIVE: To analyze the food habits of the Diabetic Person residing in rural areas of Muzaffarpur, Bihar.

METHODS: In all, 76 men and 44 women were analyzed in this research. Meals were analyzed following a 48-hour recall period of each person's eating habits. Energy, protein, total fat, carbs, and fiber are the macronutrients that are measured via the food frequency questionnaire.

RESULT: The mean energy intake of males was (2025±225) and for females was (1375±175), the mean protein intake of females was (60±5) and for males was (73.5±8.5), carbohydrates mean intake for males was (297.5±17.5) and for females was (202.5±22.5), total fat mean intake for male was (61±5) and for female was (46±4) and fiber mean intake for female was (10±2) and for male was (12±2.5). Chi-square analysis showed no correlation at $P < 0.5$ between the Age and Energy intake of males and females ($P=0.77$), Age and Protein intake of males and females ($P=0.43$), and Age and Carbohydrate intake of males and females ($P=0.89$).

CONCLUSION: There is a huge difference in Energy, Protein, Carbohydrates, and fiber intake between males and females. This study highlights the need for awareness of the intake of Energy, Protein, Carbohydrates, and fiber in rural areas that helps in the prevention and control of diabetes mellitus.

KEYWORD: Diabetes, Food frequency questionnaire, Energy, Carbohydrates, Fiber.

INTRODUCTION

Diabetes is a serious universal public health issue that affects people's lives and communities all over the world. It is projected that by 2045, the number of people with the illness will have increased from a total of 425 million in 2017 to an astounding 629 million. This increasing tendency has significant interrelated ramifications that influence not just the physical well-being of those impacted but additionally the economic and social domains as well. The costs connected with type 2 diabetes, which may occur in the form of health-related expenses or wider social consequences, highlight the pressing need for all-encompassing methods to treat and reduce the disorder's expanding global effect.¹ It is essential to take prompt and immediate steps in order to slow down the current increase in the prevalence of diabetes, and preferably reverse it. A deliberate effort should be made to invest in modifiable factors, such as weight, activity level, and diet. According to the extensive Global Cost of Disease Study, which covered 188 nations, diet is a major cause of illnesses and mortality worldwide. Thus, it is critical to give priority to programs addressing these modifiable aspects of life in order to effectively reduce the increasing incidence of diabetes². For many people, the idea of following a "diet" to manage an incurable, lifetime disorder such Type 2 diabetes may be demoralizing. The difficulties are in coming up with meal and maintaining a regular, healthful eating schedule. Medical nutritional therapy was developed as a methodical, based on data approach to controlling diabetes from nutrition in response to those difficulties. Its efficiency has been demonstrated, and it enables a methodical approach to managing diabetes. But even with all of its advantages, there are still challenges and nuances involved in putting these dietary plans into practice and keeping them up to date³. Numerous studies draw attention to the traditional Indian eating habits, that is frequently heavy in carbs—particularly refined carbohydrates found in cleaned grains including white rice. A higher risk of type 2 diabetes has been linked to high consumption of carbohydrates⁴. Using traditional techniques, scientists usually examine certain dietary categories or nutrients in connection to certain illnesses. But because actual diets don't separate minerals and food categories, this technique doesn't accurately represent how individuals really eat. To overcome this, contemporary epidemiological research on nutrition focuses on dietary behavior's, which provide a more comprehensive understanding of an individual's entire eating habits. This makes it possible to comprehend possible interactions between various dietary categories including nutrients properly^{5,6}. A correlation is being consistently shown among eating habits and Type 2 Diabetes Mellitus (T2DM) across a wide range of regional ethnicities, the sexes as well as ages in several research⁷⁻¹⁸. The prevalence of diabetes is significantly higher in rural India, which emphasizes the value of comprehending the cultural and geographical factors impacting dietary preferences. Investigating the distinct cultural and social factors that influence dietary decisions in these areas is crucial. Traditional food customs, regional cuisines, and lifestyle choices all have a significant impact on the level of incidence of diabetes. This calls for customized interventions and awareness campaigns that consider the unique characteristics of rural areas. It is imperative to have a thorough grasp of the complex interactions between social customs and health-related behaviors to address the rising incidence of diabetes across rural India¹⁹.

METHOD AND METHDOLOGY

A purposive sample technique was used to choose 120 participants who resided in Muzaffarpur's rural areas. After obtaining authorized permission, a well-designed questionnaire was given out to those who responded to collect data on their demographics. This includes their medical history, anthropometric measurements, employment position, monthly income, and level of education. The study's target population was those with diabetes, particularly participants in the 20–70 age group. Individuals underwent a 48-hour recall period during which they were instructed to record all the food and drinks they had eaten prospectively. This strategy intended to get a complete picture of their nutritional consumption while limiting the possibility of overlooking important data. An organized food frequency questionnaire was used to measure nutrient consumption. The questionnaire, which was given out in person, concentrated on the main dietary elements—energy, protein, total fat, carbs, and fiber. The purpose of open-ended questions was to entice respondents to supply precise and detailed responses. Both qualitative and quantitative methods were used in the data analysis process. While nutritional information was analyzed statistically using SPSS for Window version 20.0 to find trends and variances in food consumption, descriptive figures were used to describe demographic details²⁰.

RESULTS

The majority of the study's participants, or 34% of them, belonged to the 40–50 age range, according to their socioeconomic as well as demographics figures. The average age of the individuals was obtained using the total average scores, which came out to be 46.08 ± 17.07 .

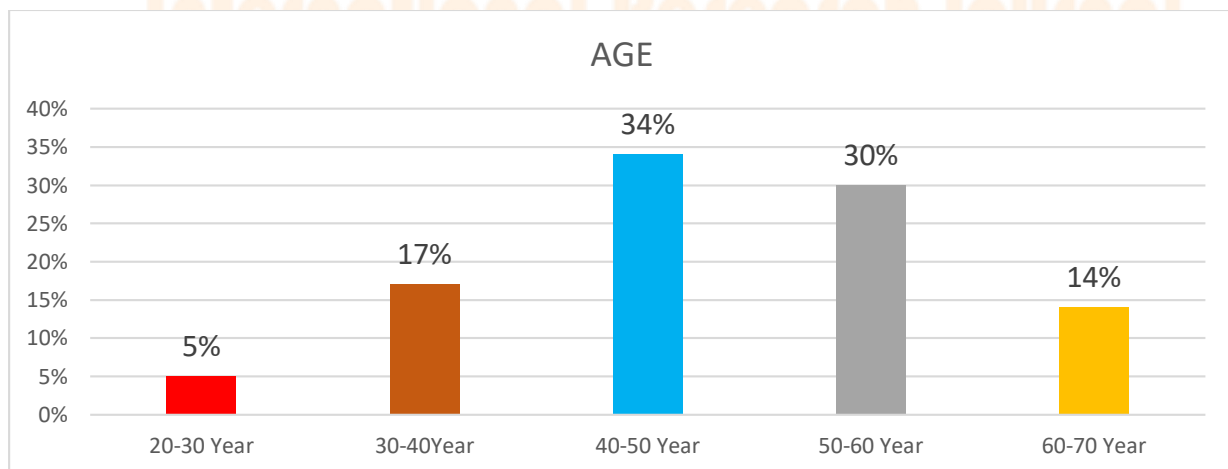


Fig 1: Age groups of subjects.

Based at the respondents' educational qualifications, 66% of them had a bachelor's degree, 8% had finished secondary school, 10% had a postgraduate degree, and 8% were educated and intermediate.

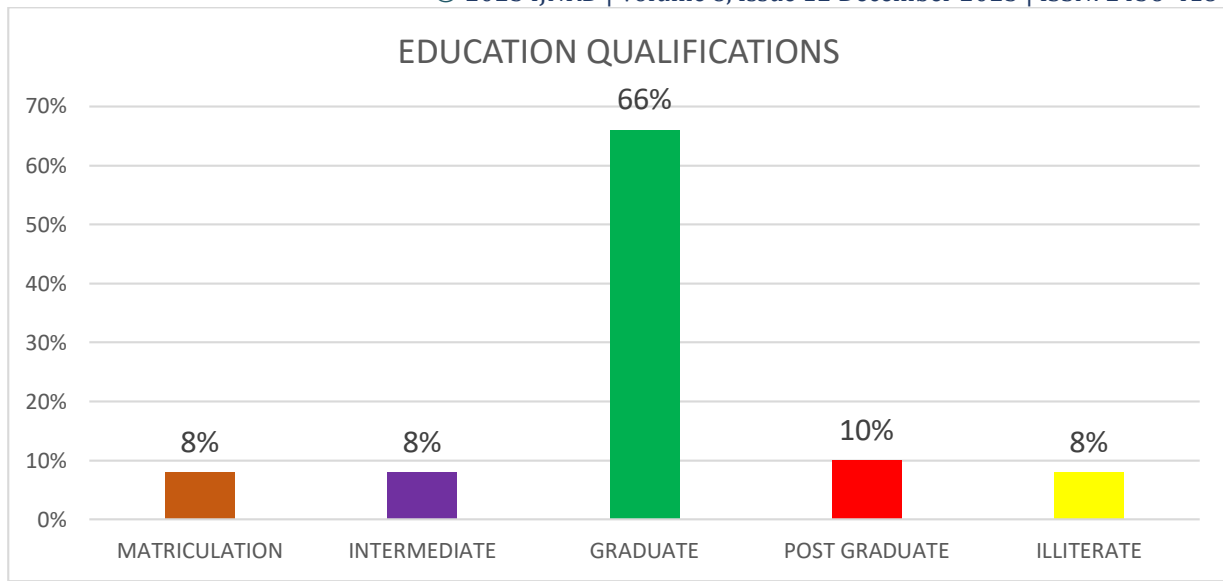


Fig 2: Educational Qualification of subjects

Regarding job status, the data indicates that 56% of people are working at present. Furthermore, 20% work as housewife full-time or are jobless at present. In the meanwhile, 4% of those questioned reported being retired.

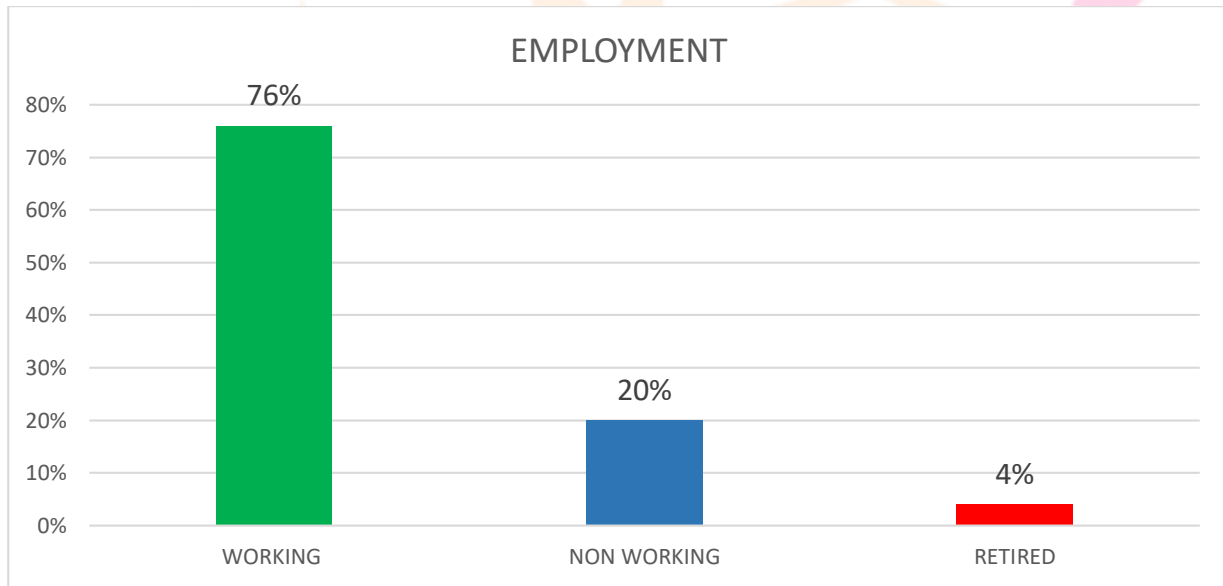


Fig 3: Employment status of subjects

According to economic data, 73% of people were middle-class, 23% were low-class, while 4% were higher-class.

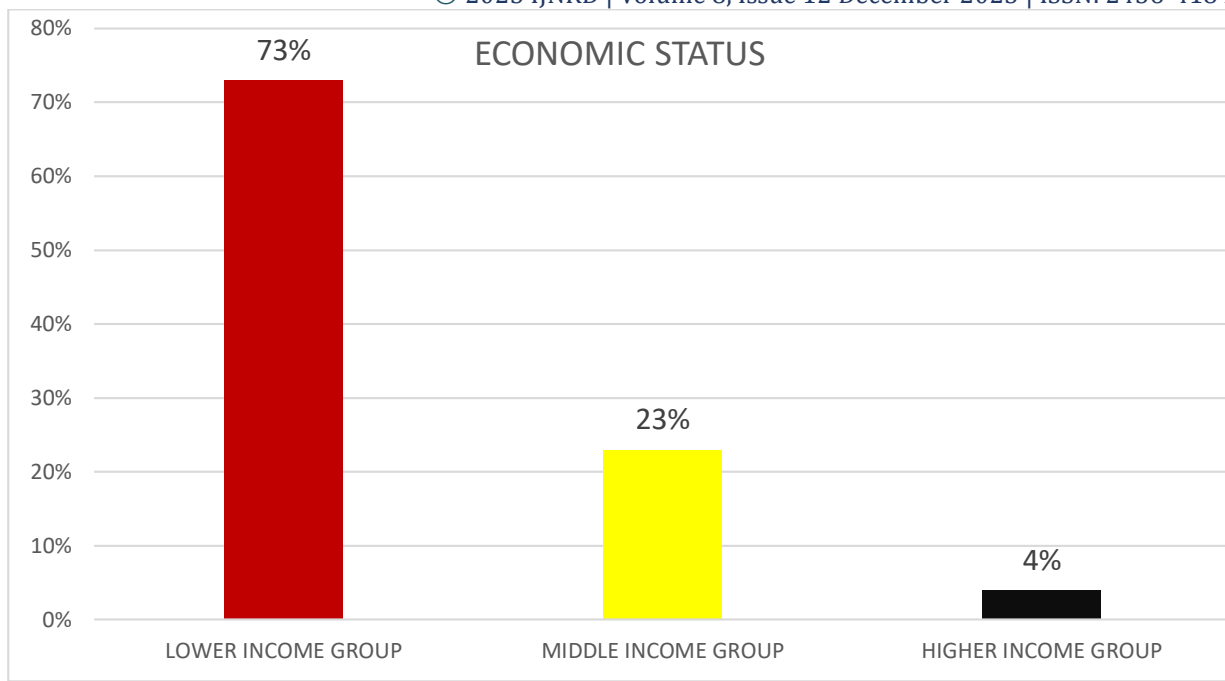


Fig 4: Economic status of Respondents.

51% of the population was identified as obese, 35% as overweight, 9% categorized as being of normal weight, while 5% as underweight, according to statistics on nutritional status.

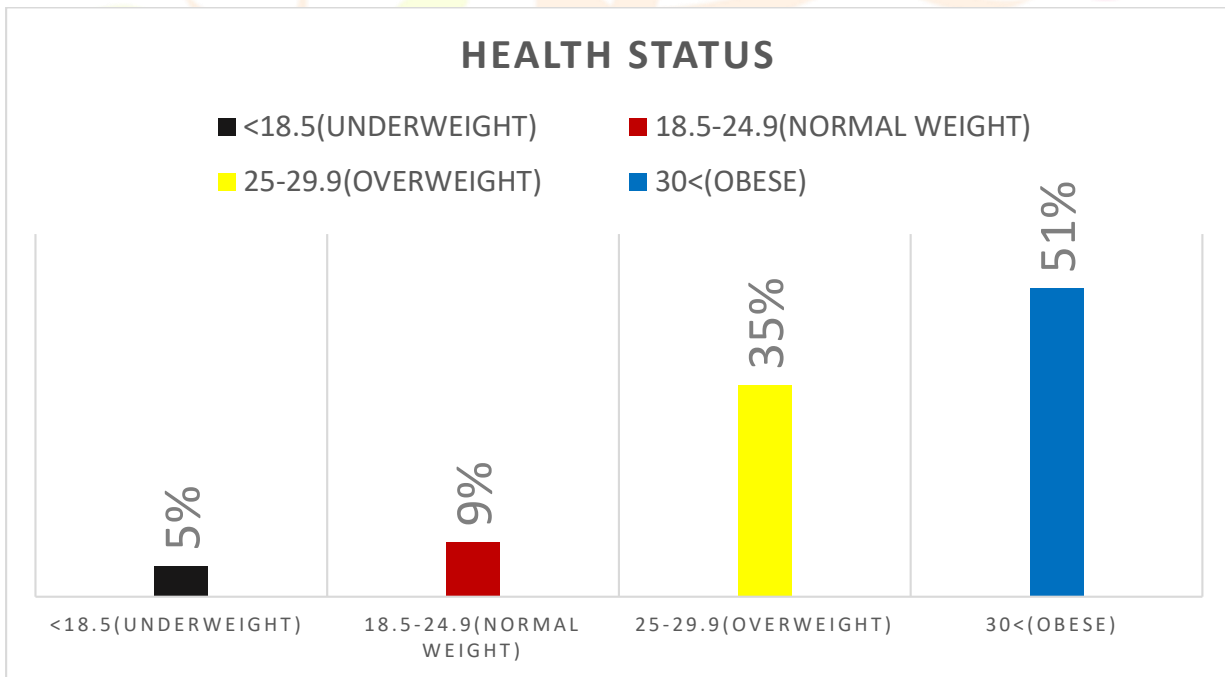


Fig 5: Health status of Respondents

Comparison of nutrient intake from our patient with the ADA recommendation.

Nutrients	Recommendation for diabetic Diet from ADA ²¹	Recommendation for diabetes diet in Thailand ²²	Average Recommendation Based on ADA, ICMR ²³ , RSSDI	Total (male + females) Mean Intake (present study)
Energy (Kcal/Day)	Set based on Age, height, Weight	Set based on Age, Height, Weight	1400-1500	1678 ± 185
Protein (gm)	15 to 20 % of Total Calorie	15 to 20 % of Total Calorie	52.5- 65	48.5 ± 4.2
Carbohydrate (gm)	40-50 gm Carbohydrate Per meal	40-50 gm Carbohydrate Per meal	210-220	249.5 ± 19.5
Fat (ml)	25- 30% of Total Calorie	25- 30% of Total Calorie	38-40	54.5 ± 4.5
Fiber (gm)	25-38 gm Per day For male and female	25-38 gm Per day For male and female	25-38	11.5 ± 2.5
Sugar (gm)		3 tea spoon	15-20	27.5 ± 6.5

The average energy recommendation is suggested by ADA to be between 1400-1500 kcal/day while total mean intake observed is higher at 1678 kcal/day this indicating individual consuming more calories than the recommended range. Protein recommendation is suggested to be between 52.5 to 65 gram per day while intake observed is lower at 48gm per day. However, this indicates individuals consume less amount of protein. Carbohydrates recommendation is suggested to be between 210-220 gram per day while intake observed is higher at 249 gm per day. However, this indicates individuals consume high amount of carbohydrates as per recommendation. Fat recommendation is suggested to be between 38-40 ML per day while intake observed is higher at 54 ml per day. However, this indicates individuals consume high amount of fat as per recommendation. Fiber recommendation is suggested to be between 25-38gm per day while intake observed is lesser at 11 gm per day. However, this indicates individuals consume lower amount of fiber as per recommendation. Sugar recommendation is suggested to be 3 spoons while intake observed is higher per day. However, this indicates individuals consume high amount of sugar as per recommendation.

Managing diabetes involves important guidelines for the food habits of diabetic patients. The majority of diabetic patients were completely dependent to rice and wheat only. They were not using variety of grains like whole grains millets Monitor and control carbohydrates as they have the most important impact on sugar level. In my study, patients were taking more carbohydrates. In my study patients were not taking variety of colorful locally available. These can be rich in essential nutrients and fibers. Vegetables Fiber helps regulate blood sugar levels and promotes a feeling of fullness. Protein helps stabilize blood sugar levels and keep satisfied in my study total mean was lesser based on requirements. Respondents were not using an oil with a good balance of omega3 and omega 6 fatty acids. My respondents had no idea regarding minimizing consumption of sugary snacks, sweets and processed foods. Blindly they

were taking sugary and packed processed foods. Limit saturated and trans fats found in fried and processed foods while my respondents was actually had no idea about good fat and sources. Their fluid intake was also adequate, they don't know about low glycemic index food items. Due to lack of knowledge and awareness they were using a higher sugar content food item they did not have a fixed mealtime and portion size of food item. Even some of the patients were not monitoring blood sugar levels regularly. In this study patients were not taking fruits in moderation or required amount. While variety of fruits that are locally grown and in season always help to get required amount. My respondent often overeats while this is important for a good digestion and other health problems. Establish regular mealtimes to help regulate blood sugar levels. Consistency in meal timing can contribute to better glucose levels.

Food Frequency Questionnaire by diabetic patients(N=120)

sl.no	Food Item	Daily amount	4-6 times/w week	2-4 times/w ek	1-2 times/w week	Weekly amount	Monthly amount	Never
A.	BEVERAGES							
	Coffee	02	03	00	00	13	07	95
	Tea	98	02	01	07	03	07	02
	Fruit juices	00	00	00	00	10	02	108
	soups	04	03	02	01	14	05	91
	Alcohol	00	02	03	02	03	02	108
B.	CEREALES							
	Roti	120	00	00	00	00	00	00
	Paratha	02	28	08	04	60	15	03
	Pasta/Noodles /Maggi	00	00	00	00	03	02	115
	Biscuits	100	05	03	01	08	01	02
	Oats / Dalia / Upma/Poha etc	10	04	03	05	04	02	03
C.	PULSES	98	02	07	05	04	02	03
D.	NUTS							
	Cashew	00	03	02	10	04	06	95
	Almonds	03	04	03	03	02	06	99
	Walnuts	01	02	02	03	04	08	99
	Any others	01	01	01	03	04	12	97
E.	FRUITS AND VEGETABLES							
	Apple/Guava/Papaya etc	75	10	02	12	08	05	05
	Green leafy vegetables	90	10	05	03	10	02	00
	Roots and tubers	50	25	13	08	03	11	10
	Other Vegetables	85	10	03	07	09	03	03
F.	MILK AND ITS PRODUCTS							

sl.no	Food Item	Daily amount	4-6 times/w week	2-4 times/we ek	1-2 times/w week	Weekly amount	Monthly amount	Never
	Paneer/chenna	45	26	15	09	13	12	00
	Curd	63	25	12	13	06	01	00
	Kheer (without sugar)	33	06	32	28	21	00	00
	Kheer (with sugar)	01	03	02	03	02	27	82
	Milk (with cream)	45	00	00		03	00	00
	Milk(Fat free)	72	00	00	00	00	00	00
G.	NON VEG FOOD ITEMS							
	Egg while only	03	00	00	00	00	00	32
	Whole egg	00	00	00	00	10	00	00
	fish	00	00	00	15	00	15	00
	chicken	00	00	12	00	03	25	00
	Mutton	00	00	00	02	00	03	00
H.	Fats and oils							
	Ghee	00	00	00	00	00	02	00
	Butter	00	00	00	00	00	00	00
	Cheese	00	00	00	00	00	00	00
	Soyabean oil	00	00	09	00	00	05	00
	Mustard oil	90	00	00	00	00	00	00
	Sunflower oil	00	00	00	00	07	00	00
	Olive oil	00	00	00	00	00	00	00
	Rice Bran Oil	00	00	00	00	00	0	00
I.	FAST FOOD	00	00	00	10	41	69	00
J.	FROZEN FOOD	00	00	00	00	06	33	81
K.	ARTIFICIAL SWEETENERS	51	10	07	03	06	20	23
L.	SWEET CANDIES	00	00	15	12	20	20	53

CONCLUSION

As a result, this research clarifies the demographic and socioeconomic variables affecting the eating patterns and health-related behaviors of a wide variety of individuals, namely those in the 40–50 age range. The demographic backdrop of the data is given by the average age of 46.08 ± 17.07 and the proportion of persons with a bachelor's degree [66%]. The fact that 56% of participants are working and 20% are either full-time housewives or jobless highlights the participants' diverse backgrounds. The high rate of obesity (51%) and inadequate dietary guideline adherence are concerning findings. The individuals showed a significant departure from the advised calorie intake, exceeding the permissible range. Consumption of protein was below prescribed amounts, while consumption of fat, carbohydrates, and sugar was over the recommended limits. The consumption of fiber was noticeably low, suggesting a possible lack of significance

of a well-balanced diet. Concerning patterns in participant diabetic care are also highlighted by the research. Many were too reliant on wheat and rice, ignoring the health advantages of a variety of cereals and the vibrant, readily accessible veggies in their area. Insufficient knowledge of processed meals, sugary snacks, and omega-3 and omega-6 fatty acids points to the need for focused education. Moreover, the absence of a set mealtime, portion control, and inconsistent blood sugar monitoring among the subjects highlights the need of thorough diabetes education. Study finds gaps in knowledge about the importance of healthy fats, low glycemic index diets, and moderation in eating fruit. The results point to the urgent need for focused initiatives to raise food choices, improve diabetes control approaches, and raise nutritional knowledge. The creation of educational initiatives to overcome these knowledge gaps and promote changes in behavior may have a substantial positive impact on the population under study as a whole.

PARTICIPANT CONSENT: Verbal informed consent was obtained from the participants. **AUTHOR'S**

CONTRIBUTION: Shalinee and Pragati originally developed this study. Shalinee collected the data under Pragati's supervision. The final manuscript was read and approved by both authors.

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