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Nutritional Evaluation and Socio-Demographic Relationships Between Type I & II Diabetes Mellitus in Pakistani Population

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Abstract

Nearly 6% of people worldwide suffer from diabetes mellitus, one of the most prevalent endocrine disorders. By 2025, there will be 300 million diabetic individuals worldwide, with type II diabetes accounting for over 97% of these cases. Weight loss may result from undiagnosed or untreated type I diabetes. The main risk factors for type II diabetes include obesity and poor lifestyle choices. According to approved medical nutrition therapy for diabetic patients, maintaining a healthy body weight involves making healthy choices rather than just decreasing calories. The purpose of this study is to compare the nutritional health of diabetes patients who are insulin dependent and those who are not. 300 patients with Type I and Type II diabetes were recruited, and they completed a questionnaire that inquired about their sociodemographic status, degree of physical activity, and 3-day food records. Anthropometry and glycemic control variables were also measured. The average age range of patients is between 20 and 80. About 15% of patients have poor glycemic control (HbA1c >6.5%), while 85% of patients have adequate glycemic control (HbA1c 5.7-6.4%). Of the 300 individuals, 113 (35.9%) have a type I diagnosis and 187 (59.4%) have a type II diagnosis. Anthropometry has been used to determine their BMI. Of those with IDDM, 38.8% are obese, and 47.8% are in good health and NIDDM, 61.2% are obese, and 52.2% are in good health. There is also a significant relationship exist between nutritional profiles of NIDDM & IDDM diabetics.

Keywords: Type II Diabetes mellitus; NIDDM, IDDM, glycemic control; insulin resistance, HbA1C.

INTRODUCTION

About 6% of people worldwide suffer from diabetes mellitus, one of the most common endocrine illnesses. It is estimated that 300 million people will have diabetes by 2025, with type II diabetes accounting for more than 97% of these cases (Doostan *et al.,* 2016; Dorosty & Naeini, 2007).In 2022, there will be 300 million people with diabetes. Over 19 million adults in Pakistan are thought to have developed diabetes in 2019 (Dorosty & Naeini, 2007; D. S. Freedman *et al.,* 2013).

In insulin dependent diabetics mellitus (type I diabetes) the body's immune system attacks the insulin-producing cells of the pancreas and more than 90% of them are permanently destroyed. The pancreas, therefore, produces little or no insulin (Doostan *et al.,* 2016). Only about 5 to 10% of all people with diabetes have type I disease. Most people who have type I diabetes develop the disease before age 30, although it can develop later in life (Doostan *et al.,* 2016). Scientists believe that an environmental factor possibly a viral infection or a nutritional factor during childhood or early adulthood causes the immune system to destroy the insulin producing cells of the pancreas.

The pancreas frequently continues to produce insulin in people with non-insulin dependent diabetes mellitus (NIDDM), or type II diabetes, sometimes even at higher-than-normal levels, especially in the early stages of the condition. Nevertheless, the body becomes resistant to the effects of insulin and is unable to use glucose to meet its needs and produce energy. The pancreas' capacity to produce insulin declines as type II diabetes worsens (D. S. Freedman *et al.,* 2013).

Diabetes type II is now widespread. Due to rising rates of obesity, physical inactivity, and poor diet, type II diabetes is increasingly being diagnosed in children, adolescents, and younger adults (International Diabetes Federation). Type II diabetes affects about 26% of those over 65. Certain racial and ethnic groups are more likely than white individuals to develop type II diabetes: American Indians, Asian Americans, Blacks, and those of Spanish or Latin American descent are two to three times more likely than white people. Additionally, type II diabetes frequently runs in families (Dorosty A R & Alavi Naeini A M, 2007).

Diabetes therapy heavily relies on diet and lifestyle choices. Prescriptions for nutrition should be tailored to each patient's needs. Maintaining ideal blood glucose levels, controlling risk factors, and averting diabetic complications all depend on maintaining adequate nutritional status. Personal and cultural tastes should be taken into account while making dietary decisions. Depending on each person's unique biological needs, the relative effects of nutritional therapy vary**.**

In honor of World Diabetes Day 2019, the International Diabetes Federation releases the 9th Edition of the IDF Diabetes Atlas, which estimates that 38 million more adults worldwide now have diabetes than in 2017. According to the IDF Diabetes Atlas 9th Edition, the prevalence of diabetes in Pakistan has increased by 148% to 17.1%. Over 19 million persons in Pakistan are thought to have diabetes in 2019, putting them at risk for potentially fatal complications. Of these 19 million, 8.5 million remain undiagnosed, making them potentially especially vulnerable. The 2020 National Diabetes Statistics report from the Centers for Disease Control and Prevention states that 34.2 million Americans had either undiagnosed or diagnosed diabetes in 2018. That is slightly more than one in ten individuals. Type II diabetes affects 90 to 95 percent of diabetics (D. Freedman *et al.,* 2013).

The main risk factor for NIDDM is obesity. Nearly half of those with diabetes are obese, and over three out of every four adults with the disease are at least overweight (N. T. Nguyen *et al.,* 2011).

According to J. D. Webster's analysis, the incidence of type I diabetes varied from 1.9 to 7.0/100,000/year in Africa, 0.13 to 10/100,000/year in Asia, approximately 4.4/100,000/year in Australasia, 3.4 to 36/100,000/year in Europe, 2.62 to 20.18/100,000/year in the Middle East, 7.61 to 25.7/100,000/year in North America, and 1.27 to 18/100,000/year in South America. The prevalence of type II diabetes was reported to be between 0.3 and 17.9% in Africa, 1.2 to 14.6% in Asia, 0.7 to 11.6% in Europe, 4.6 to 40% in the Middle East, 6.69 to 28.2% in North America, and 2.01 to 17.4% in South America. Furthermore, they claimed that both genetic and environmental factors contribute to diabetes mellitus (Kochhar *et al.,* 2009a).

Physical inactivity, medicines and hazardous substances, obesity, viral infection, and geography are environmental factors that might cause diabetes mellitus (N. Nguyen *et al.,* 2011). Reducing energy intake while upholding a healthy eating pattern is advised to help overweight or obese persons with type II diabetes lose weight. Intensive lifestyle therapies (counselling about nutrition therapy, physical exercise, and behaviour change) with continuous support will be necessary to achieve modest weight loss. For overweight or obese people with diabetes, weight loss has long been advised due to the connection between body weight (i.e., adiposity) and insulin resistance. We will be able to compare the nutritional health of diabetics who are insulin dependent and those who are not thanks to this study. Nutritional therapy can be developed to treat IDDM and NIDDM by understanding their nutritional condition. According to suggested medical nutrition therapy for diabetic patients, maintaining a healthy body weight involves making appropriate food choices in addition to reducing calories (Raffaitin *et al.,* 2007a).

Anthropometric measurements are used to determine the body's composition. Height, weight, body mass index (BMI), and body circumferences (waist, hip, and limbs) are the fundamental components of anthropometry (Ishikawa-Takata & Tabata, 2007). These measurements are crucial because they serve as diagnostic criteria for obesity, which dramatically raises the risk of a number of illnesses, including diabetes mellitus, hypertension, cardiovascular disease, and many more (Wohlfahrt-Veje *et al.,* 2014). BMI is a cheap and simple way to screen for underweight, healthy weight, overweight, and obesity (World Health Organization. Regional Office for the Western, 2008).

Rathnayake assessed the dietary status of diabetic patients who visited the University of Sri Jayewardenepura's family practice center. Rathnayake came to the conclusion that a significant portion of this population was anemic and that overweight and obesity were prevalent. Anemia increased as the length of diabetes increased. Most people consumed less protein than was advised. The BMI was significantly correlated with carbohydrate calories. Every participant's serum albumin level was within normal limits (Kochhar *et al.,* 2009b).

Kochhar worked on evaluating the nutritional health of male diabetics who were not insulin-dependent. The chosen subjects received 125 grams of quick wheat meal every day. Prior to supplementation, the subjects' daily diets were deficient in foods that protect against diabetes, such as pulses, green leafy vegetables, and other fruits and vegetables, while their intake of foods that increase risk, such as cereals, roots, tubers, and fat, was higher than recommended. But following supplementation, there was a noticeable rise in the consumption of protective foods and a fall in the consumption of fat, grains, roots, and tubers. Energy decreased significantly ($P \leq 0.01$) from 1955 to 1640 kcal, but fat decreased from 49 to 30g. Therefore, the study showed that supplementing with instant wheat meal is an effective way to enhance diabetics' nutritional status. The majority of individuals suffer from protein malnutrition and anemia. Malnutrition is more common in the elderly (Kochhar *et al.,* 2009b).

According to Turnbull & Sinclair, older adults with diabetes who live in the community may be more vulnerable to malnutrition than people without the disease. Additionally, the researchers determined that malnutrition and functional deterioration in this population most likely had a causal association (Turnbull & Sinclair, 2002).

In Isfahan, Iran, 1694 senior citizens (731 men and 963 women) who were 60 years of age or older participated in a cross-sectional survey. The findings revealed that 61.2% of the participants were overweight and 4.7% were underweight. In all subjects, viewing television for extended periods of time raised the risk of being overweight, and women were more likely to be overweight. Diabetes and coronary heart disease were linked to being overweight, while lean individuals had a lower risk of developing these conditions. In order to lower the incidence of diabetes and CVD, it is necessary to enhance nutritional status, as this study revealed a significant prevalence of overweight among Iranian senior citizens (Khoddam *et al.,* 2019).

Homeira (Khoddam *et al.,* 2019) investigated the nutritional status of Taiwanese seniors who were both functionally and non-functionally dependent. The findings demonstrated that a greater proportion of the elderly who were functionally dependent consumed less than 75% of the Taiwan Recommended Daily Nutrient Allowance (RDNA). According to the nutrient recommended intake (NRI), malnutrition was more common in the functionally reliant group than in the non-functionally dependent group (44.7% vs. 25%) (Khoddam *et al.,* 2019).

One of the main markers of DM is being overweight or obese. Instant wheat meal supplementation is a useful strategy for enhancing diabetics' nutritional status. Information regarding diabetes mellitus, nutritional status management, and lifestyle is lacking in Pakistan (Raffaitin *et al.,* 2007b).

MATERIALS AND METHODS

This study has been conducted at Saidpur Road Diabetic Centre, Rawalpindi. The study duration was six months. The study population is the walk-in diabetic patients visiting OPD. Simple random sampling technique has been used. Two steps are involved when calculating sample size:

a. Determine the sample size for an infinite population.
b. Adapt the sample size to the population that is needed.

The sample size has been calculated using Cochran formula. The sample size of 300 patients is obtained. The inclusion criteria for the patients are developed as;

a. Patients diagnosed with IDDM
b. Patients diagnosed with NIDDM
c. Age group in between 20-80 years old

The exclusion criteria for the patients are developed as;

a. Age group less than 20 years' old
b. Patients diagnosed with CKD, cardiac issues, hepatitis and metabolic disorders
c. Patients who have not signed the consent form

This study is cross-sectional and observational based. Weighing scale, measuring tape, glucometer, chemistry analyzer (Selectra E) are used as research tools. A permission letter is being issued from the institute's ethical Bio safety committee to conduct research. Another permission letter has been issued from the hospitals management to conduct research. A written consent has been taken from patients in the OPD. The study protocol has not affected the treatment protocol of the patient in any way. The identity of the subject remains confidential in relation to their responses to the questionnaire and the outcomes of the laboratory evaluation (see Appendix I).

Data has been composed using questionnaires covering socio-demographic status, 3-day diet records, and physical activity. Anthropometric and glycaemic control parameters have been also evaluated. Questionnaire has been used to gather the following data (Appendix II)

a. Demographic data
b. Anthropometry data
c. Clinical data
d. Biochemical data is also analysed using
i. HbA1c
ii. Blood glucose levels (fasting and random sugar FBS & RBS)

Food frequency questionnaire is used to collect data regarding dietary intake. Questions related to food intake are being asked from patients or their attendant at the clinic (Appendix III). The resultant data has been subjected to statistical analysis using the latest SPSS version. In descriptive analysis, mean, percentage, ratio is being used. Data analysis has been done using correlation among variables.

RESULTS

The sample is collected from 300 diabetic patients and their nutritional status is evaluated. The socio-demographic status and biomedical findings of them is also evaluated. The data is analysed using chi-square, goodness of fit test. Out of 300 patients, 187(59.4%) were diagnosed with type II and 113 (35.9%) with type I. Among type I diabetics 47.8% were healthy, and 38.8% were obese. Among type II diabetics 52.2% were healthy, 61.2% were obese. 85% patients had good glycaemic control (HbA1c 5.7-6.4%) and 15% had poor glycaemic control (HbA1c >6.5%).

Among the 300 patients surveyed, the age distribution was as follows: 12.1% were aged 20-30, 24.4% were 31-40, 31.7% fell within the 41-50 age range, 11.7% were aged 51-60, 6.3% were between 61-70, and 8.9% were in the 71-80 age group. The gender breakdown revealed that 120 patients (40%) were male, and 180 patients (60%) were female. Regarding marital status, 32 individuals (10.7%) were single, 252 (84%) were married, and 16 (5.3%) were divorced. In terms of occupation, the professionals included 13 doctors (4.3%), 35 teachers (11.7%), 31 businessmen (10.3%), 3 engineers (1%), 49 government employees (16.3%), 9 freelancers (3%), 20 individuals in various other professions (6.7%), and 134 housewives (44.7%).

In terms of education, there were 8 individuals (2.5%) with an undergraduate degree, 134 (42.5%) who completed graduate studies, 90 (28.6%) who held postgraduate qualifications, and 68 (21.6%) who were illiterate. Regarding residence, 44 participants (14%) lived in rural areas, 245 (77.8%) resided in urban settings, and 11 (3.5%) were found in peri-urban locations. As for income, 14 individuals (4.4%) earned between Rs. 20,000 and 39,000, 88 individuals (27.9%) earned between Rs. 40,000 and 60,000, and 194 participants (61.6%) had incomes exceeding Rs. 60,000, with no participants reporting earnings below Rs. 20,000 (Tables 1 and 2).

Table 1: Demographics (age, gender, marital status and profession)

Age		Gender		Marital status		Profession	
21-30	12.1%	Male	38.1%	Single	10.2%	Doctor	4.1%
31-40	24.4%	Female	57.1%	Married	80%	Teacher	11.1%
41-50	31.7%			Divorced	5.1%	Businessman	9.8%
51-60	11.7%					Engineer	1.0%
61-70	6.3%					Govt. employee	15.6%
71-80	8.9%					Freelancer	2.9%
						Others	8.3%
						Housewife	42.5%

Table 2: Demographics (education, location, income)

Education		Location		income	
Undergraduate	2.5%	Rural	14%	<Rs.20,000	1.3%
Graduate	42.5%	Urban	77.8%	Rs.20,000-39,000	4.4%
Post-graduate	28.6%	Peri- urban	3.5%	Rs.40,000-60,000	27.9%
Illiterate	21.6%			>Rs.60,000	61.6%

Patients' sociodemographic characteristics and indicators of insulin-dependent and non-insulin-dependent diabetes were significantly correlated. Sleep patterns, levels of physical activity, water consumption, clinical tests, and personal and family medical histories were among these factors. BMI and both insulin-dependent and non-insulin-dependent diabetes were shown to be significantly correlated ($\chi 2$ (14, N=300) =206.668, p=0.00). The null hypothesis was disproved. HbA1c and patients' meal times were significantly correlated ($\chi 2$ (6, N=300) = 20.802, p=0.002).

Table 3: Association of socio-demographic status with predictors of type I and type II diabetes

No.	Variables	Chi-square d f	Chi-square value	p-value
1	Age (>20-<70)	35	369.349	0
2	Gender (Male, Female)	7	111.894	0
3	Marital status (Single, Married, Divorced)	14	50.42	0
4	Education (Matric, Graduate, Post graduate, Illiterate)	21	220.275	0
5	Profession	49	483.03	0
6	Location (Rural, Urban)	No stats; location Nil	Nil	Nil

No.	Variables	Chi-square d f	Chi-square value	p-value
7	Income (<Rs. 10,000, Rs. 21,000-39,000, Rs. 40,000-60000, >Rs. 60000)	21	163.89	0

*Predictors are sleep cycle, physical activity, water intake, clinical examinations, family medical history, personal medical history)

The association of food groups and insulin dependent diabetics (type I) is being analysed. Cereal group had significant relation for insulin dependent diabetics χ^2 (2, N=300) =112.22, p=0.00. 75.2% patients were consuming >11 number of servings. 24.8%, 6-11 and 0% <6.

Table 4: Association of BMI with predictors of type I and type II diabetes

No.	Variables	Chi-square df	Chi-square value	p-value
1	BMI (kg/m^2)	14	206.668	0

Table 5: Association of meal timings and HbA1c

No.	Variables	Chi-square df	Chi-square value	p-value
1	HbA1C (4.5-5.6% Normal, 5.7-6.4% Pre diabetic, >6.5% Diabetic)	6	20.802	0.002

Fruit group had no significant relation for insulin dependent diabetics, χ^2 (1, N=300) =0.933, p=0.331 (as p-value is >0.05). 75.2% patients were consuming >4 number of servings, 24.8%, 2-4 and 0% <2.

Vegetable group had a significant relation for insulin dependent diabetics χ^2 (2, N=300) =31.703, p=0.00. 75.2% patients were consuming 3-5 numbers of servings, 20.4%, >5 and 4.4% <3.

Meat group had significant relation for insulin dependent diabetics χ^2 (2, N=300) =6.002, p=0.05. 96.3% patients were consuming >3 number of servings and 3.5%, 2-3.

Milk group had significant relation for insulin dependent diabetics χ^2 (3, N=300) =43.05, p=0.00. 40.7% patients were consuming >3 number of servings, 36.3%, 2-3 and 20.3% <2

Fats and oil groups had significant relation for insulin dependent diabetics χ^2 (9, N=300) =195.34, p=0.00. 4.10 was the consumption in 31.9% patients.

Miscellaneous groups had significant relation for insulin dependent diabetics χ^2 (4, N=300) =123.26, p=0.00. 56.0% patients were consuming 0 miscellaneous foods. 20.4% were consuming 3.

Junk food had a significant relation for insulin dependent diabetics χ^2 (17, N=300) =235.82, p=0.00. 13 was highest consumption in 20.4% patients.

Water intake had no significant relation for insulin dependent diabetics χ^2 (1, N=300) =0.345, p=0.556. 93.8% patients were consuming <4L water.6.25 consuming 4-5L.

The association of food groups and non-insulin dependent diabetics is also being analysed. Cereal group had significant relation for insulin dependent diabetics χ^2 (2, N=300) =112.22, p=0.00. 80.2% patients were consuming >11 number of servings, 14.4%, 6-11 and 5.3% <6. Fruit group had no significant relation for insulin dependent diabetics χ^2 (1, N=300) =0.933, p=0.334. 70.1 % patients were consuming >4 number of servings, 29.9%, 2-4 and 0% <2. Vegetable group had a significant relation for insulin dependent diabetics χ^2 (2, N=300) =31.703, p=0.00. 42.2% patients were consuming 3-5 numbers of servings, 41.7% >5 and 16% <3.

Table 6: Association of food groups and type I diabetics

S. No.	Variables	Chi-square df	Chi-square value	p-value
1	Cereals (<6, 6-11, >11)	2	112.22	0
2	Fruits (<2, 2-4, >4)	1	0.933	0.331
3	Vegetables (<3, 3-5, >5)	2	31.703	0
4	Meat (<2, 2-3, >3)	2	6.002	0.05
5	Milk (<2, 2-3, >3)	3	43.05	0
6	Fats and oil (Sparing)	9	195.34	0
7	Miscellaneous (0)	4	123.26	0
8	Junk food (0)	17	235.82	0
9	Water (<4, 4-5, >5)	1	0.345	0.556

Meat group had a significant relation for insulin dependent diabetics χ^2 (2, N=300) =6.006, p=0.05. 94.1% patients were consuming >3 number of servings, 1.6% 2-3 and 4.3% <2.

Milk group had significant relation for insulin dependent diabetics χ^2 (3, N=300) =43.05, p=0.00. 34.2% patients were consuming >3 number of servings, 10.7%, 2-3, 47.6% <2 and 7.5%, 0.

Fats and oil groups had significant relation for insulin dependent diabetics χ^2 (9, N=300) =195.34, p=0.00. 2 was consumed in 38% patients. 9 was the highest consumption in 7.5% patients.

Miscellaneous groups had significant relation for insulin dependent diabetics χ^2 (4, N=300) =123.26, p=0.00.56. None was consuming 0 miscellaneous food. 20.4% were consuming 3.

Junk food had a significant relation for insulin dependent diabetics χ^2 (17, N=300) =235.82, p=0.00. 27 was highest consumption in 14.4% patients.

Water intake had a significant relation for insulin dependent diabetics χ^2 (1, N=300) =0.346, p=0.556. 92.0% of patients were consuming <4L water. 8% were consuming 4-5L.

Table 7: Association of food groups and type II diabetics

S. No.	Variables	Chi-square df	Chi-square value	p-value
1	Cereals (<6, 6-11, >11)	2	112.22	0
2	Fruits (<2, 2-4, >4)	1	0.933	0.334
3	Vegetables (<3, 3-5, >5)	2	31.703	0
4	Meat (<2, 2-3, >3)	2	6.006	0.05
5	Milk (<2, 2-3, >3)	3	43.05	0
6	Fats and oil (Sparing)	9	195.34	0
7	Miscellaneous (0)	4	123.269	0
8	Junk food (0)	17	235.82	0
9	Water (<4, 4-5, >5)	1	0.346	0.556

Only 14.4% of Type II diabetics were having adequate serving of cereals (6-11) as compared to type I(24.8%) as shown in table3 and 4. 75.2% of Type I diabetics were consuming cereals greater than recommended servings as compared to type II diabetics (80.2%). 29.9% of Type II diabetics were having adequate serving of fruits (2-4) as compared to type I diabetics (24.8%). 75.2% of Type I diabetics were having adequate serving of vegetables (3-5) as compared to type II diabetics (42.2%). 16% of Type II diabetics were consuming vegetables less than recommended servings as compared to type I diabetics (4.4%). 3.5 % of Type I diabetics were having adequate serving of meat (2-3) as compared to type II diabetics (1.6%). 96.5 % of Type I diabetics were consuming meat greater than recommended servings. 94.1% of Type II diabetics were consuming meat greater than recommendations. Only 4.3% type II diabetics were consuming less than recommendations. 36.3 % Type I diabetics were having adequate serving of milk (2-3) as compared to type II diabetics (10.7%). But 40.7 % type I were consuming milk greater than recommended servings. 7.5% of type II diabetics were not consuming milk and milk products. 47.6% of type II diabetics were consuming less than recommendation. 40.7% of type I diabetics were consuming milk and milk products greater than recommendation. 9 (no of serving) was the highest consumption of fat in 7.5% of type II diabetic patients. Highest junk food intake was 27 no of servings in 14.4% of type II diabetics which is higher than type I diabetics intake. Miscellaneous intake was minimal in both type I and type II diabetics. Water intake was less than recommendation, 98.8% in type I diabetics and 92% in type II diabetics. However, 8% type II diabetics were consuming adequate water (4-5) than type I diabetics (6.6%) shown in table [5, 6, 7 and 8].

Table 8: Comparison of food groups of type I diabetes and type II diabetes

Food Groups	Type I Diabetics (%)	Type II Diabetics (%)
Cereals		
<6	0	5.3
6-7	24.8	14.4
>11	75.2	80.2
Fruits		
<2	0	0
2-4	24.8	29.9
>4	75.2	70.1
Vegetables		
<3	4.4	16
3-5	75.2	42.2
>5	20.4	41.7

Food Groups	Type I Diabetics (%)	Type II Diabetics (%)
Meat <2 2-3 >3	 0 3.5 96.3	 4.3 1.6 94.1
Milk <2 2-3 >3	 20.3 36.3 40.7	 47.6 10.7 34.2 (7.5% consuming no dairy products)
Fats and Oil (Sparing)	4.10 is the no. of serving in 31.9%	2 is the no. of serving in 38% Highest fat consumption is 9 in 7.5%
Miscellaneous 0	0 is the number in 56% 3 in 20.40%	3 in 20.40%
Junk Food 0	 13 is the highest no. of serving in 20.40%	 27 is the highest in 14.40%
Water <4 4-5 >5	 93.8 6.25 0	 92 8 0

DISCUSSIONS

The nutritional status of 300 diabetic patients who were randomly selected is examined along with their socio-demographic status. Using the chi-square goodness of fit test, the data is examined. Out of 300 patients, 187 (59.4%) had type II diabetes and 113 (35.9%) had type I diabetes. Type I diabetics are 47.8% healthy, and 38.8% obese individuals. 52.2% of type II diabetics were in good health, while 61.2% were obese. 15% of patients had inadequate glycaemic control (HbA1c >6.5%), while 85% of patients had good glycaemic control (HbA1c 5.7-6.4%).

Compared to type I diabetics, type II diabetics consumed an increased amount of cereal and fruits than was recommended. Compared to type II diabetics, type I diabetics were eating an adequate number of vegetables and meat. Diabetics with type I diabetes were getting enough milk. However, type I was consuming more milk than was advised. 7.5% of people with type II diabetes didn't consume milk or dairy products. Miscellaneous intake was minimal in both type I and type II diabetics. Intake of junk food was high among type II diabetics. 93.8% of type I diabetics and 92% of type II diabetics consumed less water than was recommended.

CONCLUSION

According to the survey's findings, type II diabetes consume more cereals than type I diabetics. Just 14.4% of people with Type II diabetes eat enough cereal. For both type I and type II diabetes, overall fruit consumption exceeds recommendations. The majority of people with type I diabetes (75.2%) get enough vegetables, but 42.2% of people with type II diabetes consume enough vegetables and 41.7% more than is advised. Compared to type II diabetics, type I diabetics consume more meat. People with type 1 diabetes are drinking more milk than is advised. Type II diabetics consume a lot of junk food. Type I diabetics consume more fat than type II diabetics. In both type I and type II diabetics, miscellaneous intake is very low. Both type I and type II diabetics consume less water than is advised. Type I and type II diabetics consume a lot of fruits and vegetables to keep their blood glucose levels stable. An appropriate diet plan intervention can lessen this issue.

Contributor statement:

Shumail Saeed served as the primary author and research developer. Zainab Hira contributed by conducting a literature survey and supporting the writing process. Mehak Fatima assisted in preparing the questionnaire. Khoula Masood, and Syed Shumaim Ali, provided help in both questionnaire preparation and problem-solving. Momina, and Motiullah helped in survey conduction and write up. Shahrukh Khan, Shumail Saeed and Hassan Aziz were instrumental in organizing the references and write up review.

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