

Assessment of Nutritional Habits of Type-2- Diabetic Patients

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ABSTRACT

Background: Diabetes mellitus is a disease characterized by hyperglycaemia resulting from defects in insulin secretion, efficacy, or both. Improving glycaemic control among patients with type 2 diabetes is vital in preventing micro- and macrovascular complications. Type 2 diabetes has become a serious threat to global health with an increase in its incidence in Asian countries.

Objectives: The study aimed to assess the nutritional habits of type-2- diabetic patients, and to find out the relationship between nutritional habits of type-2- diabetic patients with their demographic characteristics that include age, gender, level of Educational, and duration of disease.

Subjects and methods: A quantitative descriptive design was accomplished in order to inspect nutritional habits of type-2- diabetic patients. The study was carried out during the period from 30th December 2021 to 30th August 2022. A purposive sample of 100 patients were selected. The sample consisted of 50 patients from Baghdad Al-Rusafa Health Directorate/Al-Kindy Teaching Hospital and 50 patients from Baghdad AL-Karkh Health Directorate /Al-Yarmouk Teaching Hospital.

Results: The study findings showed that the majority of the sample were of the age group (21–30) years old, most sample were males, quarter of them were Intermediate school graduate, 51% of patients, their HbA1c was between 8-9, which mean that more than half of patients were not controlling their blood sugar.

Conclusion: Related to patient's feeding pattern the results identified that there was deficit knowledge in patients toward nutritional habits. Males were more than females regarding to use bad feeding pattern.

Key words: Assessment, Nutritional Habits, Type-2- diabetic mellitus.

INTRODUCTION

Diabetes mellitus (DM) is the world's third-largest, chronic, noninfectious disease after cardiovascular diseases and cancer ⁽¹⁾.

Type 2 diabetes is caused by the lifestyle change of habits of most of the population such as poor diet and nutrition, obesity, physical inactivity, and stress ⁽²⁾. Dietary habits and sedentary lifestyle are the major factors for rapidly rising incidence of DM ⁽³⁾. Best management practices are to encourage patients to measure their blood glucose, take medications, and adjust their dietary habits to maintain health with the disease ⁽²⁾. Dietary management is considered as a major step in assessing a patient's knowledge ⁽⁴⁾.

Poorly con-trolled DM can pose a considerable economic burden not only to patients but also to the society ⁽⁵⁾. The challenge for the patients is how to maintain the effective dietary pattern to manage their diabetes ⁽⁴⁾.

SUBJECTS AND METHODS

A descriptive design was accomplished in order to assess the nutritional habits of type-2- diabetic patients. A purposive (non-probability) sample of 100 patients visited Outpatient Clinic in AL Kindy Teaching Hospital and Al- Yarmouk Teaching Hospital in Baghdad city. The sample consisted of 50 patients from Baghdad Al-Rusafa Health Directorate/Al-Kindy Teaching Hospital and 50 patients from Baghdad Al-Karkh Health Directorate /Al-Yarmouk Teaching Hospital. The content validity

of the study instruments is established through a panel of 10 experts; 4 from medical ward at Al-Kindy Teaching Hospital, and 6 from College of Nursing, University of Al-Bayan. Test-retest has been obtained throughout evaluating 10 patients selected from Al-Yarmouk Teaching Hospital and Al-Kindy Teaching Hospital.

Ethical Clearance: All experimental protocols were approved from Al-Bayan University. The research was carried out in accordance with approved guidelines.

Statistical analysis:

According to the knowledge test questionnaire, Pearson correlation coefficient was used, which was 0.84. Data has been analyzed throughout the use of simple statistical analysis and the inferential analysis that included analysis of variance and the researcher used the SPSS version 24.0 for analysis of data.

RESULTS

This table showed that the majority of the sample (36.0 %) were at the age group 21–30 years old, (64%) were males, quarter of them (25%) were intermediate school graduate. 65 % had BMI of 20–25, which means healthy weight, while 40% of patients were diagnosed as diabetic in 2016 -2021 and 40% had good control of blood sugar (HbA1c) as shown in table (1) and figures (1, 2 and 3).

Table (1): Distribution of (100) diabetic patients by socio-demographic characteristics

Demographic Variables	Groups	F	%	Cum. %
1.Age :	10 – 20 year	5	5.00	5.00
	21 – 30 year	36	36.00	41.00
	31 – 40 year	24	24.00	65.00
	41-50 year	19	19.00	84.00
	51 year and more than	16	16.00	100.0
	Total	100	100	
2.Gender :	Male	64	64.00	64.00
	Female	36	36.00	100.0
	Total	100	100	
3.Level of Education	Reads & write	15	15.00	15.00
	Elementary school graduate	7	7.00	22.00
	Intermediate school graduate	25	25.00	47.00
	preparatory school graduate	19	19.00	66.00
	Institutes graduate	11	11.00	77.00
	College graduate	18	18.00	95.00
	postgraduate graduate	5	5.00	100.0
	Total	100	100	
4.Body mass index (kg/m²)	BMI 20-25 Healthy weight range	65	65.00	65.00
	26-30 Overweight (grade 1 obesity)	27	27.00	92.00
	31-35 Obese (grade 2 obesity)	6	6.00	98.00
	36-40 Very obese (morbid or grade 3 obesity)	2	2.00	100.0
	Total	100	100.0	
5.Date of diagnosis of diabetes	2000-2005	11	11.00	11.00
	2006-2010	24	24.00	35.00
	2011-2015	25	25.00	60.00
	2016-2021	40	40.00	100.0
	Total	100	100.0	
6. Good control of blood sugar HbA1c (%)	Less than 7	40	40.00	40.00
	8-9	51	51.00	91.00
	10-12	9	9.00	100.0
	Total	100	100.0	

F= Frequency; %= percent; Cum.

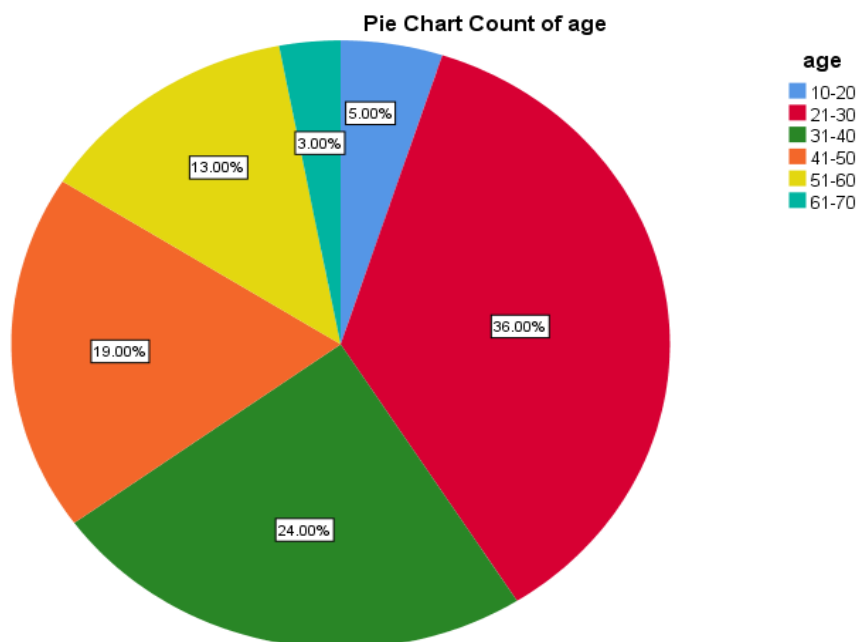


Figure (1): Pie Chart Count of Age

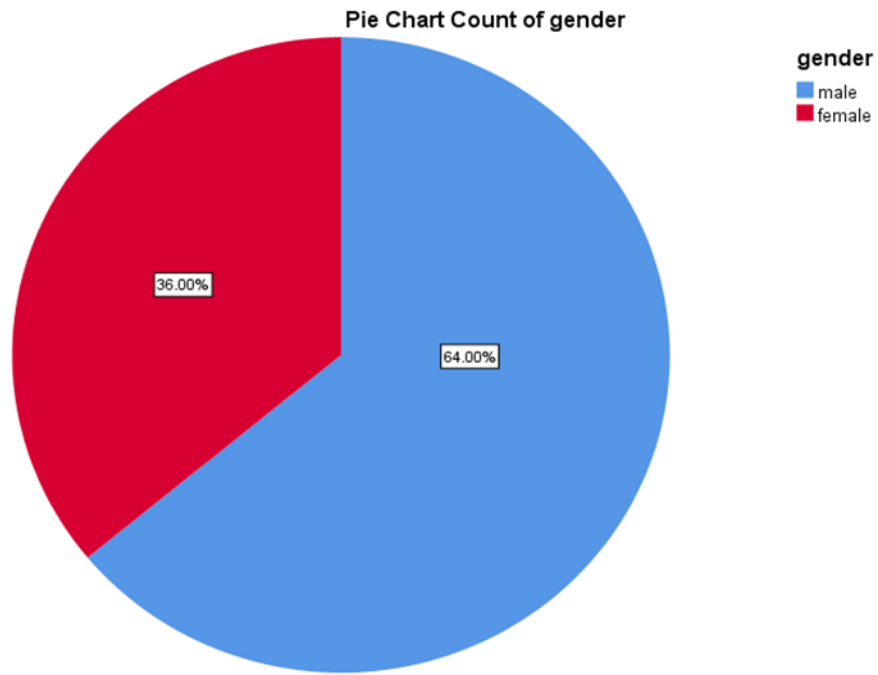


Figure (2): Pie Chart Count of Gender

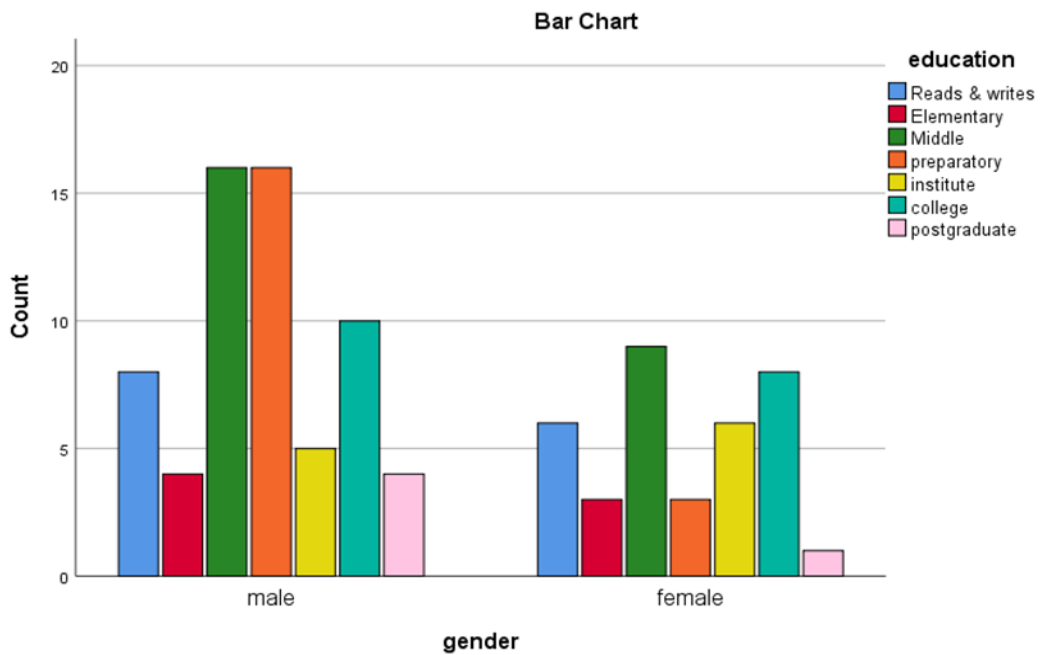


Figure (3): Figure 3: The level of Education

Table (2) showed that 51(51%) of patients, the HbA1c of them was from 8-9%, which means that more than half of patients were not controlling their blood sugar.

Table (2): The relationship between Hba1c and disease control

Good control of blood sugar	Good control of blood sugar		Mean Rank	
	Less than 7	8-9	N	%
HbA1c (%)	8-9	10-12	40	40
			51	51
			9	9
Total			100	100

Table (3) showed that more than 52 (52 %) of diabetic patients were some time skipping breakfast daily, 58 (58%) of them sometime eating less than 4 meals from restaurants a week, 65 (65%) of them eating sometime less than 3 servings of whole grain products a day, and 63 (63%) of them eating sometime less than 2-3 servings of fruits a week. Also, 63 (63%) of them were eating sometime less than 2-3 servings of vegetables a day, 36 (36%) of them always drinking less than 2-3 servings of milk products a day, while 46 (46%) of them sometime drinking less than 2-3 servings of milk products a day. Furthermore, 46 (46%) of them were eating fruits daily, 55 (55%) of them were drinking about 500 ml of sugar- sweetened soda daily, nearly about half of them 49 (49%) always were adding salt to foods during cooking or at the table, and finally 62 (62%) of them sometimes were following a special diet.

Table (3): Assessment of nutritional habits of type-2- diabetic patients (History and style of food of the sample)

No	Items	Observations	F	%	Cum. %
1.	Skipping breakfast	always	16	16.00	16.00
		sometime	52	52.00	68.00
		never	32	32.00	100.0
		Total	100	100.0	
2.	Eating >4 meals from restaurants a week	always	22	22.00	22.00
		sometime	58	58.00	80.00
		never	20	20.00	100.0
		Total	100	100.0	
3.	Eating <3 servings of whole grain products a day	always	28	28.00	28.00
		sometime	65	65.00	93.00
		never	7	7.00	100.0
		Total	100	100.0	
4.	Eating <2-3 servings of fruit a day	always	30	30.00	30.00
		sometime	63	63.00	93.00
		never	7	7.00	100
		Total	100	100.0	
5.	Eating <3-4 servings of vegetables a day	always	33	33.00	33.00
		sometime	63	63.00	96.00
		Never	4	4.00	100.0
		Total	100	100.0	
6.	Drinking <2-3 servings of milk products a day	always	36	36.00	36.00
		sometime	46	46.00	82.00
		Never	18	18.00	100.0
		Total	100	100.0	
7.	Eats fruits daily	always	33	33.00	33.00
		sometime	46	46.00	79.00
		Never	21	21.00	100.0
		Total	100	100.0	
8.	drink about 500 ml of sugar- sweetened soda daily	always	25	25.00	25.00
		sometime	55	55.00	80.00
		Never	20	20.00	100.0
		Total	100	100.0	
9.	Adding salt to foods during cooking or at the table	always	49	49.00	49.00
		sometime	37	37.00	86.00
		Never	14	14.00	100.0
		Total	100	100.0	
10.	Following a special diet	always	22	22.00	22.00
		sometime	62	62.00	84.00
		never	16	16.00	100.0
		Total	100	100.0	

F= Frequency; %= percent; Cum. % = Cumulative Percent

Table (4) showed that more than 55 % of diabetic patients were always eating beef. 53% of them always were eating chicken meat more than 2 times a week, while 43% of them were sometime eating chicken meat more than 2 times a week. 48% of them sometimes choosing higher fat red meats instead of lean red meats, 54% never used regular processed meats instead of low-fat processed meats, 52% always were eating fried foods, 38 (38%) of them sometimes were eating regular chips, crackers, popcorn nuts instead of pretzels, low-fat chips, low-fat crackers and air-popped popcorn.

Table (4): Assessment of nutritional habits of type-2- diabetic patients concerning the nature of protein and fat consumption)

No	Items	servations	F	%	Cum. %
1.	Eat beef	always	55	55.00	55.00
		sometime	31	31.00	86.00
		never	14	14.00	100.0
		Total	100	100.0	
2.	Eating chicken meat > 2 times a week	always	53	53.00	53.00
		sometime	43	43.00	96.00
		never	4	4.00	100.0
		Total	100	100.0	
3.	Choosing higher fat red meats instead of lean red meats	always	19	19.00	19.00
		sometime	48	48.00	67.00
		never	33	33.00	100.0
		Total	100	100.0	
4.	Using regular processed meats instead of low-fat processed meats	always	12	12.00	12.00
		sometime	34	34.00	46.00
		never	54	54.00	100.0
		Total	100	100.0	
5.	Eating fried foods	always	52	52.00	52.00
		sometime	43	43.00	95.00
		Never	5	5.00	100.0
		Total	100	100.0	
6.	Eating regular chips, crackers, popcorn nuts instead of pretzels, low-fat chips, low-fat crackers, air-popped popcorn	always	27	27.00	27.00
		sometime	38	38.00	65.00
		Never	35	35.00	100.0
		Total	100	100.0	

F= Frequency; %= percent; Cum. % = Cumulative Percent.

Table (5) showed that more than half of sample (52%) were sometime skipping breakfast, while 17% of them were always skipping breakfast. 57% of males and females sometime were eating > 4 meals from restaurants a week, while 23% of them always were eating > 4 meals from restaurants a week. 64% of sample sometimes were eating < 3 servings of wholegrain products a day, while 29% of them were always eating < 3 servings of whole grain products a day. 62% of sample sometimes were eating < 2-3 servings of fruit a day, while 31% of them were always eating < 2-3 servings of fruit a day. 62% of sample sometimes were eating < 3-4 servings of vegetables a day, while 34% of them were always eating < 3-4 servings of vegetables a day. Furthermore, the results in this table indicated that 46% of them sometimes were eating or drinking < 2-3 servings of milk products a day, while 37% of them were always eating or drinking < 2-3 servings of milk products a day. 45% of respondents sometimes had fruit drink a day, while 34% of them were always eating or drinking fruit a day. 39% and 37% of sample sometimes and always were eating regular cheese respectively. 54% and 26% of them sometimes and always were drinking about 500 ml of sugar- sweetened soda daily respectively. 49% of sample always were adding salt to foods during cooking or at the table, while 37% of them sometimes were adding salt to foods during cooking or at the table. Finally, the results showed that 61% of respondents sometimes were following a special diet, while 23% of them followed a special diet.

Table (5): Relationship between patients' feeding pattern regarding history and style of food with gender.

		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
skipping breakfast	Male	9	9	30	30	25	25	64	64
	Female	8	8	22	22	6	6	36	36
	Total	17	17.0	52.0	52	31	31.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eating >4 from restaurants a week	Male	16	16.0	34	34.0	14	14.0	64	64
	Female	7	7.0	23	23.0	6	6.0	36	36
	Total	23	23.0	57	57.0	20	20.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eating <3 servings of whole grain products a day	Male	19	19.0	42	42.0	3	3.0	64	64
	Female	10	10.0	22	22.0	4	4.0	36	36
	Total	29	29.0	64	64.0	7	7.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eating <2-3 servings of fruit a day	Male	20	20.0	42	42.0	2	2.0	64	64
	Female	11	11.0	20	20.0	5	5.0	36	36
	Total	31	31.0	62	62.0	7	7.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eating < 3-4 servings of vegetables a day	Male	18	18.0	43	43.0	3	3.0	64	64
	Female	16	16.0	19	19.0	1	1.0	36	36
	Total	34	34.0	62	62.0	4	4.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eating or drinking <2-3 servings of milk products a day	Male	31	31.0	26	26.0	7	7.0	64	64
	Female	6	6.0	20	20.0	10	10.0	36	36
	Total	37	37.0	46	46.0	17	17.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Fruit drink a day	Male	29	29.0	23	23.0	12	12.0	64	64
	Female	5	5.0	22	22.0	9	9.0	36	36
	Total	34	34.0	45	45.0	21	21.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Eat regular cheese	Male	31	31.0	18	18.0	15	15.0	64	64
	Female	6	6.0	21	21.0	9	9.0	36	36
	Total	37	37.0	39	39.0	24	24.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Drink about 500 ml of sugar- sweetened soda daily	Male	16	16.0	33	33.0	15	15.0	64	64
	Female	10	10.0	21	21.0	5	5.0	36	36
	Total	26	26.0	54	54.0	20	20.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
Adding salt to foods during cooking or at the table	Male	36	36.0	22	22.0	6	6.0	64	64
	Female	13	13.0	15	15.0	8	8.0	36	36
	Total	49	49.0	37	37.0	14	14.0	100	100
		always		sometimes		never		Total	
		F	%	F	%	F	%	F	%
following a special diet	Male	19	19.0	35	35.0	10	10.0	64	64
	Female	4	4.0	26	26.0	6	6.0	36	36
	Total	23	23.0	61	61.0	16	16	100	100

F= Frequency; % = percent; Cum. % = Cumulative Percent.

Table (6) showed that 50% of patients with middle school level of Education always were skipping breakfast,

27.3% of middle and secondary school always were eating > 4 meals from restaurants a week, 32.1% of middle school always were eating < 3 servings of whole grain products a day, 33.3% of college Education had < 2-3 servings of fruit a day, (33.3%) of middle school always eating <3-4 servings of vegetables a day and 22.2% of middle school always were eating or drinking <2-3 servings of milk products a day. 30.3% of secondary school had fruit drink a day, 33.3% of secondary school had cheese, 35% of institute never had about 500 ml of sugar- sweetened soda daily, 35.7% of secondary school never to add salt to foods during cooking or at the table and 31.3% of reading and writing and middle school never followed a special diet.

Table (6): Relationship between patients' feeding pattern regarding history and style of food and level of Education

Variables						
Skipping breakfast			always	sometimes	never	Total
Education	Reads & writes	Count	2	8	5	15
		% within skipping breakfast	11.8%	15.4%	16.1%	15%
	Elementary	Count	1	5	1	7
		% within skipping breakfast	5.9%	9.6%	3.2%	7%
	Middle	Count	8	11	6	25
		% within skipping breakfast	47.1%	21.2%	19.4%	25%
	Secondary	Count	2	13	4	19
		% within skipping breakfast	11.8%	25%	12.9%	19%
	institute	Count	2	4	5	11
		% within skipping breakfast	11.8%	7.7%	16.1%	11%
	college	Count	1	9	8	18
		% within skipping breakfast	5.8%	17.3%	25.8%	18%
postgraduate	Count	1	2	2	5	
	% within skipping breakfast	5.8%	3.8%	6.5%	5%	
Total		Count	17	52	31	100
		% within skipping breakfast	100%	100%	100%	100%
Eating >4 from restaurants a week						
			always	sometimes	never	Total
Education	Reads & writes	Count	3	10	2	15
		% within Eating >4	13.1%	17.5%	10%	14.1%
	Elementary	Count	2	5	0	7
		% within Eating >4	8.7%	8.8%	0%	7.1%
	Middle	Count	6	12	7	25
		% within Eating >4	26.1%	21.1%	35%	25.3%
	Secondary	Count	6	7	6	19
		% within Eating >4	26.1%	12.3%	30%	19.2%
	institute	Count	1	8	2	11
		% within Eating >4	4.3%	14%	10%	11.1%
	college	Count	4	12	2	18
		% within Eating >4	17.4%	21.1%	10%	18.2%
postgraduate	Count	1	3	1	5	
	% within Eating >4	4.3%	5.3%	5%	5.1%	
Total		Count	23	57	20	100
		% within Eating >4	100%	100%	100%	100%
Eating <3 servings of whole grain products a day						
			always	sometime	never	Total
Education	Reads & writes	Count	1	13	1	15
		% within Eating <3	3.4%	20.3%	14.3%	14.1%
	Elementary	Count	2	5	0	7
		% within Eating <3	6.9%	7.8%	0%	7.1%
	Middle	Count	9	14	2	25
		% within Eating <3	31.0%	21.9%	28.6%	25.3%
	Secondary	Count	8	11	0	19
		% within Eating <3	27.6%	17.2%	0%	19.2%
	institute	Count	5	6	0	11
		% within Eating <3	17.2%	9.4%	0%	11.1%
	college	Count	4	11	3	18
		% within Eating <3	13.8%	17.2%	42.9%	18.2%
postgraduate	Count	0	4	1	5	
	% within Eating <3	0%	6.3%	14.3%	5.1%	
Total		Count	29	64	7	99
		% within Eating <3	100%	100%	100%	100%

Eating <2-3 servings of fruit a day						
			always	sometime	never	Total
Education	Reads & writes	Count	1	12	1	14
		% within Eating <2-3	3.3%	19.4%	14.3%	14.1%
	Elementary	Count	3	4	0	7
		% within Eating <2-3	10%	6.5%	0%	7.1%
	Middle	Count	5	16	4	25
		% within Eating <2-3	16.7%	25.8%	57.1%	25.3%
	Secondary	Count	7	12	0	19
		% within Eating <2-3	23.3%	19.4%	0%	19.2%
	institute	Count	3	8	0	11
		% within Eating <2-3	10%	12.9%	0%	11.1%
	college	Count	10	6	2	18
		% within Eating <2-3	33.3%	9.7%	28.6%	18.2%
postgraduate	Count	1	4	0	5	
	% within Eating <2-3	3.3%	6.5%	0%	5.1%	
Total		Count	30	62	7	99
		% within Eating <2-3	100%	100%	100%	100%
Eating < 3-4 servings of vegetables a day						
			always	sometime	never	Total
Education	Reads & writes	Count	6	7	1	14
		% within Eating < 3-4	18.2%	11.3%	25%	14.1%
	Elementary	Count	2	5	0	7
		% within Eating < 3-4	6.1%	8.1%	0%	7.1%
	Middle	Count	11	13	1	25
		% within Eating < 3-4	33.3%	21%	25%	25.3%
	Secondary	Count	3	15	1	19
		% within Eating < 3-4	9.1%	24.2%	25%	19.2%
	institute	Count	3	8	0	11
		% within Eating < 3-4	9.1%	12.9%	0%	11.1%
	college	Count	6	12	0	18
		% within Eating < 3-4	18.2%	19.4%	0%	18.2%
postgraduate	Count	2	2	1	5	
	% within Eating < 3-4	6.1%	3.2%	25%	5.1%	
Total		Count	33	62	4	99
		% within Eating < 3-4	100%	100%	100%	100%
Eating or drinking <2-3 servings of milk products a day						
			always	sometime	never	Total
Education	Reads & writes	Count	6	3	5	14
		% within Eating or drinking <2-3	16.7%	6.5%	29.4%	14.1%
	Elementary	Count	4	3	0	7
		% within Eating or drinking <2-3	11.1%	6.5%	0%	7.1%
	Middle	Count	8	17	0	25
		% within Eating or drinking <2-3	22.2%	37%	0%	25.3%
	Secondary	Count	7	9	3	19
		% within Eating or drinking <2-3	19.4%	19.6%	17.6%	19.2%
	institute	Count	4	4	3	11
		% within Eating or drinking <2-3	11.1%	8.7%	17.6%	11.1%
	college	Count	6	9	3	18
		% within Eating or drinking <2-3	16.7%	19.6%	17.6%	18.2%
postgraduate	Count	1	1	3	5	
	% within Eating or drinking <2-3	2.8%	2.2%	17.6%	5.1%	
Total		Count	36	46	17	99
		% within Eating or drinking <2-3	100%	100%	100%	100%

fruit drink a day						
			always	sometime	never	Total
Education	Reads & writes	Count	4	6	4	14
		% within fruit drink a day	12.1%	13.3%	19%	14.8%
	Elementary	Count	2	3	2	7
		% within fruit drink a day	6.1%	6.7%	9.5%	7.4%
	Middle	Count	9	11	5	25
		% within fruit drink a day	27.3%	24.4%	23.8%	25.1%
	Secondary	Count	10	6	3	19
		% within fruit drink a day	30.3%	13.3%	14.3%	19.3%
	institute	Count	4	5	2	11
		% within fruit drink a day	12.1%	11.1%	9.5%	10.9%
	college	Count	2	11	5	18
	% within fruit drink a day	6.1%	24.4%	23.8%	8.1%	
postgraduate	Count	2	3	0	5	
	% within fruit drink a day	6.1%	6.7%	0%	4.2%	
Total		Count	33	45	21	99
		% within fruit drink a day	100%	100%	100%	100%
Eat cheese						
			always	sometime	never	Total
Education	Reads & writes	Count	3	4	7	14
		% within eat cheese	8.3%	10.3%	29.2%	14.1%
	Elementary	Count	3	3	1	7
		% within eat cheese	8.3%	7.7%	4.2%	7.1%
	Middle	Count	8	11	6	25
		% within eat cheese	22.2%	28.2%	25%	25.3%
	Secondary	Count	12	3	4	19
		% within eat cheese	33.3%	7.7%	16.7%	19.2%
	institute	Count	6	3	2	11
		% within eat cheese	16.7%	7.7%	8.3%	11.1%
	college	Count	3	11	4	18
	% within eat cheese	8.3%	28.2%	16.7%	18.2%	
postgraduate	Count	1	4	0	5	
	% within eat cheese	2.8%	10.3%	0%	5.1%	
Total		Count	36	39	24	99
		% within eat cheese	100%	100%	100%	100%
Drink about 500 ml of sugar- sweetened soda daily						
			always	sometime	never	Total
Education	Reads & writes	Count	4	10	0	14
		% within drink about 500 ml	16%	18.5%	0%	11.5%
	Elementary	Count	4	3	0	7
		% within drink about 500 ml	16%	5.6%	0%	7.2%
	Middle	Count	8	13	4	25
		% within drink about 500 ml	32%	24.1%	20%	25.3%
	Secondary	Count	4	13	2	19
		% within drink about 500 ml	16%	24.1%	10%	16.7%
	institute	Count	2	2	7	11
		% within drink about 500 ml	8%	3.7%	35%	15.5%
	college	Count	2	10	6	18
	% within drink about 500 ml	8%	18.5%	30%	18.8%	
postgraduate	Count	1	3	1	5	
	% within drink about 500 ml	4%	5.6%	5%	4.8%	
Total		Count	25	54	20	99
		% within drink about 500 ml	100%	100%	100%	100%

Adding salt to foods during cooking or at the table						
			always	sometime	never	Total
Education	Reads & writes	Count	6	6	2	14
		% within adding salt	12.5%	16.2%	14.3%	14.1%
	Elementary	Count	4	2	1	7
		% within adding salt	8.3%	5.4%	7.1%	7.1%
	Middle	Count	15	10	0	25
		% within adding salt	31.3	27%	0%	25.3%
	Secondary	Count	10	4	5	19
		% within adding salt	20.8%	10.8%	35.7%	19.2%
	institute	Count	4	7	0	11
		% within adding salt	8.3%	18.9%	0%	11.1%
college	Count	8	6	4	18	
	% within adding salt	16.7%	16.2%	28.6%	18.2%	
postgraduate	Count	1	2	2	5	
	% within adding salt	2.1%	5.4%	14.3%	5.1%	
Total		Count	48	37	14	99
		% within adding salt	100%	100%	100%	100%
Doing <30 total of physical						
			always	sometime	never	Total
Education	Reads & writes	Count	1	4	9	14
		% within doing <30 total of physical	7.1%	7%	32.1%	15.4%
	Elementary	Count	2	3	2	7
		% within doing <30 total of physical	14.3%	5.3%	7.1%	8.9%
	Middle	Count	6	12	7	25
		% within doing <30 total of physical	42.9%	21.1%	25%	29.6%
	Secondary	Count	4	9	6	19
		% within doing <30 total of physical	28.6%	15.8%	21.4%	21.9%
	institute	Count	1	7	3	11
		% within doing <30 total of physical	7.1%	12.3%	10.7%	10%
college	Count	0	18	0	18	
	% within doing <30 total of physical	0%	31.6%	0%	10.5%	
postgraduate	Count	0	4	1	5	
	% within doing <30 total of physical	0%	7%	3.6%	3.5%	
Total		Count	14	57	28	99
		% within doing <30 total of physical	100%	100%	100%	100%
following a special diet						
			always	sometime	never	Total
Education	Reads & writes	Count	4	5	5	14
		% within following a special diet	18.2%	8.2%	31.3%	19.2%
	Elementary	Count	4	2	1	7
		% within following a special diet	18.2%	3.3%	6.3%	9.2%
	Middle	Count	3	17	5	20
		% within following a special diet	13.6%	27.9%	31.3%	24.2%
	Secondary	Count	3	12	4	19
		% within following a special diet	13.6%	19.7%	25%	19.4%
	institute	Count	2	8	1	11
		% within following a special diet	9.1%	13.1%	6.3%	9.1%
college	Count	6	12	0	18	
	% within following a special diet	27.3%	19.7%	0%	15.6%	
postgraduate	Count	0	5	0	5	
	% within following a special diet	0%	8.2%	0%	2.7%	
Total		Count	22	61	16	99
		% within following a special diet	100%	100%	100%	100%

Table (7) showed that 75.9% of males had beef, 75% of males always were eating chicken meat > 2 times a week, 73.7% of males always were choosing higher fat red meats instead of lean red meats and 66.7% of males always were using regular processed meats instead of low-fat processed meats. 61.5% of males always were eating fried foods, 63% of males always were eating regular chips, crackers, popcorn nuts instead of pretzels, low-fat chips, low-fat crackers and air-popped popcorn, 68.2% of males always were adding butter, margarine, or oil to bread, potatoes, rice, or vegetables at the table, and 57.1% of males always were using whole milk instead of skimmed milk.

Table (7): Relationship between patients' feeding pattern regarding the nature of protein and fat consumption for patient and gender.

Eat beef						
			always	sometime	never	Total
Gender	male	Count	41	16	6	63
		% within eat beef	75.9%	51.6%	42.9%	63.6%
	female	Count	13	15	8	36
		% within eat beef	24.1%	48.4%	57.1%	36.4%
Total		Count	54	31	14	99
		% within eat beef	100%	100%	100%	100%
Eating chicken						
			always	sometime	never	Total
Gender	male	Count	39	22	2	63
		% within eating chicken	75%	51.2%	50%	63.9%
	female	Count	13	21	2	36
		% within eating chicken	25%	48.8%	50%	36.4%
Total		Count	52	43	4	99
		% within eating chicken	100%	100%	100%	100%
choosing higher fat						
			always	sometime	never	Total
Gender	male	Count	14	31	18	63
		% within choosing higher fat	73.7%	66%	54.5%	63.6%
	female	Count	5	16	15	36
		% within choosing higher fat	26.3%	34%	45.5%	36.4%
Total		Count	19	47	33	99
		% within choosing higher fat	100%	100%	100%	100%
Using regular processed meat						
			always	sometime	never	Total
Gender	male	Count	8	22	33	63
		% within using regular processed meat	66.7%	66.7%	61.1%	63.6%
	female	Count	4	11	21	36
		% within using regular processed meat	33.3%	33.3%	38.9%	36.4%
Total		Count	12	33	54	99
		% within using regular processed meat	100%	100%	100%	100%
Eating fried food						
			always	sometime	never	Total
Gender	male	Count	32	28	3	63
		% within eating fried food	61.5%	66.7%	60%	63.6%
	female	Count	20	14	2	36
		% within eating fried food	38.5%	33.3%	40%	36.4%
Total		Count	52	42	5	99
		% within eating fried food	100%	100%	100%	100%
Eating regular chips						
			always	sometime	never	Total
Gender	male	Count	17	17	29	63
		% within eating regular chips	63%	45.9%	82.9%	63.6%
	female	Count	10	20	6	36
		% within eating regular chips	37%	54.1%	17.1%	36.4%
Total		Count	27	37	35	99
		% within eating regular chips	100%	100%	100%	100%

Adding butter margarine						
			always	sometime	never	Total
Gender	male	Count	15	33	15	63
		% within adding butter margarine	68.2%	64.7%	57.7%	63.6%
	female	Count	7	18	11	36
		% within adding butter margarine	31.8%	35.3%	42.3%	36.4%
Total		Count	22	51	26	99
		% within adding butter margarine	100%	100%	100%	100%
Using whole milk						
			always	sometime	never	Total
Gender	male	Count	8	24	31	63
		% within using whole milk	57.1%	52.2%	79.5%	63.6%
	female	Count	6	22	8	36
		% within using whole milk	42.9%	47.8%	20.5%	36.4%
Total		Count	14	46	39	99
		% within using whole milk	100%	100%	100%	100%

DISCUSSION

In the present study, the majority of the sample (36 %) were of the age group 21–30 years old, 64% were males, 25% were middle school, 65% had 20–25 BMI and 40% of patients their date of diagnosis of diabetes was in 2016–2021. 51% of patients their HbA1c was between 8–9%, which means that more than half of patients were not controlled concerning their blood sugar. This result is not consistent with **Sami and others** ⁽⁶⁾ who reported that average age of the patients was 45 (40–51) years, and most of the patients were males (57.7%), compared to females (42.3%).

More than 50% of the patients' duration of diabetes was between 5–10 years. Almost 50% of the patients were overweight. There was a significant relationship (P level <0.05) between BMI and disease control. **Boyea and others** ⁽⁷⁾ revealed in their study a relationship between obesity and glycemic control among people with type 2 diabetes in the United States.

Moreover, our study revealed that the majority of the sample 65 (65 %) were eating < 3 servings of whole grain products a day. **Jambi et al.** ⁽⁹⁾ indicated that whole grains consumption of diabetic males were: no intake 113(14.3%), 1–4/ week 146 (18.5%) and 5 or more 532 (67.3%). While, diabetic females showed: no intake 93 (15.2%), 1–4/ week 91 (14.9%) and 5 or more 428 (69.9%).

Our results showed that 55 (55%) of patients had beef, 53 (53%) were eating chicken meat > 2 times a week and 52(52%) had fried foods. **Mphasha et al.** ⁽⁸⁾ revealed that 53 (27%) of diabetic patients eat meat, chicken, fish, eggs and milk. Also, our findings revealed that males equal females regarding always skipping breakfast (50%) for each. 68.2% of males had > 4 meals from restaurants a week, 64.3% of males were eating <3 servings of whole grain products a day, 63.3% of males had < 2–3 servings of fruit a day and 51.5% of males had <3–4 servings of vegetables a day. **Hansaram et al.** ⁽⁴⁾ revealed that knowledge of the diabetes patients regarding diabetic diet shows that the knowledge score was independent of Gender.

Our study revealed that 50% of middle school level of Education always were skipping breakfast, 27.3% of middle and secondary school had > 4 meals from restaurant a week, 32.1% of middle school were eating <3 servings of whole grain products a day, 33.3% of college Education were eating <2–3 servings of fruit a day and 33.3% of middle school had <3–4 servings of vegetables a day. **Karaoui et al.** ⁽¹⁰⁾ indicated that those with a university degree had a significantly higher knowledge and practice score than those with intermediate or primary schooling.

Our study showed that 75.9% of males were eating beef, 75% of male had chicken meat > 2 times a week, 73.7% of males were choosing higher fat red meats instead of lean red meats and 66.7% of males were using regular processed meats instead of low-fat processed meats. **Tirficia et al.** ⁽¹¹⁾ revealed that the proportion of diabetic dietary non-adherence was slightly higher in females (49.4%) than in males (44.7%).

CONCLUSION

According to our study, the results identified that there was deficit knowledge in patients toward nutritional habits and they needed Educational preparation that is more detailed and which may also greatly contribute to more understanding and knowledge of nutritional habits of type-2- diabetics.

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