

A Study on Factors Affecting the Adherence of Medical Nutrition Therapy Amongst Patients with Type 2 Diabetes Mellitus Attending Outpatient Clinics of Teaching Hospital Jaffna, Sri Lanka

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Abstract

Background:

Diabetes care includes lifestyle modification which includes Medical Nutritional Therapy (MNT). Diabetes nutrition therapy can result in cost saving and improved outcomes such as HbA1C reduction. Despite understanding the importance of diabetic MNT adherence, implementation is difficult due to various reasons.

Objective:

To study the factors affecting the adherence of diabetic MNT among patients with type 2 diabetes mellitus attending outpatient clinics of Teaching Hospital Jaffna.

Methods:

This descriptive hospital based cross sectional study was conducted in outpatient medical clinics of Teaching Hospital Jaffna for a period of six months from April 2020 to September 2020. All registered type 2 Diabetes Mellitus patients, who visited for their monthly diabetes follow-up were included in this study. Knowledge on diabetes MNT was assessed using a 5-component questionnaire and adherence with MNT was assessed using a single question. Median score 13 was used to categorize the knowledge score on diabetic MNT into adequate knowledge (13 and above) and inadequate knowledge (<13) for statistical analysis which was done by using SPSS version 26.

Results:

Out of 351 patients with diabetes 51.3% were females and mean age of participants was 59.42 ± 13.08. Mean duration of diabetes in years among participants was 7.41 ± 5.26. Majority of participants (65.5%; CI: 60.4-70.4) showed poor adherence with recommended diabetic MNT and 53.0% of the patients reported they consume more than half (portion) starchy food type plate in their daily meal. Our analysis showed knowledge regarding diabetes MNT significantly influenced adherence with diabetic MNT recommendations (Chi square-25.61; P<0.001) and 31.3% (CI: 26.6-36.3) participants found to have inadequate knowledge in the assessment. Further 28.5% of them believed that fat and oils can be consumed liberally and only 35.9% identified correct type of food plate for a patient with diabetes. Individual knowledge, cravings, social priorities, understanding the portion size, cost of some foods were noted as perceived barriers among participants for recommended diabetic MNT adherence.

Conclusion:

The adherence of diabetic MNT was poor among participants and knowledge of participants regarding diabetic MNT significantly influences adherence of MNT. In addition, majority of them reported their daily food plate consists with major portion of starch (Type 1, Type 3 and Type 4). Furthermore, this research has explored several sociocultural unique aspects affecting adherence to diabetes MNT, as such through structured educational interventions by including these factors, health care providers could improve the adherence of diabetic MNT.

Keywords: Medical Nutrition Therapy, Diabetic diet, adherence to dietary recommendation, Northern Sri Lanka

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Introduction

The burden of Diabetes Mellitus is increasing worldwide [1], and around 80% of people who are living with diabetes are in low- and middle-income countries in the world [1]. According to International Diabetes Federation (IDF), the global estimate for Diabetes prevalence among adults aged 20–79 years in 2017 was estimated as 425 million cases (8.8%), this proportion will be expected to rise around 9.9% in 2045. In Sri Lanka, diabetes is a growing problem and estimated prevalence of diabetes was 23% among adults according to Sri Lanka Health and Ageing Survey 2018/2019. [2]

Fundamental aspect of diabetes care is lifestyle modification which consists of, diabetes self-management education and support (DSMES), Medical Nutritional Therapy (MNT), physical activity, smoking cessation and psychological care [3]. Among those the most challenging part is medical nutritional therapy especially for the patient as well as the healthcare provider. Furthermore, there was lack of clarity and a high variability in opinion with regards to correct dietary practices, especially regarding serving sizes and frequency of meals [3]. American Diabetes Association Standards of Medical Care in Diabetes - 2018 suggests “Carbohydrate intake from vegetables, fruits, legumes, whole grains, and dairy products, with an emphasis on foods higher in fiber and lower in glycemic load, is preferred” [3]. Diabetic nutrition therapy can result in HbA1C reduction [4]. Protein appears to increase insulin response without increasing plasma glucose concentrations in type 2 Diabetes patients. Further saturated fat from diet needs to be reduced gradually and should be replaced with unsaturated fats. Diet rich in monounsaturated and polyunsaturated fats are considered to improve glucose metabolism and lower CVD risk [3].

In Jaffna Teaching hospital medical officer (MO-Diploma holder in Nutrition) provide MNT advice to those who were referred from the medical clinics to diabetes Centre (under endocrinologist) and dietary advice also usually provided by either MO/Nursing officers. Currently Teaching Hospital Jaffna doesn't have a dietician/ Nutritionist or diabetic educator. In addition to this, MNT advice is given by treating clinicians during the monthly visits in the medical clinics. Furthermore hardly any studies were undertaken in Northern Sri Lanka where the Teaching Hospital Jaffna a tertiary care centre is situated. So this study aimed to determine the level of adherence with diabetic MNT recommendation and to explore the selected factors associated with diabetic dietary compliance in the region.

Methodology

This was a descriptive hospital based cross sectional study, carried out in outpatient medical clinics of Teaching Hospital Jaffna. Data collection was done over six month period from April 2020 to September 2020.

All registered type 2 Diabetes Mellitus patients, who visited for their monthly diabetes follow-up were included in this study. Patients who had special dietary modifications with type 2 DM (chronic kidney disease stage III and above and Chronic liver cell disease), patients with malignancy, neurological illnesses and on Nasogastric / Percutaneous Endoscopic Gastrostomy (PEG) feeding, patients who had associated dementia, cognitive impairment and mentally or physically not fit enough to answer the questions such as aphasia or psychiatric illness and Type 2 DM patients those who are pregnant and lactating mothers were excluded from the study.

Sample size and sampling technique

The following formula was utilized to calculate the sample size [5].

$$N = z^2 \times p [1-p] / m^2$$

N=required sample size

Z=confidence level at 95% [standard value of 1.96]

P=prevalence of dietary non-compliant patients in the study population (There has been lack of studies in factors affecting the compliance of MNT among type 2 diabetes patients in Sri Lanka, so the estimated prevalence rate has been considered as 50%).

M=margin of precision [5%]

Therefore, the sample size was calculated was 384. But we were able to collect data from 351 patients (87.1% of estimated sample). All the patients met the criteria and who gave consent included in the study during study period. No specific sampling technique was applied and sample were collected consecutively.

Data collected by interviewer assisted questionnaire. Questionnaire was prepared by authors based on standard International and National guidelines for diabetes and diet (American Diabetes Association Standards of Medical Care in Diabetes 2018 and Dietary guidelines & Nutrition Therapy for Specific Disease, Nutrition Division - Ministry of Health, 2014) [3,6].

Expert validation was obtained from four board certified physicians, two senior registrars and registrars in general medicine and two intern house officers in general medicine and pretested. Tamil and Sinhala translations were scrutinized by one senior registrar, two registrars in medicine and two medical students and two English and Sinhala language teachers. Adherence to diabetic MNT among participants was assessed by asking the statement “is your daily meals are prepared according to diabetic recommendation?” and answers were recorded as “Yes, every day”, “Some days only”, “No” and “Other answers”. Knowledge on diabetes MNT was assessed using a 5-component questionnaire with options “Yes”, “No” and “no idea”. Ethical approval was obtained from ethical review committee of faculty of medicine, University of Jaffna.

Statistical analysis:

Data analysis was done using SPSS version 26 software package. Descriptive statistics were used appropriately. Numerical values were expressed as mean, median +/_ SD and percentages were used for categorical variables with CI when necessary. Knowledge questions were given 4 options namely

“Yes” “No”, “No Idea” and “Other answers”. Correct answers had 3 points, while incorrect answers were allocated 1 point. “Other answers” got 2 points and total points were added to calculate total score. Median score knowledge was 13 was used for categorizing the participants into adequate or inadequate knowledge (Adequate knowledge 13 and above, Inadequate knowledge below 13). Factors (gender, age categories, monthly income, residence, educational status and duration of diabetes (categories) associated with knowledge were tested by using Chi square test and P value < 0.05 was considered as statistically significant. Similarly unadjusted analysis was carried out with following factors age, gender, place of residence, monthly income of family, diabetes duration and knowledge score categories and adherence to MNT.

Results

Background Characteristics of participants: Out of 351 patients with diabetes mellitus majority of them were females (51.3%), mean age of participants was 59.42+ 13.08 and mean duration of diabetes in years among participants was 7.41+5.26. Majority of the participants (55.3%) were living in urban or suburban area. Most of them completed secondary education (72.4%) and majority (77.5%) belongs to lower income group (Family income less than Rs30,000).

Knowledge regarding diabetic MNT: Level of knowledge regarding diabetes MNT among participants was assessed by using 5 questions as shown in Table 1.

Table 1: Knowledge (regarding diabetic MNT) assessment among participants

Knowledge Questions	Yes	No	No Idea	Other answers
1. Do you agree adopting diabetic diet helps you to control your blood sugar level?	307(87.5)	22(6.25)	22(6.25)	0
2. Do you know having meals in regularized time intervals is beneficial to you for diabetic blood sugar control?	282(80.3)	32(9.1)	36(10.3)	1(0.3)
3. Do you agree eating unpolished, bran rich grains help to control the rise in your blood sugar level?	293(83.2%)	29(8.3)	28(8.0)	2(0.6)
4. Can you use Palmyrah palm sugar, jaggery or Kithul jaggery as a substitute for sugar?	114(32.5%)	184(52.3%)	49(14.0%)	4(1.1%)
5. Do you know having vegetables rich in fibre content in your diet avoid blood sugar fluctuation?	21(6.0%)	223(63.5%)	106(30.2%)	1(0.3%)

Mean score of the participant was 13.21+ 1.89 with range of 7-15 and median score was 13, Even though majority of participants found to be having adequate knowledge (68.7% CI: 63.7-73.4), 31.3% (CI: 26.6-36.3) of participants showed inadequate knowledge of diabetic MNT. Significant number of patients (63.5%) didn't believe eating vegetables rich in fibre content helps to avoid blood sugar fluctuations.

Factors affecting knowledge score of diabetic MNT.

Influence of socio demographic factors on diabetic diet knowledge score analysed and summarized in Table 2. There was no difference in knowledge score noted with gender (P=0.925), age categories (P=0.228), monthly income (P=0.501) and duration of diabetes (P=0.506). Proportion of patients resides in urban areas showed more adequate knowledge (72.2%) compared to who resides in rural area (64.3%) but this result was not statistically significant (P=0.116). But proportion of patients having adequate knowledge significantly increased

with their educational status (P<0.001).

Knowledge and practices among participants regarding specific foods which affect diabetic control

Significant proportion (42.2%) of participants reported that they were using sugar substitutes such as palmyrah palm sugar, jaggery or kithul jaggery and only 30.2% of participants were using fibre rich vegetable more than 5 portions (1-Portion- 80g) in a day in their 3 main meals. When participants were asked to report regarding the fat and oil consumptions in their diet 28 patients (8.0 %) believed it can be used liberally, so they were using liberally and even though they believe reducing fat consumption is safe 18.8% haven't done that yet.

Visual aid as shown in Figure 1 were used to assess the participants daily food plate, interestingly majority (53%) of them consuming starch rich plate (Type 1 or type 3 or Type 4) and significant proportion of them believe those are ideal for diabetes (10.3%, 6.6%, 8.0% respectively).

Table 2: Factors influencing on diabetic MNT knowledge score (n-351)

Variable	Category	Inadequate knowledge	Adequate Knowledge	Statistics
Age	20-40	9(20.9%)	34(79.1%)	Chi Square-4.326 df-3,P=0.228
	41-60	52(36.4%)	91(63.6%)	
	61-80	43(29.1%)	105(70.9%)	
	81 and above	6(35.3%)	11(64.7%)	
Gender	Male	54(31.6%)	117(68.4%)	Chi Square-0.009 df-1,P=0.925
	Female	56(31.1%)	124(68.9%)	
Place of Residence	Urban	54(27.8%)	140(72.2%)	Chi Square-2.475 df-1,P=0.116
	Rural	56(35.7%)	101(64.3%)	
Educational status	Not attended school	15(78.9%)	4(21.1%)	Chi Square-55.62 df-3, P<0.001***
	Primary	35(61.4%)	22(38.6%)	
	Secondary	56(22.0%)	198(78.0%)	
	Tertiary	4(19.0%)	17(81.1%)	
Family Monthly Income	<Rs10000	31(33.3%)	62(66.7%)	Chi Square-2.329 df-3,P<0.501
	Rs10000-Rs19999	21(25.9%)	60(74.1%)	
	> Rs20000-Rs29999	35(35.7%)	63(64.3%)	
	>Rs30000	23(29.1%)	56(70.9%)	
Diabetic duration	0-5 Years	51(35.9%)	91(64.1%)	Chi Square-3.321 df-4,P=0.506
	6-10 years	32(30.2%)	74(69.8%)	
	11-15 Years	13(23.2%)	43(76.8%)	
	16-20 Years	12(30.8%)	27(69.2%)	
	Above 20 years	2(25.0%)	6(75.0%)	

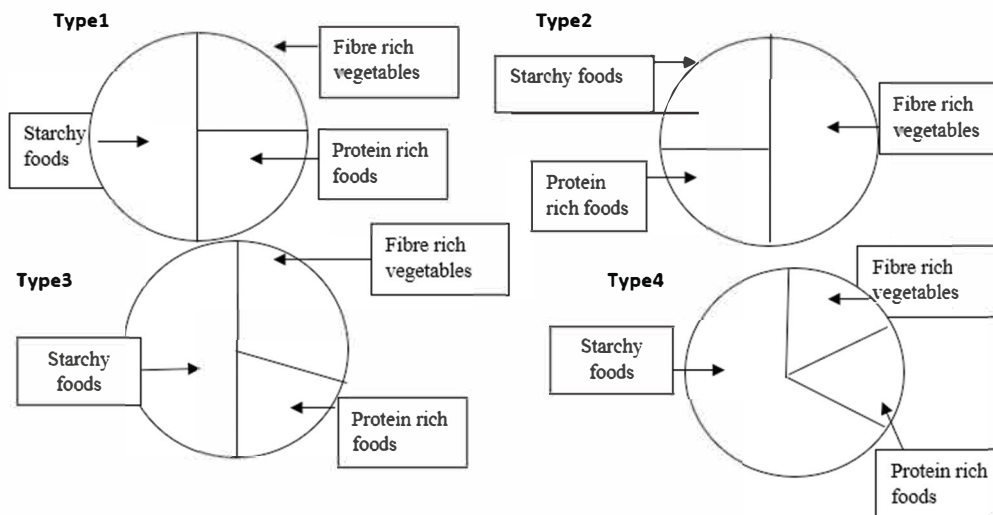


Figure 1: Visual aid of Food Plate

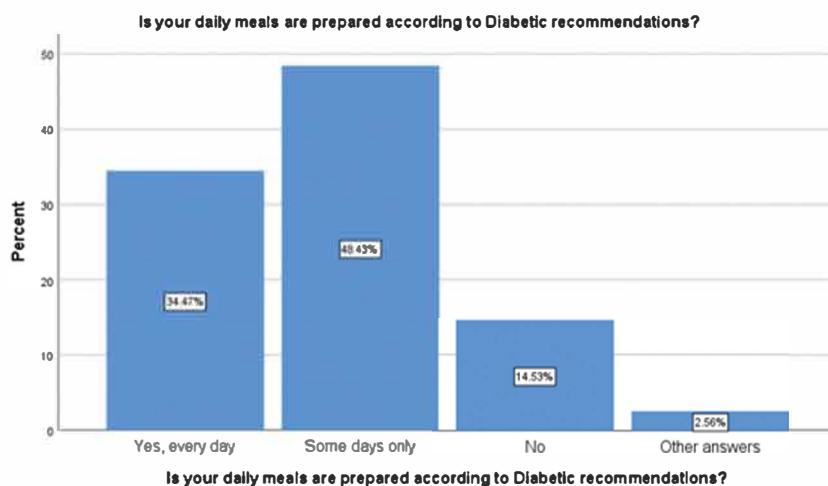


Figure 2: Adherence level of diabetic MNT (Medical Nutrition Therapy) among participants

Figure 2 shows the adherence level of diabetic MNT among participants. Only 34.5% (95%CI: 29.6% - 39.6%) of them reported that they were adhering to diabetic recommendation meals daily and majority of them (48.4 %) adhere only in some days. But 14.4% of them mentioned they do not adhere at all.

Factors affecting diabetic Medical Nutrition Therapy adherence

Different socio demographic factors were examined to identify influences on adherence of diabetic MNT and results were summarized in Table 3. Only factor significantly influences on adherence of diabetic MNT recommendation was knowledge of participants regarding diabetic MNT ($P < 0.001$). Other factors studied (age, gender, place of residence, family income and diabetes duration) did not show significant association ($P > 0.05$).

Effect of cost in selection of some specific foods (Fibre Rich Vegetables, Egg, Sea Foods (Fish and

Prawns), Cereals (Green Gram, Cow pea or Black Gram), Milk and Milk Products which are good for diabetic were analysed and summarized in Table 4.

Certain situations leading patients to engage in poor adherence to MNT, which were summarized in Table 5. One hundred and fifty six (44.4%) patients mentioned, “Starchy food is readily available to eat and 19.1% mentioned they are cheap”. Interestingly 12.5% were not aware that reducing starchy food is beneficial for diabetic control. Furthermore 24.2% mentioned they are easy to cook. In addition, when drinks or snacks with added sugar were served in workplace or relatives place, 25.4% mentioned “I don’t want to tell that I am diabetic, so I take them” which indicates potential stigma and 37.9% of them knew that food or drinks with added sugar are unsafe, but they took them because, to respect relatives or work friends or don’t want to give them uneasiness.

Table 3: Factors associated with adopting recommended diabetic MNT among participants

Variable	Category	Yes every day	Some days only	No	Other answers	Statistics
Age	20-40	14(32.6%)	16(37.2%)	11(25.6%)	2(4.7%)	Chi Square-9.766 df-9,P=0.370
	41-60	49(34.3%)	70(49.0%)	20(14.0%)	4(2.8%)	
	61-80	49(33.1%)	78(52.7%)	2(12.2%)	0	
	81 and above	9(52.9%)	6(35.3%)	2(11.8%)	0	
Gender	Male	51(29.8%)	89(52.0%)	26(15.2%)	5(2.9%)	Chi Square-3.262 df-3,P=0.353
	Female	70(38.9%)	81(45.2%)	25(13.9%)	4(2.2%)	
Place of Residence	Urban	70(36.1%)	96(49.5%)	23(11.9%)	5(2.6%)	Chi Square-2.56 df-3,P=0.465
	Rural	51(32.5%)	74(47.1%)	28(17.8%)	4(2.5%)	
Educational status	Not attended school	6(32.6%)	5(26.3%)	6(31.6%)	2(10.5%)	Chi Square-13.547 df-9,P=0.139
	Primary	22(38.6%)	28(49.1%)	6(10.5%)	1(1.8%)	
	Secondary	84(33.1%)	128(50.4%)	37(14.6%)	5(2.0%)	
	Tertiary	9(42.9%)	9(42.9%)	2(9.5%)	1(4.85)	
Family Monthly Income	<Rs10000	36(38.7%)	44(47.3%)	11(11.8%)	2(2.2%)	Chi Square-7.809 df-9,P=0.554
	Rs10000-Rs19999	32(39.5%)	38(46.9%)	10(12.3%)	1(1.7%)	
	> Rs20000-Rs29999	29(29.6%)	53(54.1%)	13(13.3%)	3(3.1%)	
	>Rs30000	29(30.4%)	35(44.3%)	17(21.5%)	3(3.8%)	
Diabetic duration	0-5 Years	53(37.3%)	61(43.0%)	26(18.3%)	2(1.4%)	Chi Square-14.298 df-12,P=0.282
	6-10 years	31(29.2%)	62(58.5%)	9(8.5%)	4(3.8%)	
	11-15 Years	20(35.7%)	27(48.2%)	8(14.3%)	1(1.8%)	
	16-20 Years	12(30.8%)	18(46.2%)	7(17.9%)	2(5.1%)	
	Above 20 years	5(62.5%)	2(25.0%)	1(12.5%)	0	
Diabetic MNT knowledge	Inadequate	24(21.8%)	53(48.2%)	26(23.6%)	7(6.4%)	Chi Square-25.608 df-3, P<0.001***
	Adequate	97(40.2%)	117(48.5%)	25(10.4%)	2(0.8%)	

Table 4: Effect of cost on selection of specific food

Foods which are good for diabetes	Unable to afford because of cost
Fibre Rich Vegetable	53(15.1%)
Egg	53(15.1%)
Sea Foods (Fish, Prawns etc.)	104(29.6%)
Nutritious Milk Powders	203(57.8%)
Vitamin Tablets or Tonics	221(63.0%)
Cereals (Green Gram, Cow pea or Black Gram)	87(24.8%)
Milk and Milk Products	70(19.9%)

Table 5: Response of participants in specific situation where diabetic MNT adherence were challenged

Questions	No (%)
How do you respond, when drinks or snacks with added sugar are served in workplace or relatives place?	
1. These foods are unsafe for diabetic patients, so I refuse them	179(49.9%)
2. These foods are unsafe, but I take them because, to respect them or not to give uneasiness	131(37.9%)
3. I don't want to tell that I have Diabetes, so I take them	89(25.4%)
What is your opinion regarding your consumption of Starchy food items?	
1. I have craving to eat these foods	120(34.2%)
2. These foods are easy to cook	85(24.2%)
3. These foods are readily available for me to eat	156(44.4%)
4. They are cheaper	67(19.1%)
5. I don't have an idea that, reducing starchy foods is beneficial for diabetes	44(12.5%)
What is the reason to take drinks or snacks with added sugar, palmyrah palm sugar, jaggery or kithul jaggery in your diet?	
1. I like to eat these foods and drinks	225(64.1%)
2. I don't have any idea regarding the consumption of these foods, so I take them	77(21.9%)
3.Others	49(14.0%)

Discussion

Many studies showed the influence of lifestyle modifications such as dietary modifications and exercise on glycaemic control [7-10]. A study from India revealed that dietary pattern significantly predicts (12.6%) HbA1C control [4]. Key to achieve desirable effect through dietary modification is adherence to recommended dietary guidelines. **Current study revealed 65.5% (95%: CI: 60.4-70.4) of patients were not adhere with diabetic MNT recommendations, it's in line with a study from Ethiopian hospital (74.3%) [11]. Studies done in some South Asian regional countries and the dietary non-adherence rate reported were 57.5% [4] 63% [12] and 87.5% [13].**

According to CDC (Centre for Disease Control and Prevention) ideal food plate for diabetes, should fill half plate with non-starchy vegetables, one quarter with a lean protein e.g.: chicken, eggs and remaining one quarter can be fill with carbohydrate foods (Type 2) [15]. But current study revealed 53.0% of the patients consuming more than half of the (portion) of starchy food type plate in their daily meal (Type 1, III and IV types). Furthermore 10.8 % patients reported consuming daily meals consist of ¾ of starch in their plates and only 35.9% mentioned ideal type of food plate for diabetes (Type 2). So, starch consumption among the patients in this study was alarmingly high and only 30.2% of participants were using fibre rich vegetable more than 5 portions in a day in their 3 main meals. When participants in the current study asked for the reasons for starchy food consumption, majority mentioned (44.4%) easily available food item to eat, followed by 34.2% mentioned craving for such food, 24.2% mentioned easy to cook and remaining 19.1% mentioned cheaper in price.

Interestingly 42.2% reported they use sugar substitutes as reported in another study in Southern Sri Lanka [16] which showed about 65% used to take refined sugar liberally. Another international study reported far above carbohydrate intake than the recommendation which was 55% of energy intake from carbohydrates [17].

A qualitative study from Western province of Sri Lanka concluded poor adherence to diabetic MNT adherence and exercise practices despite of good understanding regarding lifestyle modification among diabetic patients [18]. But current study **31.3% (CI: 26.6-36.3) of participants showed inadequate knowledge of diabetic MNT which was only factor significantly influenced on diabetic MNT recommendation (P<0.001).** Further analysis showed educational status of the participants significantly influenced (P<0.001) on diabetic diet knowledge. Similarly, another study showed significant relationship between education and diabetic MNT adherence, that is those who have basic education, secondary schooling and higher education showed statistical significant difference (P<0.001)[19].

Further 28.5% of patients believed fat and oils can be consumed liberally. A study from India highlighted concerning issue of high fat consumption among the diabetic patient related to oil usage in cooking [20]. In Italy a study reported non-satisfactory results towards compliance to dietary recommendations especially high intake of saturated fat diet and low intake of fibre. Interestingly 17.9% of participants reported that they believe eating fruits are unsafe in diabetes in our study.

Major barrier we found in the adherence to dietary recommendation was understanding the portion size and similar finding also observed in another study [17]. In addition, 3.1% of patients mentioned lack of income as a reason for poor adherence followed by 2.3% said no self-control and another 2.3% mentioned lack of knowledge. Almost a quarter (24.8%) of patients reported they cannot afford to buy cereals (Green Gram, Cow pea or Black Gram), 15.1% mentioned cannot afford for fruits and vegetables and same proportion of them told they cannot afford sea foods such as fish and prawns. This fact highlights the socio economic disparities among the population and its effect on recommended diabetic dietary adherences.

Participants were asked how they will respond during different situation in regard to recommended diabetic MNT, when soft drinks and snacks given at workplace, 37.9% responded they will take them to respect the work colleagues. Qualitative studies showed major barriers at individual level for diabetic dietary adherences were motivation, individual knowledge, perceptions regarding moderation in eating, self-responsibility and cravings [22]. Other barriers are social priorities, family's food habits and poor social support [23]. Further studies showed nutrition education programs were strongly enhances dietary adherence [24, 25]

Limitations

Even though this study revealed significant information in diabetic MNT adherence, as this study was confined to outpatient department patients at Teaching Hospital Jaffna, Sri Lanka extrapolating these findings to general population need further factors in consideration. Further validity of the tools used to determine knowledge and adherence could have been improved by using other method of determining concordance with dietary recommendations like food frequency questionnaire, 24-hour dietary recall and validity studies. Cut offs in knowledge scores, unmeasured confounders / covariates (educational inputs received, family members affected with diabetes, attitudes/beliefs towards food, impact of COVID, diabetes distress etc) might affected some of the findings which could be improved in future studies.

Conclusions and recommendations

This descriptive study showed that majority of participants were not preparing their daily meals according to diabetic MNT recommendations. In addition, majority of them reported their daily food plate consists with major portion of starch (Type 1, Type 3 and Type 4). Furthermore, among the studied factors, only knowledge of the participants regarding diabetic MNT significantly influenced on food preparation according to the recommendations to diabetic MNT recommendation. Additional analysis showed considerable proportion of participants had inadequate knowledge regarding diabetic MNT and educational status significantly influenced the knowledge of the participants. In addition, the cost of the specific diets such as milk, sea food, fibre rich vegetables and cereals also affecting the choice of diabetic diet. Some misconceptions among the participants such as using sugar substitutes, fruit consumption, fat consumption and ideal foot plate (regarding portion) were identified as barriers for adopting recommended diabetic MNT. These facts could be used in the targeted health promotion activities to improve the adherence to diabetic MNT.

Abbreviations:

IDF	International Diabetes Federation
DSMES	Diabetes Self-Management Education and Support
MNT	Medical Nutritional Therapy
CVD	Cardio Vascular Disease
DM	Diabetes Mellitus
PEG	Nasogastric and Percutaneous Endoscopic Gastrostomy

BP	Blood Pressure
SPPS	Statistical Package for Social Science
SD	Standard Deviation
CI	Confidence Interval

Declaration:

Ethics Approval and Consent to Participate: The ethical approval for the current study was acquired from the Ethics Review Committee (ERC) Faculty of Medicine, University of Jaffna. Informed consent was obtained from all the participants' prior recruitment to the study.

Availability of Data and Materials: Data supporting the conclusions of this article will be provided on request

Competing Interests: The authors have declared that they have no competing interests.

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