RESEARCH

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Does nutritional status affect on quality of life among patients with Diabetes Mellitus?

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Aim: **To determine the nutritional status effect on quality of life among patients with diabetes mellitus.** ***Methods:*** **A case controlled study. Patients with diabetes mellitus (case group) attended a diabetes polyclinic of a state hospital and their family members (control group) were selected randomly (n=200). The data were collected by patient information form, Mini Nutritional Assessment Scale, Diabetes Quality of Life Scale from diabetic subjects, and personal information form, Mini Nutritional Assessment Scale, SF-36 Quality of Life Scale from non-diabetic subjects.** ***Results:*** **The mean age of the case group was 50.06 ± 10.44 (18-64) years, and control group was 39.46 ± 12.47 (18-63) years. A negative significant correlation was found between total MNA score and total DQOL scale score (p<0.01) among patients with diabetes mellitus.** ***Conclusions:*** **Patients with diabetes mellitus may be at risk of malnutrition when compared with non-diabetics. There is probably a causal relationship between malnutrition and health related quality of life decline in this group.**

INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease that affects the quality and duration of life by causing organ and dysfunctions due to the complications. DM has affected 380 million people in worldwide. In 2030 years, It is reported that 438 million people. In worldwide, the Middle East and North Africa had highest prevalence of DM in 2014 year. Turkey, between Asian countries, is one of the countries having the highest prevalence (%16.5) of DM (1, 2, 3).

Diabetes Mellitus can be treated by medications given to provide glycemic control and by lifestyle changes (4). In The American Diabetes Association Standards of Medical Care 2015, integral role of nutrition therapy has been identified in diabetes management. Also, the Association recommends that diabetic people actively engage self-management, education and cure planning (5). However, as the duration of diabetes increases, food intake decreases due to diseases-related complications (hyperglycemia, hypoglycemia, hyperlipidemia), functional deficiencies (poor dentition, ill-fitting dentures and dysphagia) (4) and the changes of treatment plan in determining what to eat for diabetes people (5, 28-30). Furthermore, social conditions (low income) and medical conditions (cancer, gastroparesis, dementia, and depression) can increase malnutrition rates of diabetic people (6, 7, 31). For this reason, malnutrition is common in individuals with diabetes. However, nutrition is important for maintaining quality of life (QoL). A better QoL has been observed in health populations. Malnutrition has a negative effect on diabetes prognosis, and consequently on QoL. Therefore, it is fundamental to assess the nutritional status of this population at regular intervals (4). In a study conducted by Cabangon et al. (2016), it was found that 63% of hospitalized individuals with diabetes had a high risk of malnutrition and 45% of them had severe malnutrition. In another study conducted by Paris et al. (2013), the prevalence of malnutrition in hospitalized elderly individuals with diabetes were found to be 21% and the risk of malnutrition was 39% (11) Although it is well established that an improved nutritional status results in a better QoL and healing process in certain chronic diseases, but this relationship is little known in DM. Miguel et al (2015) found that 30.1% of diabetic patients were malnourished who had been hospitalized. Malnourished diabetic patients have longer hospitalizations and higher costs than those at no nutritional risk (12).

Malnutrition and diabetes mellitus, which are two common conditions that can have significant implications for patients' health and diet. It emphasizes that, when managing patients with malnutrition or diabetes, nurses should undertake careful assessment of their nutritional requirements, tailoring interventions to the individual and involving family and carers where appropriate (13). Previous studies have investigated malnutrition and quality of life in patients with DM. But, information about the nutritional status of effect on QoL is limited. The aims of this study were to determine the nutritional status effect on quality of life among patients with diabetes mellitus.

Research Questions

1. How is the nutritional status of patients with diabetes mellitus?
2. How is the quality of life of patients with diabetes mellitus?
3. Does nutritional status effect on quality of life among patients with diabetes mellitus?

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4.Is there any difference between patients with diabetes mellitus and non-diabetic subjects according to nutrition status?

MATERIAL AND METHODS

This descriptive study was conducted at the diabetes training polyclinic in a state hospital, Manisa, Turkey during the period from March 2017 through March 2018. During the study period, approximately N=600 diabetic patients applied to the diabetes training polyclinic. Patients were selected randomly. Diabetic patients; who had been one and over year's diagnosis of DM, not having gestational DM, having a co-family member without DM, being between 18 and 65 years, being able to establish verbal communications, not having cancer, dementia and Alzheimer's, foot amputation, coming for routine follow-up regularly and being willing participant, were included in the study. Finally, case group was composed of 100 diabetic subjects. One hundred non-diabetic subjects were randomly chosen in a ratio of 1:1 from the co-family members. Non-diabetic subjects were asked about signs and symptoms of diabetes and if suspected, they were referred for confirmation.

The data were collected by patient information form, Mini Nutritional Assessment Scale (MNA), Diabetes Quality of Life (DQOL) Scale from patients with diabetes mellitus, and personal information form, Mini Nutritional Assessment Scale (MNA), SF-36 Quality of Life Scale from non-diabetic subjects with face to face interviews.

Instruments

Patient information form

The patient information form was prepared by the researchers so as to capture personal information on age, gender, marital status, education, past medical history, type of diabetes mellitus, duration and metabolic control parameters.

Personal information form

The personal information form was prepared by the researchers so as to capture personal information on age, gender, marital status, education and past medical history.

Diabetes Quality of Life (DQOL) Scale

The scale was developed by Jacobson et al. (1988) to assess quality of life. The validity and reliability study for Turkish population was conducted by Yildirim et al. (2007). The scale consists of 45 questions and 4 sub-dimensions (satisfaction with treatment, impact of treatment, Worry about the future effects of diabetes, Worry about social/vocational issues). Each dimension in the scale is scored between 1-5 points. The scale is five-point Likert type. As a result, Points close to 1 point represent high quality of life and scores close to 5 points indicate low quality of life. The total score of the scale is at least 45 and at most 225 (14). In the current study, Cronbach's alpha of this scale, sub-dimension 'satisfaction with treatment', sub-dimension 'impact of treatment', sub-dimension 'Worry about the future effects of diabetes', sub-dimension 'Worry about social/vocational issues' was found respectively 0.94; 0.89; 0.90; 0.74; 0.90.

Short Form 36 Health Survey (SF-36)

SF-36measures broadly health-related quality of life. The survey consists of 36 items and eight domain scales, including physical role functioning, physical functioning, pain, vitality, general health perceptions, emotional role functioning, social role functioning and mental health. Domain scale scores are linearly converted a 0 (worst health) to 100 (best health) scale. Mental component summary and physical component summary scores were also generated (15). In the current study, Cronbach's alpha of this scale was found 0.91.

Mini Nutritional Assessment

MNA has been included general health, food habits, self-perceived health and anthropometric items (weight loss, BMI, upper arm circumference, calf circumference. Patients with a score < 17 are considered as 'malnourished', them with a score of 17–23.5 as being 'at risk of malnutrition', them with a score > 24 as 'normal' (16, 17).

Statistical analysis

Statistical evaluation of the data was performed on computers; social demographic characteristics and scores of scales were examined using arithmetic averages and standard deviation (SD). Differences between cases and controls groups were assessed using independent sample-T test for normally distributed continues variables and chi-square test for categorical variables. Pearson's correlation analysis was used to examine relationships. Probability values (p) less than 0.05 were considered statistically significant.

RESULTS

The socio-demographic and clinical characteristics of the study participants are presented in Table 1. The mean age of the case group was 50.06±10.44 (18-64) years, whereas the mean age of the non-diabetic group was 39.46±12.47 (18-63) years. There were no significant differences between cases and controls regarding the socio-demographic characteristics investigated (gender, marital status and profession).

It was shown that most of subjects were 'normal' for nutrition (diabetic subjects=51.0% *vs* non-diabetic subjects=75.0%) in terms of MNA scores. While about half of the diabetic subjects (49.0%) was found as 'at risk of malnutrition (46.0%)' and 'malnourished (3.0%)'; a quarter of the non-diabetic subjects (25.0%) was determined as 'at risk of malnutrition' according to MNA scores. When the groups were compared in terms of MNA scores, there was statistical significant difference between diabetic subjects and non-diabetic subjects (p<0,001). The diabetic subjects scored significantly lower on the MNA than the non-diabetic subjects (Table 2, Figure 1).

Table 3 presents mean scores of SF-36 and domains non-diabetic subjects. The mean scores of physical functioning, social role functioning, pain, vitality, emotional role functioning, physical role functioning, mental health, general health perceptions domains were found respectively; 85.15±16.06, 69.45±26.64, 69.45±26.64, 51.20± 22.34, 64.33±45.75, 58.84±42.99, 62.12±18.54, 55.71±24.50.

The DQOL scale total score was found to be 2.62±0.50 (min-max:1.51-4.27). Table 4 presents mean scores of DQOL scale and sub-dimensions among of the patients with DM. DQOL scale total score did not differ significantly in terms of gender, marital status, education status, profession among patients with DM. But there was statistical significant difference score of *'Impact of Treatment'* in terms of gender, educational status, profession. It was found that statistical significant difference score of *'Worry about Social/Vocational issues'* according to marital status and profession. Moreover, there was statistical significant difference score of '*Worry about the Future Effects of Diabetes'* in accordance with gender and profession. In addition, it was found that statistical significant difference score of '*Satisfaction with Treatment'* according to gender.

When statistical relationships were investigated among total MNA score and domains of SF-36; there was significant a positive relationship

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Table 1 Socio-demographic and clinical characteristics of the study participants (n=200)

	Diabetic subjects (n=100)		Non-diabetic subjects (n=100)		
Variables	**n**	**%**	**n**	**%**	**Significance**
Gender					
Female	57	57.0	69	69.0	x^2=3.089
Male	43	43.0	31	31.0	p=0.079
Marital status					
Single	9	9.0	17	17.0	x^2=2.829
Married	91	91.0	83	83.0	p=0.093
Education status					
Literate and Elementary school	88	88.0	63	63.0	x^2=16.894
High school and university	12	12.0	37	37.0	**p=0.00****
Profession					
Housewife	52	52.0	54	54.0	x^2=0.425
Employee	17	17.0	19	19.0	p=0.809
Retired and others	31	31.0	27	27.0	
Having another diseases					
No	38	38.0	97	97.0	
Hypertension	40	40.0	1	1.0	
Coroner Artery Disease	10	10.0	0	0.0	
Retinopathy	2	2.0	0	0.0	
Neuropathy	3	3.0	0	0.0	
Others	7	7.0	2	2.0	
	Mean±†SD		**Mean±†SD**		**Significance**
Age (years)	50.06±10.44(18-64)		39.46±12.47 (18-63)		t= 6.517 **p=0.00****
Body Mass Index (kg/cm^2)	31.10±6.84 (16.9-58.00)		28.95±6.77 (16.22-56.68)		t= 2.235 **p=0.02***
Duration of Diabetes (years)	7.06±6.43 (1-32)				
Fasting blood glucose (mg/dl)	253.68±120.323 (92-750)				
HbA1c (%)	10.29±2.08 (6-16)				

*Note= †SD-Standard deviation; *p<0.05; **p<0.01*

Table 2 Mini Nutritional Assessment Scores of the study participants (n=200)

	Diabetic subjects (n=100)		Non-diabetic subjects (n=100)		Significance
Mini Nutritional Assessment	**n**	**%**	**n**	**%**	
Normal	51	51.0	75	75.0	x^2=12.355 **p=0.000****
At risk of malnutrition and malnourished	49	49.0	25	25.0	
	Mean±†SD		**Mean±†SD**		
	23.13±3.28 (12.50-30.00)		24.77±3.06(12.50-30.0)		t=-3.659 **p=0.000****

*Note= †SD-Standard deviation; *p<0.05; **p<0.01*

Table 3 Mean Scores of domains of Short Form 36 Health Survey (n=100)

Domains of SF-36	Mean±†SD	‡Min-max
Physical Functioning	85.15±16.06	5-100
Social Role Functioning	69.45±26.64	0-100
Pain	69.45±26.64	0-100
Vitality	51.20±22.34	0-100
Emotional Role Functioning	64.33±45.75	0-100
Physical Role Functioning	58.84±42.99	0-100
Mental Health	62.12±18.54	8-96
General Health Perceptions	55.71±24.50	5-100

Note= †SD-Standard deviation; ‡Min-max- Minimum- maximum

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Table 4 Mean Scores of Diabetes Quality of Life Scale and sub-titles (n=100)

Variables	DQOL Scale Score	Satisfaction with Treatment	Impact of Treatment	Worry about the Future Effects of Diabetes	Worry about Social/ Vocational issues
Gender					
Female	2.70±0.45	3.35±0.69	2.65±0.46	2.36±0.56	1.63±0.60
Male	2.52±0.53	3.20±0.72	2.43±0.55	1.85±0.60	1.68±0.64
Significance	t=1.814 p=0.07	**t=1.064** **p=0.03***	**t=2.199** **p=0.03***	**t=4.352** **p=0.000****	t=-0.431 p=0.67
Marital status					
Single	2.59±0.49	3.67±0.74	2.59±0.38	2.25±0.70	2.54±0.93
Married	2.91±0.54	3.25±0.70	2.55±0.52	2.13±0.63	1.56±0.51
Significance	u=270.000 p=0.09	u=276.500 p=0.11	u=397.000 p=0.88	u=373.000 p=0.07	**u=153.500** **p=0.002***
Education status					
Literate and Elementary school	2.65±0.48	3.33±0.68	2.60±0.50	2.17±0.65	1.64±0.60
High school and university	2.38±0.56	2.97±0.88	2.26±0.47	1.90±0.43	1.71±0.80
Significance	t=1.626 p=0.13	t=1.342 p=0.20	**t=2.330** **p=0.04****	t=1.449 p=0.15	t=-0.304 p=0.77
Profession					
Housewife	2.67±0.46	3.34±0,71	2.66±0.47	2.37±0.57	1.60±0.61
Employee	2.46±0.60	3.04±0,89	2.32±0.44	1.90±0.65	1.93±0.72
Retired and others	2.58±0.52	3.32±0,63	2.51±0.57	1.90±0.60	1.59±0.55
Significance	F=1.566 p=0.21	F=1.208 p=0.30	**F=3.141** **p=0.048****	**F=8.032** **p=0.001***	F=2.184 p=0.12
Means DQOL Scale Score and sub-titles	2.62±0.50	3.28±0.71	2.56±0.51	2.14±0.63	1.65±0.62

*Note= *p<0.05; **p<0.01*

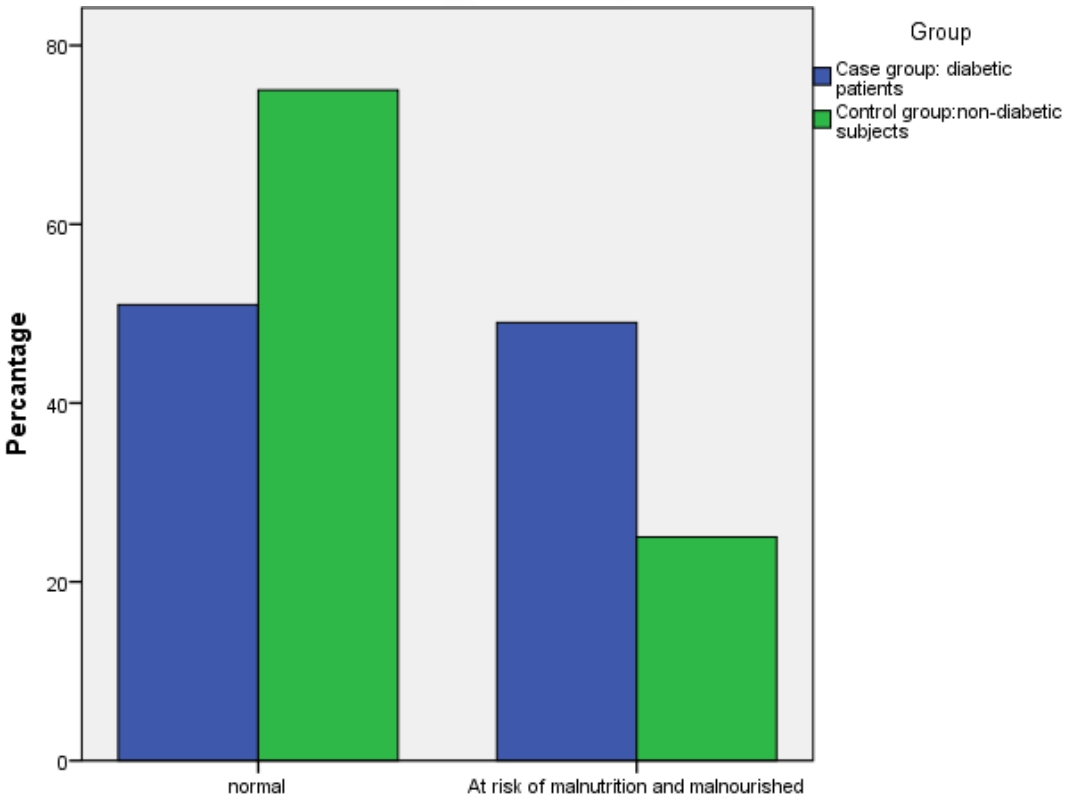

Figure 1.Mini Nutritional Assessment Scores of the Study Participants (n=200)

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Table 5 Relationship between Mini Nutritional Assessment Scores and Mean Scores of Diabetes Quality of Life Scale and sub-titles (n=100)

	Diabetic Subjects					
	#MNA	Satisfaction with treatment	Impact of treatment	Worry about the future effects of diabetes	Worry about social/vocational issues	##DQOL Scale
#MNA	1	-,445**	-,406**	-,415**	-,416**	-,514**
Satisfaction with treatment		1	,614**	,486**	,381**	,869**
Impact of treatment			1	,741**	,423**	,889**
Worry about the future effects of diabetes				1	,480**	,757**
Worry about social/vocational issues					1	,612**
DQOL Scale Score						1

*Note: r values were given in the table. #MNA-Mini Nutritional Assessment;## DQOL-Diabetes Quality of Life; *p<0.05; **p<0.01*

between total MNA scores and 'vitality' ($p<0.05$) and 'emotional role functioning' ($p<0.01$) domains scores of SF-36 in non-diabetic subjects.

Statistical relationships among total MNA score and DQOL Scale and sub-title scores are presented in the Table 5. There was significant negative correlation between total MNA score and DQOL Scale and sub-title scores ($p<0.01$).

DISCUSSION

Malnutrition has a high prevalence in the World, and a burden on patients and health careers (18). It has been demonstrated that nutritional assessment before admission in the hospital has positive patients' outcomes (19, 20). While individuals with diabetes have a higher risk than non-diabetic subjects (8), the prevalence of malnutrition in patient applied to diabetes policlinic is still unknown.

Diabetes prevalence is globally, similar in men and women but it is slightly higher in men <60 years of age and in women at older ages. Overall, diabetes prevalence is higher in men, but there are more women with diabetes than men (1). Supporting this idea, we found that some of the social-demographic characteristics of our patients were similar to other studies (4, 21, 22, 23, 24).

Although the risk of malnutrition is expected to be more prevalent in patients with chronic illness than in general population, it is also an important consideration when a disease such as diabetes is present (4, 25). For diabetic patients, regular physical activity and a correct diet could result in better disease control and nutritional status and an increase in quality of life. Less research has been investigated relationship between malnutrition and quality of life among this population group (12, 26). The main finding of our study was that there was statistical significant difference between diabetic subjects and non-diabetic subjects in terms of MNA scores. That is, nutritional status scores of the diabetic subjects were significantly lower than the non-diabetic subjects. Therefore nutritional status was associated with both DQOL and dimensions in diabetic subjects. That is, quality of life was affected by level of nutritional status, and better quality of life was associated with better nutritional status among patients with DM. These findings were similar to those by Alfonso-Rosa et al. (2013) and Miguel et al. (2015). Miguel et al. (2015) shown that a third of diabetic patients admitted at Spanish hospitals were malnourished. Alfonso-Rosa et al. (2013) stated that nutritional status was moderately associated with quality of life in patients with DM.

In this study, it was found that quality of life score were moderate among patients with DM. This finding could be explained that it just has not developed diabetes related complications and middle age sample. These findings were in line with earlier studies (14, 27) which were found moderate level of quality of life among patients with DM.

This study showed that 75.0% of non-diabetic subjects were normal nutritional level and much higher quality of life which was compared to diabetic subjects. Moreover, it was determined that 'vitality' and 'emotional role functioning' were affected by better nutritional status. This finding could be explained that non-diabetic subjects who had not chronic diseases and also younger than diabetic subjects. On the other hand, although diabetic patients have lived with his/her family but they did not achieve the recommended nutrient intake, and their nutritional status was lower as compared to their family members.

Limitations

There are several limitations in the current study. One of these limitations was that non-diabetic subjects were younger than diabetic subjects. Another limitation was sample size was small population.

CONCLUSION

The following results were found according to this research data:

- About half of diabetic people is malnourished and at risk malnutrition.
- A quarter of non-diabetic people is 'at risk malnutrition'.
- There is a statically significant difference between diabetic and non-diabetic people according to MNA scores.
- The quality of life is moderate level in diabetic people.
- As nutritional status of diabetic people get better, the quality of life of them increases.

The findings showed that nutrition play an important role in the quality of life among patients with diabetes mellitus. Nevertheless, these findings could provide information to healthcare professionals to plan nutrition training not only diabetic patients but also family members to increase their quality of life. So, it is suggested that diabetic patients is followed for nutritional status, this study is repeated in community-based, non-hospitalized and hospitalized diabetic people and different age groups.

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Article Keywords

Diabetes mellitus, nutrition, quality of life, patient

Notes

This study was presented as "verbal presentation" at The First International Internal Medicine Nursing Congress on 25-27 November 2018, Antalya, Turkey

Declaration

We declare that we have no significant competing financial, professional, or personal interest that might be influenced by the presentation of the manuscript.

Ethical considerations

This study protocol was approved on 17th February 2017 by the Research Ethics Committee of the Manisa Celal Bayar University Faculty of Medicine at Manisa, Turkey, Ethical Board number #20.478.486. All procedures were in accordance with the Helsinki Declaration of 1964 and later versions. Informed consent or substitute for it was obtained from all patients and co-family members for being included in the study.

Conflict of interest

All authors have no conflicts of interest to disclose.

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