

Malnutrition in Elderly Diabetic Patients: A Case-Control Study

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Abstract:

Background and objectives: Nutritional assessment in elderly diabetic patients to detect malnutrition is essential and integral part in diabetes management and to avoid adverse nutrition-related outcomes, which is a potential cause or an aggravation of morbidity and mortality. The aim of this study was to identify the prevalence of malnutrition and find out factors associated with malnutrition, in elderly diabetic patients.

Methods: A case-control study was carried out between April 2015 and April 2016. A sample of 200 cases diagnosed and registered at Shahid Layla Qasim diabetic center in Erbil city was selected. The cases were compared with 200 controls free from diabetes and matched in age (± 3 years), and gender. The controls were collected from the patients admitted to surgical wards in Rizgary and Erbil Teaching Hospitals. The patients were directly interviewed using Mini Nutritional Assessment-Short Form.

Results: The prevalence of malnutrition in elderly diabetic and non-diabetic patients was 12% and 1%, respectively ($P < 0.001$). Majority of diabetic patients (85.5%) were uncontrolled; with a higher malnutrition rate in uncontrolled diabetics (12.9%). The prevalence of malnutrition was significantly increased with increasing age ($P = 0.015$), increasing the duration of diabetes ($P < 0.001$) and type of treatment ($P = 0.047$).

Conclusion: Elderly diabetic patients were more susceptible to malnutrition than non-diabetic patients. The prevalence of malnutrition in uncontrolled diabetics was nearly two times higher than in controlled diabetic patients. There is a need for regular screening nutritional status of elderly diabetic patients through a regular health education program.

Keywords: Malnutrition, Diabetes mellitus, Old age, Erbil

Introduction:

Diabetes is highly prevalent, affecting approximately 220 million people worldwide¹ and this number is expected to rise to 300 million in the year 2025.² In 2004, an estimated 3.4 million people died from consequence of high blood sugar and projected that will double between 2005 and 2030. In 2014, 9% of adults 18 years and older had diabetes. In 2012 diabetes was the direct cause of 1.5 million deaths. More than 80% of diabetes deaths occur in low- and middle-income countries¹. The nutritional status of elderly people has been related to functional ability to perform basic daily activities without assistance.³ Malnutrition is defined as a state in which a deficiency, excess or imbalance of energy, protein and other nutrients causes adverse effects on body form, function and clinical outcome.⁴ Malnutrition is associated with a decline in functional status, impaired muscle function, decreased bone mass, immune dysfunction, anemia, reduced cognitive function, poor wound healing, and delayed recovering from surgery, higher hospital and readmission rate, and mortality.⁵ Older adults, especially those with uncontrolled hyperglycemia, are at risk for nutritional deficiencies. The age-related changes in various physiological functions, including alteration in taste, smell, and gastric acidity, increase the risk of nutritional deficiency. Older diabetic subjects appear to be at greatest risk for vitamin B1, B12, C, D, and folate deficiency, as well as deficiency in various minerals, including calcium, zinc, and magnesium.⁶

In elderly people, malnutrition is associated with diminished cognitive and functional performance, diminished self-care ability,^{7, 8} worse oral healths, poor eyesight and several difficulties with

mealtimes such as problems in using a fork or a knife.⁹ In hospitalized patients, depression scores were higher in malnourished patients than in those who were at risk.¹⁰ The European society for clinical nutrition and metabolism (ESPEN) defines nutritional risk as “the chance of a better or worse outcome from disease or surgery according to an individual’s nutritional status”. The diagnosis of nutritional risk makes it possible to perform a nutritional intervention and to avoid adverse outcomes, including malnutrition.¹¹ Despite all known about diabetes mellitus, little is known about the nutritional status of older people with diabetes mellitus. There is a need to study the nutritional status of elderly diabetic patients. The aim of this study was to determine the prevalence of malnutrition, and find out factors associated with malnutrition, in elderly diabetic patients.

Materials and Methods:

A case-control study was carried out between April 2015 and April 2016. The cases were interviewed in Shahid Layla Qasim diabetic center in Erbil city which is the only center for the diabetic patients. A sample of 200 cases (diabetic patients age 60 years old and more and their venous fasting plasma glucose of ≥ 126 mg/dl according to definition and diagnosis of diabetes mellitus and intermediate hyperglycemia, recommended by WHO/IDF consultation)¹² diagnosed and registered at the center was selected. New cases of CVA, patients with malignant diseases, diabetes for less than 1 years and Type 1 DM were excluded from the study. Those cases were compared with 200 controls free from diabetes and matched in age (± 3 years), and gender. Controls were collected from the patients admitted to surgical wards in Rizgary and Erbil teaching hospitals. Collection of data was performed by direct interviews in a

specially designed questionnaire using Mini Nutritional Assessment-Short Form. The Mini Nutritional Assessment-Short Form (MNA-SF) questionnaire scale (0-14) was used as the assessment of the nutritional status, score ≤ 7 defined as malnutrition, 8-11 scores as at risk of malnutrition which need further assessment and ≥ 12 defined as well nutritional statuses.¹³ The study was approved by research ethics committee of Kurdistan Board of Medical Specialties. A verbal informed consent was obtained from both cases and controls before being interviewed. An official permission was obtained from the Directorate of the health of Erbil and the administrations of the center and hospitals to carry out the study. The questionnaire included data on the age, gender, duration of disease and treatment regimen (oral hypoglycemic agent, insulin, dietary or mixed treatment), height, weight and body mass index (kg/m^2) was calculated and categorized into four groups according to Hanlon et al.¹⁴ underweight (<18.5), normal weight (18.5-24.9), overweight (25-29.9), and obese (≥ 30). HbA1c ≤ 7 was considered as diabetic control¹⁵. Data analysis was performed using statistical package for social sciences (SPSS, version 21), Chi-square (χ^2) test was used to compare the proportions. $P \leq 0.05$ was considered statistically significant.

Results:

Diabetic patients have a mean $\pm$ SD age of 66.73 ± 5.87 years (ranged from 60 to 90 years) and the controls have a mean $\pm$ SD age of 67.03 ± 5.88 years (ranged from 60 to 87 years). In both cases and controls, males constituted 45% of the sample, giving a male: female ratio of 0.82:1. The prevalence of uncontrolled diabetic patients among

study sample was 85.5%. Table 1 revealed that 6.5% of participants (12% of diabetic patients and 1% of non-diabetic patients) have malnutrition, and the proportion of at risk of malnutrition among diabetics (56.5%) was higher than that for non-diabetic (40.5%), and this finding is statistically significant ($P < 0.001$).

This study shows that the prevalence of malnutrition among uncontrolled (12.9%) is nearly two times higher than that (6.9%) among controlled diabetic patients, but there is no statistically significant association between nutritional status and diabetic control ($P=0.075$) as shown in Table 2. The prevalence of malnutrition in diabetic patients was significantly increased with age ($P=0.015$), and the prevalence of malnutrition in female diabetic patients was (12.7%) non significantly higher than (11.1%) in males ($P=0.363$), while in non diabetic patients it is slightly higher (1.1%) in males than (0.9%) in females ($P=0.175$) as shown in Table 3. Results revealed shows that malnutrition in elderly diabetic patients on mixed treatment (13%) was higher than in those on the dietary regimen (10%) and on oral hypoglycemic agents (7.1%). These variations are statistically significant ($P=0.047$) as shown in Table 4. Table 5 revealed that the prevalence of malnutrition in diabetic patients with the duration of diabetes for 20 years and more was (30%) higher than in those patients with the duration of diabetes for 10-19 years (22.2%) and less than 10 years (4.8%), and the prevalence of malnutrition was significantly increased with increasing the duration of diabetes ($P<0.001$).

Table 1: Nutritional status of cases and controls

Nutrition status	Case		Control		Total		P – value
	No.	%	No.	%	No.	%	
Malnutrition	24	12	2	1	26	6.5	< 0.001
At risk	113	56.5	81	40.5	194	48.5	
Normal nutrition	63	31.5	117	58.5	180	45	
Total	200	100	200	100	400	100	

Table 2: Nutritional status of controlled and uncontrolled diabetics

	Diabetic cases				Total		P –value
	Controlled No.	%	Uncontrolled No.	%	No.	%	
Malnutrition	2	6.9	22	12.9	24	12	0.075
At risk	22	75.9	91	53.2	113	56.5	
Normal nutrition	5	17.2	58	33.9	63	31.5	
Total	29	100	171	100	200	100	

Table 3: Nutritional status of cases and controls by age and gender

Age and gender		Nutritional status						P – Value
		Malnutrition		At risk		Normal nutrition		
		No.	%	No	%	No.	%	
Age (in years)		Cases						
60-69		12	8.1	85	57.4	51	34.5	0.015
70-79		8	19	24	57.1	10	23.8	
≥ 80		4	40	4	40	2	20	
Age (in years)		Controls						
60-69		1	0.7	53	36.3	92	63	0.238
70-79		1	2.4	21	50	20	47.6	
≥ 80		0	0.0	7	58.3	5	41.7	
Gender		Cases						
Male		10	11.1	47	52.2	33	36.7	0.363
Female		14	12.7	66	60	30	27.3	
Gender		Controls						
Male		1	1.1	30	33.3	59	65.6	0.175
Female		1	0.9	51	46.4	58	52.7	

Table 4: Nutrition status in elderly diabetic patients and treatment

Treatment	Malnutrition		At risk		Normal nutrition		Total		P-value
	No.	%	No.	%	No.	%	No.	%	
OHA	2	7.1	12	42.9	14	50	28	100	0.047
Insulin	0	0	0	0	1	100	1	100	
Dietary regime	1	10	3	30	6	60	10	100	
Mixed	21	13	98	60.9	42	26.1	161	100	
Total	24	12	113	56.5	63	31.5	200	100	

Table 5: Nutrition status of diabetic patients and duration of diabetes

Duration of diabetes (in years)	Malnutrition		At risk		Normal nutrition		Total		P – value
	No.	%	No.	%	No.	%	No.	%	
< 10	6	4.8	74	58.7	46	36.5	126	100	< 0.001
10-19	12	22.2	26	48.1	16	29.6	54	100	
≥ 20	6	30	13	65	1	5	20	100	
Total	24	12	113	56.5	63	31.5	200	100	

Discussion:

In this study the most frequently affected age group was 60-69 years. The mean age of diabetics was 66.73 ± 5.87 which is lower than (75.7 ± 6.5) that reported in a study done by Turnbull and Sinclair in the United Kingdom,¹⁶ this can be explained by the difference in mean life expectancy between the two populations and due to the sample selection. There is a progressive increase in the number of people reaching old age. It has been estimated that approximately 50% of diabetic patients are over 65 years of age.¹⁷ The prevalence of diabetes keeps increasing with age reaching a plateau in people over 70 year's old.¹⁸ The prevalence of malnutrition in diabetic patients was 12% which is similar to the finding of a study done in Iran,¹⁹ but lower than that reported in Spain (21.2%),²⁰ in the United Kingdom (26%),¹⁶ in Sweden (26%)²¹ and in Brazil (29.5%).²² The statistically significant association between diabetes and poor nutrition can be explained by that the diabetes is a chronic and catabolic disease, in

addition to that most of the patients have uncontrolled diabetes, they may have also diabetic complications, effect of medications, decline in cognitive and functional status, poor dentition, isolation, poverty,^{8,23} gastrointestinal and endocrine disorders, loss of taste and smell, decreased appetite due to both disease state and psychosocial factors,²⁴ sarcopenia, accelerated muscle mass and strength loss.²⁵ The prevalence of uncontrolled diabetes in the study sample was 85.5% in comparison with other studies, nearly the same rates (87%) were reported in Erbil/Iraq²⁶ and (80%) in Ecuador²⁷, but lower rate was reported in another study done in Erbil/Iraq²⁸ (61%), in Jamaica²⁹ (77%), and in the USA³⁰ (59%). This study also revealed that 12.9% of cases with uncontrolled diabetes have malnutrition in comparison to only 6.9% controlled diabetes. The malnutrition rate significantly increased with increasing age, this is consistent with studies done in Spain,²⁰ and in Turkey.³¹ Poor nutritional status of elderly is attributed to multiple factors including age,

decreased appetite, diminished physical activity, and reduced fat free body mass even in the absence of overt catabolic illness.²⁴ The elderly diabetics may not be able to attend to clinic or spend a long time waiting for clinic appointments.³² The current study revealed that malnutrition was higher in females than in males and this is consistent with studies done in Iraq,³³ Iran,¹⁹ and Spain.²⁰ This can be attributed to many factors including that most of female diabetics had a higher rate of depression, lower cognitive and physical ability, poorer reported health status and more diagnosed diseases.³⁴ Many studies indicate that women live longer than men but report more physical illness and functional disability (impaired self-care, impaired mobility, cessation of work, and reduction of work).³⁵ The higher prevalence of malnutrition in elderly diabetic patients on mixed treatment may be due to their uncontrolled diabetes and increasing age. The results revealed that a significant association between the duration of diabetes and poor nutrition. In elderly patients with history of diabetes for 20 years and more, 30% of them were malnourished and 65% of them were at risk for malnutrition. Such result goes with the finding of the study conducted in Spain.²⁰ This can be explained by that the duration of diabetes has been associated with the appearance of chronic complications and morbidity. An increased prevalence of malnutrition has been described in patients with nephropathy,³⁶ retinopathy and diabetic foot ulcers.³⁷

Conclusions:

Elderly diabetic patients were more susceptible to malnutrition than non-diabetic patients. The prevalence of malnutrition in uncontrolled diabetics was nearly two times higher than in controlled diabetic patients. There is a need for regular screening nutritional status of elderly diabetic patients through a regular health education program.

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