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NUTRITIONAL STATUS & ITS RELATIONSHIP WITH BLOOD GLUCOSE LEVELS AND SEXUAL DYSFUNCTION IN DIABETIC ADULT MALE

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***ABSTRACT*:**

Background Malnutrition is a common problem in India. Malnourished patients may be more prone to a higher level of glucose levels and sexual dysfunction. The present study has been carried out to evaluate the nutritional status of diabetic patients and the association between malnutrition, glucose levels and sexual dysfunction problem of diabetic patients.

Objective: To explore the nutritional status and its relationship with blood glucose levels and sexual dysfunction among young diabetic male

Material & Methods: A prospective, cross-sectional study has been carried including 282 subjects between 25-60 years of age groups (married male) who were enrolled in the study, patients visiting PGIMER, Chandigarh Endocrinology OPD. All patients were enrolled on prescribed proforma. Interview based data collection was done. Through clinical examination was done. Nutritional status was classified on the Mini Nutritional Assessment score. Sexual dysfunction assess by the International Index of Erectile Function (IIEF) Scale. Blood samples were obtained for blood glucose levels and HbA1c. Statistical calculation was done using SPSS 20.0. P-value <0.05 was considered statically significant.

Results: Out of 282 participant's prevalence of risk of malnutrition & normal nutrition status were 114 (40.4%) & 168 (59.6%) respectively. The sample mean ±SD Fasting Blood Glucose Level (FBG), Post Prandial Blood Glucose Level (PPBG), HbA1c & International Index of Erectile Function (IIEF) level were 164±62 mg/dl, 235±60 mg/dl, 8.5±2 % & 40.1±12.6 score respectively. When compare in both group of MNA, at risk of malnutrition patients show FBG, PPBG, HbA1c & IIEF 177±69mg/dl, 254±84mg/dl, 9.0±2.3% & 39.4±12.3 score respectively. Patients with normal nutritional status levels show FBG, PPBG & HbA1c with significant p value 156±56.3 mg/dl (p-value 0.006), 223.7±71.1mg/dl (p-value 0.001), 8.2±1.7% (p-value 0.003) respectively & IIEF score with non-significant p value, 40.7±12.9 (p-value 0.391). The mean ±SD Body Mass Index (BMI) of the patients was 25.6±4.3kg/m2 in the overweight range.

The patients data show correlation as when MNA score correlate with FBG significantly ($r = -0.163$, $p < 0.01$), MNA score correlate with PPBG ($r = -0.190$, $p < 0.01$), MNA correlate with HbA1c ($r = -0.179$, $p < 0.01$), whereas non-significant correlation was found MNA with IIEF ($r = 0.051$, $p > 0.01$) & MNA with age ($r = 0.009$, $p > 0.01$).

Conclusion: A high prevalence of malnutrition among adult with diabetes was observed. Malnutrition was related to blood glucose levels & HbA1c level. So periodic assessment of nutrition of diabetic patients will help in better monitoring & therefore fair control over their blood glucose levels.

Keywords: *Nutrition, Diabetic, Fasting Blood Glucose, Postprandial Blood Glucose, BMI, Mini Nutritional Assessment (MNA), Glycated Hemoglobin, International Index of Erectile Function (IIEF), Sexual dysfunction*

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INTRODUCTION

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 (1). Malnutrition is a common problem in India. Malnutrition a risk factor for many problems and is under diagnosed and undertreated. Even with the recent development of simple screening tools, systematic evaluation of nutrition assessment is still neglected (2). Notwithstanding all that is known about diabetes mellitus, little is known about the nutritional status of diabetic patients (3). Diabetes mellitus is one of the most prevalent endocrine pathologies in the general population is especially in (50-65 years of age group) India is considered the diabetes capital (India times: June 2017) of the world with about70 million afflicted by this disease.

Sexual dysfunction is also more common in diabetic person (4). The present study has been carried out to evaluate the nutritional status of diabetic patients and the association between malnutrition, glucose levels and sexual dysfunction problem of diabetic patients. The mini nutritional assessment (MNA) tool (scale 0-14) (5, 6) has been developed in to order early detection of malnutrition and to permit early nutritional intervention when needed. Malnutrition prevalence is hackneyed among young diabetes mellitus patients and is undiagnosed. So we aimed to determine the prevalence of malnutrition in adult diabetic patients and to find its impact on prognosis.

OBJECTIVE

To explore the nutritional status and its relationship with blood glucose levels and sexual dysfunction among young diabetic males.

METHODOLOGY

Study Area: PGIMER Chandigarh (Endocrinology OPD)
Subjects: Diabetic adult male patients visiting PGIMER, Chandigarh (Study population)
Study design - Quantitative & Interview based data collection.
Study duration- 12 months
Age Group - 25- 60 years of age group (Married Male)
Participants and procedure - Participants were recruited and the questionnaire was filled.

Inclusion criteria:

1. Aged between 25 -60 years
2. Married Male Diabetic Mellitus Patients (Type2).
3. Physician approval for selected patient.
4. Willingness to provide the informed consent.

Exclusion criteria:

1. Aged <25 >60 years.
2. Patients due for any kind of surgery.
3. Enrolled in other active intervention research studies.
4. Patients not willing to participate in the study.

Ethical aspect:

- Ethical permission has been granted by Institutional Ethics Committee of PGIMER, Chandigarh (letter No. INT/IEC/2016/2005 dated: 29/04/2016)
- The informed consent of the patients was obtained.

300 diabetic patients who enrolled, a total 282 fulfilled the inclusion criteria, who agreed to participate and complete questionnaire finally included in the study according to previously calculated sample size with a response rate of (94%). Data were collected by personal interview by using interviewer-administered questionnaire (IAQ).

Measures - The study questionnaire involved data regarding patients socio-demographic as age, educational level, and diabetes-related information.

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TOOLS

Mini Nutritional Assessment Questionnaire (MNA) - The MNA is a non-invasive and validated questionnaire to evaluate nutritional status in adult diabetic male persons. It classified into three groups: 1° score < 7: malnourished, 2° score ≥ 8 and <11: at risk of malnutrition, 3° score ≥ 12: well-nourished, with a maximum of 14 points (7-11). Mini nutrition assessment (MNA) questionnaire (tool) was used to assess the nutrition status of patients. By MNA without any laboratory data, the nutritional status of the patients can be easily predicted with questions and anthropometric measurements (12). The MNA is 6-item questionnaire comprising anthropometric measurements (6) (10)

Anthropometric Measurement - Anthropometric information was gathered. Height (in cm) and body weight (in kg) and Body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters). BMI calculation was as part of the MNA.

INTERNATIONAL INDEX OF ERECTILE FUNCTION (IIEF)

International Index of Erectile function (IIEF-15) questionnaire was used to detect sexual dysfunction (ED). The 15 question International Index of Erectile Function (IIEF) Questionnaire is a validated, multidimensional, self-administered investigation that has been found useful in the clinical assessment of erectile dysfunction. It has a total score of 75 (13, 14).

Biochemical factors - Fasting Blood Glucose levels, postprandial blood glucose levels and HbA1c Levels checked.

Statistical Analysis - SPSS 20.0 (SPSS Inc., Chicago, IL) statistical software was used to analyze data. Continuous variables were described by means ± standard deviations. Discrete variables were described as counts and percentages. The differences of means were tested with the independent group t-test and the distribution of proportions with the chi-square test. ANOVA, cross-tabulation was used to perform statistical calculation using SPSS. Spearman's correlation coefficient was used for correlation. All statistical significance was set at p-value of 0.05 levels

RESULTS

A total of 282 patients were included in the study. Our results did not show any patients under the 'Malnourished' category in MNA, therefore patients were categorized into "At risk of malnutrition' & 'Normal nutrition status' groups. 114 (40.4%) subjects were 'At the risk of malnutrition' and 168 (59.6%) were at 'Normal nutritional status' with no significant difference between both the group (p-value 0.103) **(Table 1).** The total sample mean ±SD age in years was 48±8.1 years, ranged from 25-60 years old. There was a non-significant difference in age of both groups of MNA, at risk of malnutrition mean age was 47±8.4 years and normal nutritional status mean age was 49±7.9 years **(Table 1).** The maximum respondents were from the age group 52-60 years n=122 (43.3%), 98 (34.8%) from the age group 43-51years, 42 (14.9%) from 34-42 years the age group &20(7.1%) from the youngest age group 25-33 years. Data shows patients were increased with an increase in age of both groups **(Table 1 & Figure 1).**

The sample mean ±SD Fasting Blood Glucose Level (FBG), Post Prandial Blood Glucose Level (PPBG), HbA1c & International Index of Erectile Function (IIEF) level were 164±62 mg/dl, 235±60 mg/dl, 8.5±2 % & 40.1±12.6 score respectively **(Table 2 & Figure 2).** When compared in both group of MNA, 'At risk of malnutrition' patients showed FBG, PPBG, HbA1c & IIEF 177±69mg/dl, 254±84mg/dl, 9.0±2.3% & 39.4±12.3 score respectively. Patients with 'Normal nutritional status' levels showed FBG, PPBG &HbA1c with significant p value 156±56.3 mg/dl (p value 0.006), 223.7±71.1mg/dl (p value 0.001), 8.2±1.7% (p value 0.003) respectively& IIEF score with non-significant p value, 40.7±12.9 (p value 0.391) **(Table 2 & Figure 2).** The mean ±SD Body Mass Index (BMI) of the patients was 25.6±4.3kg/m2 in overweight range. 'At risk of malnutrition' had significantly lower BMI 24.7±5.1 (p value 0.003) when compared to 'Normal nutritional status' patients 26.2±3.4kg/m2 **(Table 2).** The mean ±SD MNA score was 12.13±1.7, in 'At the risk of malnutrition' 10.29±1.0 & 13.38±0.7 in 'Normal nutritional status' patients which was highly significant (p-value 0.000) **(Table 2).** The patients data showed correlation MNA score correlated with FBG significantly (r = -0.163, p <0.01), MNA score correlated with PPBG

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(r = -0.190, p <0.01), MNA correlated with HbA1c (r = -0.179, p <0.01), whereas non-significant correlation was found MNA with IIEF (r = 0.051, p > 0.01)&MNA with age (r = 0.009, p > 0.01).

DISCUSSION

Well, known about, regular physical activity and a correct diet could result in better diabetes and its complication control. Little is known regarding the nutritional status and its relationship with blood glucose parameters like FBG, PPG, HbA1c and its outcomes. The main finding of this study was that the nutritional status of diabetic patients of the adult age group was directly proportional to the blood glucose levels and inversely proportional to sexual dysfunction. Our data shows 'Normal nutritional status' patients have better control over blood glucose levels and IIEF score. Most the studies show a nutritional assessment of diabetic patients in old age by MNA (7, 8, 15-19), while nutritional assessment with MNA in adult diabetic in the Indian population is missing so need to conduct this study. As a screening test for nutritional status, the MNA questionnaire was chosen because it is easy to use. The MNA is of particular interest since it detects not only malnourished people but also persons at risk of malnutrition, allowing early nutritional intervention when needed. Data shows patients were increased with the increase in age of both groups (Table 1 & Figure 1). About 40 % of diabetic patients with at risk of malnutrition with high blood glucose levels show that malnutrition is a health problem that can be controlled by proper nutritional assessment& counseling. Similar to other studies of Bulent Saka et al 44% with poor nutritional status (16), Pertoldi W et al (20) and Shaikh et al with (21) about 62% malnutrition. Gau-BR et al (22) patients at risk of malnutrition about 70%.

Liu G X et al (19)also did a similar study with 302 elderly participants with MNA but in older patients (>/=65) with Type 2 diabetes & 18.5% malnourished, 33.1% at risk of malnutrition and 48.3% normal nutritional status patients, which is quite similar with our study. Gau-BR et al (22) identified patients 'At risk of malnutrition' (70.5%) or 'Malnourished' (14.6%) (Mean MNA score, 20.6±3.4). Prevalence of malnutrition & diabetes in the north Indian population was similar to other studies in Europe by Sanz Paris et al (17) 40% at risk of malnutrition where they have done MNA for elderly diabetic patients. This data shows that in Europe diabetic patients were at risk of malnutrition at the mean age of 78 years (40%) while in our study in India mean age 48 years have (40%) at the risk of malnutrition. Similarly, in European studies, most of the cases of diabetes were in the age group of 50-65 years. The mean MNA score 12.13 (7-14) our study is similar to other studies 12.23 of Turnbull et al. (15) for diabetic patients. His score is non-significant while our study shows highly significant in both groups. MNA score correlated significantly with other parameters in our study resemble with other studies of Gerber V et al. (7, 15). Like other study, MNA was a non significant correlation with age (7). In our study the mean age (48±8.1 years) and age range (25-60 years), which was comparable to study done by Shaikh et al and Oyibo et al (21, 23) shown mean age of patients was 47 and 58 years, range of age 30-70 & 29-78 years respectively. The nutritional status worsens with age same in our study (table 1 & figure 1) can compare with Sanz Paris et al (17). The sample size, the response rate of the subjects and non-significant difference in age of both the group of our study is in accordance with the study done by Fattah Badr et al. (18). The mean BMI in our study24.7±5.1 is similar result with Agarwal et al (24), Sanz Paris et al (17) and 24.42±4.39 of the study done by Bulent Saka et al (16) low BMI in at risk of malnutrition group. We have got a statistically significant difference between BMI, FBG, PPG & HbA1c. These findings are in congruence with other studies. (24-26) The mean BMI found in our study was in the overweight range (26) and higher in normal nutritional status subjects. In Agrawal study, there was a significant positive correlation between BMI & FBG (24). A study reported by Onyesom Innocent et al showed a positive but weak correlation between BMI & BGL among male subjects while in our study there is non-significant weak negative association (27). Our findings are similar to other studies that also used the MNA as a tool for evaluate the nutritional status of diabetic patients and HbA1c associated with MNA (28). A study was done by Imran Ali Shekh et al also shows similar output with 387 subjects, MNA done and mean age & blood glucose level similar to our results.

CONCLUSION

In conclusion, Malnutrition in diabetes is usually under diagnosed, 40% of our study subjects were categorized as 'at risk of malnutrition'. Like elsewhere early detection can prevent malnutrition status in diabetic patients. MNA could be included in the assessment to develop an overall plan for treatment and nutrition as well as to the risk of diabetic complication can be controlled by doing the same. Due to the high dispersion of diabetes with malnutrition, adequate nutritional care should be emphasized for each diabetic patient. The data show patients with normal nutritional status have better control over blood glucose as well as IIEF score. Therefore every

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diabetic patient should be properly monitored and then the nutritional status should be maintained for good control over the disease which is lacking in most of the cases. Periodic nutritional assessment of diabetic patients will help in better monitoring and therefore fair control over their blood glucose levels and sexual dysfunction. Improves the quality of nutritional care services provided.

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Conflict of Interest - The authors declare no conflict of interest.

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Baseline characteristics of the study population				
	At risk of Malnutrition	**Normal Nutritional Status**	**Total**	**P value**
Numbers	114	168	n=282	
Numbers	114 (40.4%)	168 (59.6%)	n=282	(P 0.103)
Age (mean ±SD) in years	47±8.4	49±7.9	48±8.1	(P 0.103)
25-33 Years	10 (8.8%)	10 (6.1%)	20 (7.1%)	(P 0.181)
34-42 Years	19 (16.7%)	23 (13.7%)	42 (14.9%)	

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43-51 Years	40 (35.1%)	58 (34.5%)	98 (34.8%)	
52-60 Years	45 (39.5%)	77 (45.8%)	122 (43.3%)	P>0.05

Table 1: Baseline characteristics of the study population according to age group

Baseline characteristics of the study population				
	At risk of Malnutrition	**Normal Nutritional Status**	**Total**	**P value**
Numbers	114 (40.4%)	168 (59.6%)	n=282	(P 0.103)
FBG	176.9±68.9	156±56.3	164±62	(P 0.006)
PPG	254±84.4	223.7±71.1	235±60	(p 0.001)
HbA1c	9.0±2.3	8.2±1.7	8.5±2.0	(p 0.003)
IIEF	39.4±12.3	40.7±12.9	40.1±12.6	(P 0.391)
BMI (mean ±SD)	24.7±5.1	26.2±3.4	25.6±4.3	(p 0.003)
MNA (score 0-14 points)	10.29±1.0	13.38±0.7	12.13±1.7	(p 0.000)

Table: 2 Characteristics of patients group according to nutritional status

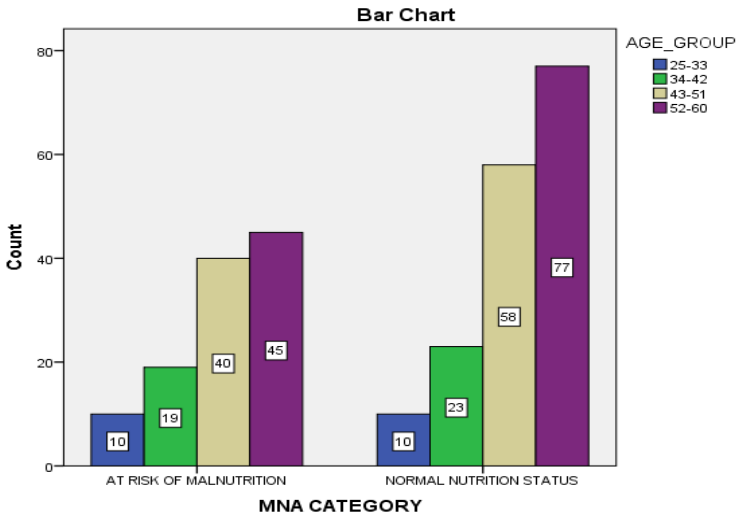

Figure 1: MNA status in different age group

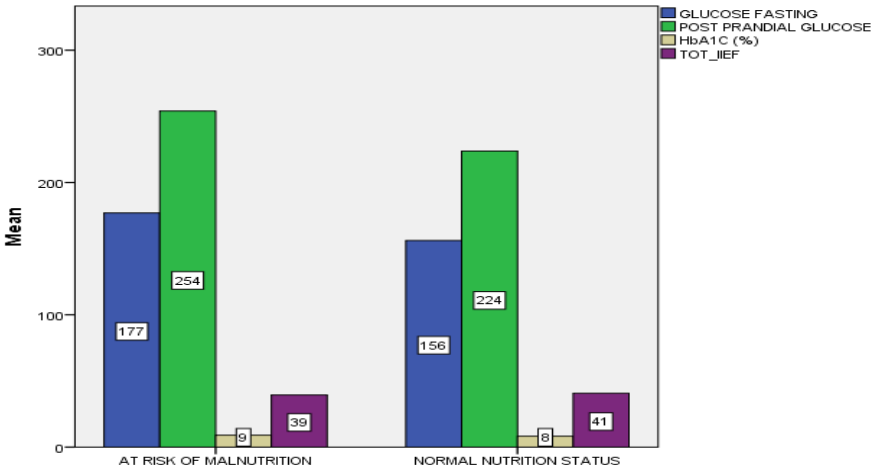

Figure 2: MNA status in Blood glucose levels and IIEF score

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