

Stress as a limiting factor in the management of type 2 diabetes mellitus

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ABSTRACT

Stress has a role in the aetiology of Type 2 Diabetes (T2DM) both as a predictor and as a prognostic factor. Psychological factors have been shown to impair glycaemic control and increase the risk of complications due to diabetes mellitus. The present study was conducted with an objective to assess the influence of stress on the management of T2DM. A cross sectional survey was conducted among 500 T2DM patients in five districts of North Kerala namely Kasargod, Calicut, Malappuram, Wayanad and Palakkad with a pre tested questionnaire. A dichotomous scale was used to assess the seven theoretical mediating domains that influence stress of the T2DM patients. Based on the positive and negative response of the patient stress score was developed and categorised as mild, moderate and severe stress score. The different factors influencing the quality of life of a T2DM were statically analysed with SPSS Statistics Version 21. In the present study stress is negatively linked with increasing age and gender. A positive association of stress was found among patients with low income with no job and poor educational background. Diabetes patients who did not exercise regularly had seven times higher stress score (87.8%) than who did it regularly (18.8%). Recreational activities including reading books and use of internet or social media had a positive influence on stress than TV and radio like media. Stress had a positive association with the duration, HbA1c level and complications of the disease; when stress level increased occurrence of complications also increased. Regarding their medication insulin using patients had severe stress score (62.2%). The above findings led to a conclusion that stress had a positive influence on T2DM.

INTRODUCTION

Perceived stress is a strong risk factor for T2DM. An emerging body of literature suggests that stress has a role in the aetiology of type 2 diabetes mellitus (T2DM) both as a predictor of new onset of T2DM and as a prognostic factor in people with existing T2DM (Ruth *et al.*, 2017). Stress on diabetes risk is not mediated by the traditional risk factors due to hypertension, physical

activity, smoking, diet quality, and body mass index (Harris *et al.*, 2017). American Diabetes Association (ADA) reported that people under stress may not take good care of themselves. Since diabetes and stress are directly or indirectly related, it is important to evaluate the effect of stress in patients with diabetes.

It has been estimated that as much as 60 per cent of T2DM disease risks is due to modifiable environmental

factors including obesity, physical inactivity, diet quality, smoking and abnormal cholesterol levels (Murea *et al.*, 2012). Induced negative emotions, such as depression and anxiety may also contribute to diabetes risk (Balducci *et al.*, 2011, Theorell *et al.*, 2015 and Rotella and Mannucci, 2013).

Stress due to diabetes is mainly happened because of the prolonged activation of the hypothalamic pituitary adrenal axis and sympathetic nervous system or indirectly through impaired sleep (Pouwer *et al.*, 2010). Pathophysiological mechanisms linking stress to diabetes had included direct neuro-endocrine effects such as cortisol and adrenaline hormone produced during stress are counter-regulatory to insulin, and indirect effects mediated by traditional risk factors (Kelly and Ismail, 2015 and Williams *et al.*, 2013).

Furthermore stress-related coping strategies, such as comfort eating behaviour with an increased preference for energy and nutrient dense foods (Bazhan and Zelena, 2013), may result in weight gain or an increase in waist circumference which are both pivotal risk factors for diabetes (Kouvonen *et al.*, 2011 and Tuomilehto *et al.*, 2001). The psychological status of a patient with diabetes varies with the stages of illness, complications, social support, work and family environment and a host of other factors Therefore attention to psychological aspects of diabetes mellitus is a particularly important both in terms of improvement in Diabetes related parameters as well as to enhance emotional health and quality of life of the patients as well as caregivers (Sridhar, 2015). Unfortunately majority of the medical practitioners were not giving much importance to this area.

According to Sweileh *et al.* (2014) psychosocial assessment should be part of routine clinical evaluation of T2DM patients at primary healthcare clinics to improve quality of life and decrease adverse outcomes among diabetic patients. The present study was carried out to assess the influence and effect of stress on quality of life of T2DM patients.

MATERIAL AND METHODS

The present study was carried out on 500 patients of T2DM confirmed by clinical and laboratory assessment obtained from Governmental and non Governmental hospitals in five districts of North Kerala namely Kasargod, Calicut, Malappuram, Wayanad and Palakkad. Samples from each district were equally

distributed. A cross sectional survey was conducted during the period of 2005 to 2007. The details on the health status as well as demographic parameters of the T2DM patients were collected using questionnaires and schedules through direct Interview method.

A dichotomous scale was used to assess the each responses of T2DM on the seven theoretical mediating domains that influence stress (family problems, finance, social issues, lack of family support, complications of disease, diet management and job related stress). Each positive responses were scored as 1 and negative responses as 0. T2DM patients with maximum stress score 7 were considered as most stressed person and with score 0 as minimum stressed person. In the present study minimum score assigned was 1 and maximum score was 6. It was again categorised under 3 equal cut points such as Mild Stress score (1-2 score), Moderate Stress score (3-4 scores) and Severe Stress score(5-6 score). Statistical analysis was done with the various demographic and health related variables of T2DM with stress score to assess the influence of stress on the management of T2DM.

OBSERVATIONS AND ANALYSIS

The selected patients consisted of 304 male (61%) and 196 female (34%). Maximum numbers of the patients were in the age group of 51-65 years. Men experienced low level of stress when compared to women and adults who had recently recognized the occurrence of the disease. According to Zaidi *et al.* (2017) stress is negatively linked with increasing age and positively linked with gender. In the present study both the age and gender had negative association with the stress. 50 per cent males and 50 per cent females had severe stress score. Present data reveals that both the male and females had equal chance of being affected by the stress. Patients who were married had higher stress score when compared to their unmarried counterparts.

According to the Census of India Report (2013) literacy in India is a key for socio-economic progress. So the influence of stress on socio-economic status of the patient was statistically assessed. One way ANOVA analysis results a positive association of stress with educational status and economic status of the T2DM. Patients with poor educational status and low income family had severe stress compared to the high income well educated counterparts. Unemployed patients had

severe stress score (64.1%) than employed patients (35.9%). A positive association of stress was found among patients with a large family. Influence of stress on the lifestyle habits of the T2DM using t test are summarized in the Table 1.

According to Pathak and Pathak (2012) smoking and drinking by diabetic subjects further deteriorates the effects of diabetes, while regular physical exercise has beneficial effect. In the present study stress had no significant relation with smoking and alcohol consumption pattern of diabetes patients. At the same time exercise showed positive significance with stress. Diabetes patients who did not exercise regularly had seven times higher stress score (87.8%) than who did exercise regularly (18.8%).

Now-a-days influence of media on stress is significant. Those spend leisure time in reading books had less stress compared to patients watching Television (TV) or listening Radio. Internet and social media can also influence stress positively. T2DM patients who update their knowledge through listening to health related programmes had less stress.

In the present study out of total patients 39 per cent of the patients had Mild Stress 48 per cent had Moderate Stress and 13 per cent had Severe Stress. When it was attempted to examine, how diabetes affected stress in the patients, it was found (Fig. 1) that in the case of T2DM moderate stress patients, diabetes complications, treatment expenses and a mere thought of diabetes as a life time disease had highly increased their stress. Since Diabetes is a big financial burden for the poor socio-economic country like India, the majority of T2DM patient's severe stress was mainly due to financial worries about the treatment expenses.

One third of the T2DM mild stress patients were worried about their diet, medication and thought about Diabetes as a lifetime disease.

Table 2 describes the influence of stress score on disease related factors of the T2DM. It is clear from the study that there existed a positive correlation with diabetes related complications and stress level; when stress level increased occurrence of complications also increased. Patients with complications of diabetes had severe stress score (96.9%) when compared to their counterparts without any complications of diabetes. When number of complications increased severity of the stress also increased.

A positive association was found with stress level and blood pressure (BP) of the diabetes patients and the result was statistically significant ($p = 0.000$). But the presence of lipid profile had a negative relation with stress. 56.3 per cent T2DM without cholesterol had severe stress than those T2DM patients with high cholesterol level (43.8%).

HbA1c is a mild stone marker for identifying the glycaemic control of diabetic patients. In the present study HbA1c level was positively significant with stress score. The main medications commonly used for diabetes management are oral hypoglycaemic agents (OHA) or insulin injection. Regarding their medication insulin

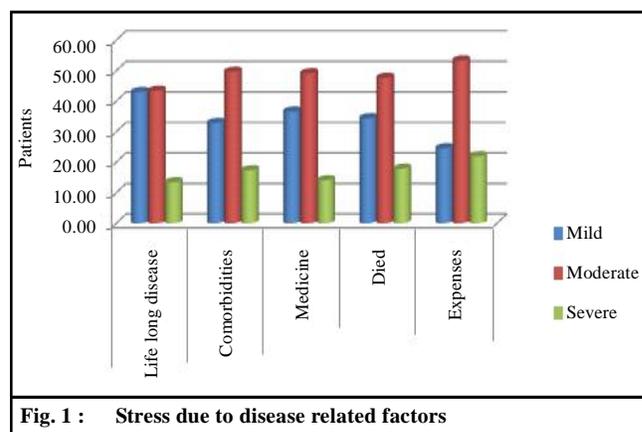


Fig. 1 : Stress due to disease related factors

Lifestyle habits		t test				
		No	Mean	Std. deviation	T	P value
Exercise	Yes	205	2.75	1.199	-3.531	0
Smoking	Yes	78	3.16	1.29	1.425	0.155
Alcohol	Yes	96	3.16	1.13	1.616	0.107
Reading books	Yes	205	2.75	1.199	-3.531	0
TV watching	Yes	422	2.92	1.221	-2.637	0.009
Internet using	Yes	108	2.58	1.11	-3.864	0
Listening health programmes	Yes	149	1.56	0.65	-3.687	0

Table 2 : Influence of stress on disease related factors of the T2DM					
Factors	Mild stress score (n=198)	Moderate stress score (n=238)	Severe stress score (n=64)	Chi square	P value
Diabetes treatment [in (%)]					
No medication	9	12	0		
	4.6	5.1	0		
Oral only	142.0	117	21		
	72.1	49.4	32.8		
Insulin or insulin + oral	86.0	108	43		
	43.4	45.6	67.2	47.788	0.000
Presence of chronic complications [n(%)]					
Yes	126	181.0	62		
	63.6	76.1	96.9		
No	72	57	2		
	36.4	23.9	3.1	28.825	0.000
Number of chronic complications [n (%)]					
0	72	57	2		
	36.4	23.9	3.1		
1	60	65	10		
	30.3	27.3	15.6		
>2	66	116.0	52		
	33.3	48.7	81.3	49.242	0.000
Duration of diabetes [n (%)]					
< 10 years	145	138	23		
	73.2	58.0	35.9		
>10 years	53	100	41		
	26.8	42.0	64.1	30.310	0.000
Blood pressure to target [n (%)]					
Yes	86	131	47		
	43.4	55	73.4		
No	112	107	17		
	56.6	45.0	26.6	18.386	0.000
Lipid profile to target [n (%)]					
Yes	98	106	28		
	49.5	44.5	43.8		
No	100	132	36		
	50.5	55.5	56.3	1.275	0.529

using patients had severe stress score (62.2%). Patients suffering from diabetes for more than 10 years were found to have severe stress score (64.1%) which indicated that the duration of the disease had highly influenced stress.

In a study, Imayama *et al.* (2011) had identified predictors of quality of life of diabetic patients as lifestyle, personal and medical factors. Particularly, the study highlighted that the gender, age, marital status, trait, and income had higher score with life satisfaction. The particular study also noted that individuals who are

nonsmoker and high on physical activity were found to be significantly related with better health in adults with diabetes. Another researcher forwarded similar conclusions regarding the impact of socio demographic factors on quality of life among diabetic patients (Issa and Baiyewu, 2007). A study conducted by Thommasen and Zhang (2006) also noticed that diabetes is related with lower quality of life scores. Verma *et al.* (2017) emphasized that strategies should be designed to diagnose diabetes early which would not only prevent diabetic-

related complications but also prevent corrosion of quality of life among the diabetic patients.

The findings of the study concluded that stress had a positive effect on Type 2 Diabetes mellitus. So stress management and appropriate lifestyle modification are necessary for managing full-fledged Diabetes mellitus. Psychosocial assessment as a part of routine clinical evaluation of T2DM patients will also improve the quality of life and decrease adverse effect among diabetic patients.

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