

# Stress and anxiety among people with type 2 diabetes mellitus

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## ABSTRACT

**Background:** Diabetes mellitus and psychiatric disorders share a bidirectional association by influencing each other in multiple ways. The aim of the study was to find out proportion of persons having stress and anxiety and their association with age and gender among diabetic adult population.

**Methods:** This was a cross-sectional study conducted among the patients attending the outpatient department of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM General Hospital) and Dhaka Medical College & Hospital (DMCH) Dhaka, Bangladesh. By convenient sampling, 130 participants with type 2 diabetes mellitus were included according to inclusion and exclusion criteria during January-March, 2020. Data were collected through face-to-face interview by paper and pen method with a semi-structured questionnaire. Dhaka University Anxiety Scale and Perceived Stress Scale-10 were used.

**Result:** Most (87.7%) of the respondents had moderate level of anxiety. Severe stress was more prevalent among females (76.9%) than males (23.1%) and the difference was statistically significant ( $p=0.034$ ). Twenty two (16.9%) of respondents were above the cut off point for anxiety and 6.0% were female among them. Among the respondents with anxiety, male (81.8%) were more than female (18.2%) and the difference was significant ( $p=0.001$ ). Stress was highly prevalent among comparatively younger age group ( $d > 50$  years) than the older ( $> 50$  years) and this difference was statistically significant ( $p=0.001$ ). Anxiety was not significantly different among two age groups ( $p=0.183$ ).

**Conclusion:** Stress was more prevalent among females and younger age group. Anxiety on the other hand was more prevalent among males and there was no significant difference between older and younger age groups. Large scale and organized scientific studies in this field are needed to determine the effect of stress and anxiety in patients with diabetes mellitus.

**Key Words:** Anxiety, Diabetes, Stress

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## INTRODUCTION

The number of people having chronic illness like type 2 diabetes mellitus and coronary heart disease is increasing worldwide including among the adult population of Bangladesh.<sup>1</sup> According to the World Health Organization report (2017) in Bangladesh diabetes and coronary heart disease accounted for 5.09% and 14.31% respectively of total deaths.<sup>1</sup> These illnesses are major source of stress as well because they might create a number of stressful situation and life changes.<sup>1</sup> Besides, diabetes and hypertension may lead to higher healthcare costs due to loss of productivity from sickness absenteeism, and premature mortality.<sup>2</sup>

The prevalence of diabetes mellitus (DM) is increasing in Bangladesh in both urban and rural areas.<sup>3</sup> A recent scoping review (1994-2013) revealed that the prevalence

of type 2 diabetes varied from 4.5% to 35.0% in Bangladesh.<sup>3</sup> The International Diabetes Federation estimated 7.1 million people with diabetes in Bangladesh and almost an equal number with undetected diabetes.<sup>3</sup> This number is estimated to double by 2025 and it will be 13% by 2030.<sup>2</sup> On the other hand, mental illness is also very alarmingly high in Bangladesh. Prevalence of any mental disorder is stated as 16.8% among general adult population in a nationwide study conducted by National Institute of Mental Health.<sup>4</sup> The study found depressive disorders in 6.7% and anxiety disorders in 4.6% of the respondents.<sup>2</sup>

Diabetes and psychiatric disorders share a bidirectional association by influencing each other in multiple ways.<sup>2</sup> The prevalence of anxiety and depressive disorders in type 2 diabetes is approximately 60% higher than the general population. The complications of anxiety and depression affect all populations globally, but more than two-thirds of people who are suffering from these two disorders are living in developing countries.<sup>6</sup> Patients with diabetes who have depression and anxiety disorders usually are less physically active and show less interest to take their prescribed medications.<sup>2</sup> Previous studies show that anxiety and depression have an important negative impact on abilities of diabetic patients.<sup>2</sup> Some of the recent studies, including a systematic review, have reported a higher prevalence and incidence of anxiety disorders in people with type 2 diabetes compared with the general population.<sup>8</sup> Female sex, younger age, low socioeconomic status and concomitant chronic illnesses are particular vulnerability factors for developing anxiety disorders.<sup>2</sup>

Psychological stress is believed to be an essential risk factor for DM, and stressful experiences may affect the onset and metabolic control of DM negatively.<sup>9</sup> A large population-based survey of glucose tolerance found an association between stressful experiences and the diagnosis of type 2 diabetes which is a complex area with fewer studies being done.<sup>9</sup> The chronic stress factors can over-activate the hypothalamic-pituitary-adrenal (HPA) axis, resulting in an increased release of various insulin counter-regulatory hormones such as cortisol and adrenaline and eventual negative impact in the metabolic control of DM.<sup>9</sup> Elevated plasma catecholamine levels and glucose intolerance have been found to be associated with stress even in healthy individuals, suggesting that stress can lead to transient hyperglycemia even in the non-diabetic population.<sup>2</sup>

In diabetes, anxiety is associated with poor glycemic control, increased risk of diabetes-related complications including risk of stroke and poor quality of life but these conditions may improve with proper and timely management of anxiety.<sup>8</sup> Hence, it is essential to identify and address anxiety in persons with diabetes as early as possible, in order to reduce the burden of comorbid disease, improve blood glucose control and therefore reduce the risk of diabetic complications.<sup>8</sup>

In this study we aimed to find out proportion of persons having stress and anxiety and their association with age and gender among diabetic adult population attending outpatient department of two different tertiary care hospitals.

## METHODS

This was a cross-sectional study conducted among the patients attending the outpatient departments (OPD) of BIRDEM General Hospital and Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh. Necessary permission was taken from Directors of the respective Institutes. A total of 130 respondents of 18 years and above, diagnosed as a case of type 2 diabetes mellitus were selected conveniently during January to March 2020. Persons with severe physical or mental illness or cognitive impairment were excluded. After taking informed consent, data were collected by face to face interview with paper and pen method. A semi-structured questionnaire designed by the researcher containing socio-demographic and other variables was used.

In our study we have used two psychometric scales, namely Perceived Stress Scale-10 (PSS-10)<sup>2,3</sup> and Dhaka University Anxiety Scale (DU Anxiety Scale)<sup>4</sup>.

Perceived Stress Scale (PSS) measures “the degree to which situations in one’s life are appraised as stressful”. The original version of PSS was developed by Cohen et al. and consists of 14 items (PSS-14). This scale was later reduced to 10 items (PSS-10), removing 4 items because of low factor loading based on the results of principal component analysis. A four item version was also developed as a brief version. The PSS, in 14, 10, and 4- item versions, has been frequently used across various cultures and populations and translated into many languages. Among three versions of PSS, the PSS-10 is recommended since it has more satisfactory psychometric properties than PSS-14 and PSS-4.<sup>4</sup> Individual scores on the PSS can range from 0 to 40 with

higher scores indicating higher perceived stress. Scores ranging from 0-13 is considered low stress, 14-26 moderate stress and 27-40 would be considered high perceived stress.<sup>4</sup>

PSS-10 scale was translated to Bangla, back translated and compared by the researchers with the original English version. Pre-testing with Bangla version of PSS-10 was done among 10 respondents. According to the findings of pretesting the Bangla version of PSS - 10 was then finalized after necessary modification.

The Anxiety Scale was developed by Deeba & Begum (2004) in the cultural context of Bangladesh for measuring level of anxiety of Bangladeshi population.<sup>12</sup> The scale consists of 36 items on a 5 point Likert scale ranging from 0 (never applicable) to 4 (profoundly applicable).<sup>12</sup> The reliability and validity was found high enough. The cut of point is 47.5 and scoring for mild anxiety is 54 and less, moderate 55 to 66, severe 67 to 77 & profound 78 to 135 and above.<sup>12</sup>

Data were analyzed using Statistical Package for Social Sciences (SPSS), version 24.0 for Windows.

**RESULTS**

In the current study, age of the most of the respondents was of d” 50 years (76.2%) with the mean age of 41.09. Among them, proportion of female (50.8%) was slightly higher than male (49.2%). Majority of the respondents were Muslim (96.2%) and service-holder (49.2%). Monthly family expenditure for more than half of the respondents (56.2%) was <20,000 BDT.

Sociodemographic findings are shown in Table I.

**Table I** Socio-demographic characteristics of the study population (N=130)

Characteristics	Frequency	Percentage
Age		
≤50	99	76.2
≥51	31	23.8
Gender		
Male	64	49.2
Female	66	50.8
Religion		
Islam	125	96.2
Hinduism	4	3.1
Christianity	1	0.7
Occupation		
Service	64	49.2
Business	41	31.5
Student	4	3.1
House wife	21	16.2
Monthly family expenditure (BDT)		
<20,000	73	56.2
20,000-60,000	45	34.6
>60,000	12	9.2

Most (87.7%) of the respondents had moderate level of stress (114 of 130 respondents). Severe stress was more prevalent among female (76.9%) than male (23.1%) and the difference was statistically significant (p < 0.05). (Table II)

Twenty-two (16.9%) of respondents were above the cut off point for anxiety and 6.0% were females among them. Among the respondents with anxiety male (81.8%) was more than female (18.2%) and the difference was significant (p<0.05). (Table III)

**Table II** Stress level and gender of the respondents (N = 130)

Stress	Male	Female	Total	Test statistic
Mild	3 (100%)	0 (0.0%)	3 (100%)	$\chi^2_{(2)} = 6.775 p = 0.034$
Moderate	58 (50.9%)	56 (49.1%)	114 (100%)	
Severe	3 (23.1%)	10 (76.9%)	13 (100%)	

**Table III** Gender of the respondents and presence of anxiety (N = 130)

Anxiety	Male	Female	Total	Test statistic
No anxiety	46 (42.6%)	62 (57.4%)	108 (100%)	$\chi^2_{(1)} = 11.251 p = 0.001$
Anxiety present	18 (81.8%)	4 (18.2%)	22 (100%)	

**Table IV** Association of age of the respondents with Stress and Anxiety (N = 130)

Variable	Mean difference	95% CI	T	p value
Stress	2.927	1.264–4.590	3.482	0.001
Anxiety	-6.120	-15.168 - 2.928	-1.338	0.183

Independent t test revealed that stress was highly prevalent among comparatively younger age group (dd 50 years) than the older (> 50 years) and this relation was statistically significant ( $p < 0.05$ ) but anxiety was not significantly different among two age groups ( $p > 0.05$ ). (Table IV)

## DISCUSSION

In this study a total of 130 adults of 18 years and above were included. Among these respondents 10% had sever level of perceived stress as per PSS-10. In a study conducted in Chennai 32% of the participants had high scores and 3% had very high scores on PSS scale.<sup>15</sup> In another study conducted in at a rural tertiary care center in Kolar district of Karnataka 'perceived stress' was detected in 39.3% of the participants, on the other hand, another study conducted in Mangalore, Karnataka, among type 2 diabetic patients showed 22.1% had stress using PSS-10.<sup>16</sup> A study done in 17 countries including India, reported 9.8% of diabetics to be under permanent stress using two semi structured questions.<sup>16</sup> Studies done in various countries such as China, Malaysia, Croatia, and Japan have shown varying levels of stress among diabetics ranging from 7% to 15.2% using different scales of assessment.<sup>16</sup> In a case control study conducted in Karnataka state of India, stress was found to be high among diabetics (22.17%) as compared to that in non-diabetics (16.92%).<sup>17</sup> In another case control study using DASS in Faisalabad, Pakistan it was observed that the 47.9%, 69.6% and 62.9% patients with type-2 diabetes mellitus were suffering in depression, anxiety and stress respectively.<sup>18</sup> In our study, stress level was found to be high among 10% of participants, which is a bit low in comparison to above mentioned studies.

In this study 16.9% of respondents were above the cut off point for anxiety as per DU Anxiety scale. In a study conducted in Pakistan the prevalence of anxiety symptoms in patients with type 2 diabetes using the Hospital Anxiety and Depression Scale was reported to be around 57.9%.<sup>19</sup> In a diabetic center in Tabuk among

diabetic population anxiety was reported among 4.3% of the patients.<sup>9</sup>

In a collaborative study across 15 countries differing in socioeconomic status, cultural background and levels of healthcare services, anxiety disorder was observed in 18% of people with type 2 diabetes.<sup>8</sup> Factors associated with higher prevalence of anxiety disorders were female gender, longer duration of diabetes, more diabetes complications and poorer diabetic control.<sup>8</sup> In that study Bangladesh was included and among 194 samples no patient with anxiety was screened out with the scale used that is MINI.<sup>8</sup> There are wide variations in the prevalence of anxiety disorders across countries and within, which could be due to heterogeneous study samples, the use of different assessment tools and even using different cut-off levels within the same scales.<sup>8</sup>

In our study 76.9% of the respondents who had severe stress were female. On the other hand, 18.2% was female among the persons above cut off value for anxiety scale. Gender difference in psychological distress has long been a focus of many scientific studies. Relevant previous epidemiological researches showed that in general, females tend to suffer more from mental problems than males. Females and males respond to stress differently as a consequence of their differential sensitivity to events.<sup>21</sup> Females are more vulnerable to stress and pain than males, so they might experience greater sadness and anxiety, furthermore self-concepts of traditional masculinity and femininity can affect their attitudes and behaviors towards life experiences.<sup>21</sup> The prescribed gender role expectations, in turn, lead to their differential internalizing and externalizing problems and it has been evidenced that women were more likely to struggle with internalizing disorders such as depression and anxiety.<sup>21</sup>

In a study conducted in Karachi, Pakistan using PSS, findings revealed significant gender difference on the variable of perceived stress ( $p < .05$ ) and female diabetics score higher than male diabetics.<sup>22</sup>

In a matched case-control study in Qatar, diabetic women had higher depression (63.3% vs 50.4%), anxiety (70.1% vs 61.6%) and stress (73.3% vs 61.4%) scores than men in that study.<sup>23</sup> Another cross sectional study carried out in Malaysia showed stress and anxiety significantly associated with female sex.<sup>24</sup>

In our study we found that stress level was significantly high in female but anxiety level was not. Stress was highly prevalent among comparatively younger age group and this relation was statistically significant. But anxiety was found not significantly different among 2 age groups.

Epidemiologic surveys of the general population have consistently found that current and lifetime anxiety disorders are less prevalent in older than younger adults. Reason for this finding is unknown, but several hypotheses have been proposed. These hypotheses include age-related changes in brain neurotransmitter function, age-related psychological and/or social changes, disorder-associated mortality, and a cohort effect. Other proposed hypotheses include reluctance on the part of older people to acknowledge emotional and psychological symptoms, reduced sensitivity of epidemiologic survey instruments in older persons, and recall bias.<sup>25</sup> A cross sectional study was conducted to compare the frequency of anxiety disorders in older and younger persons findings of which are consistent with those of community-based epidemiologic surveys, that anxiety disorders are more prevalent in younger adults.<sup>25</sup>

Our study was conducted in two selected tertiary care hospitals. So, the study population might not represent the whole community. The respondents were selected conveniently due to time constraints and other reasons. As a result, there might be some selection bias.

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