Prevalence of Distress among Diagnosed Type 2 Diabetics Residing in Rural and Urban Areas of District Amritsar: A Cross-Sectional Study

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Abstract

Background: Patients with diabetes face psychological issues which may be part of the spectrum of disease experience, distinct from depression, which hinder glycemic control. Therefore, this study was planned to determine the prevalence of diabetes related distress, and its association with socio-demographic variables, treatment status, and glycemic control in adults with type 2 diabetes.

Materials and Methods: A cross-sectional study was conducted among diagnosed type 2 Diabetic patients residing in urban and rural field practice area of Government Medical College, Amritsar. Data was collected for a period of one year. Pre-tested, validated questionnaire Diabetes Distress Screening Scale 17 (DDS17) was used. Quantitative and Qualitative variables were compared using t-test and Chi-square test respectively. P value <0.05 was considered to be statistically significant.

Results: Overall, 18% of study participants were found to be distressed. Distress was slightly higher among urban study participants (21%) in comparison to rural study participants (15%) but this difference was not statistically significant. Significantly higher distress levels were observed among study participants who reported inadequate treatment, uncontrolled glycemic status and complications due to diabetes.

Conclusions: Diabetes related distress is associated with treatment status, glycemic status and complications due to diabetes. There is need to manage diabetes well and achieve glycemic control in all patients to reduce level of distress among them.

Keywords: Diabetes related distress, Glycemic control, Type II diabetes mellitus

Introduction

Globally, there has been a shift in the causes of illness and death from infectious diseases to non-communicable diseases (NCDs). This changing pattern has been attributed to the effects of an (ongoing) epidemiologic transition.1 In recent years, NCDs, such as cardiovascular diseases (CVD), diabetes, chronic obstructive pulmonary diseases (COPD) and cancers have become an emerging pandemic globally with disproportionately higher rates in developing countries.2

Diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or...
glucose), or when the body cannot effectively use the insulin, it produces. In 2016, WHO declared diabetes as the seventh leading cause of death and estimated 1.6 million deaths occurred directly due to diabetes.

In 2020, according to the International Diabetes Federation (IDF), 463 million people have diabetes in the world and 88 million of these live in Southeast Asia region. The prevalence of diabetes in India has risen from 7.1% in 2009 to 8.9% in 2019. Punjab is one of the prosperous and rich states of India with high rates of obesity and alcohol intake which are one of the major risk factors associated with diabetes. A state-wise STEP wise approach to NCD risk factor surveillance (STEPS) survey was conducted in 2014-2015 where the prevalence of diabetes was reported to be 8.3% in state.

Once a diabetic is always a diabetic but blood sugar levels can be controlled through day-to-day activities and adherence to medication. Therefore, following fixed day-to-day routines and making dietary modifications (avoidance of sweets, high glycemic index foods) brings in distress among the diabetics. Diabetes distress, a relatively new concept, is getting increasing attention these days. It implies far broader affective experience than major depressive disorder. A chronic disease comes with worries, concerns and fears, specifically emotional distress among individuals living with it.

There could be diabetes related conflict with loved ones and, strange relationship with health care individuals, making life more difficult. These emotional burdens and worries about diabetes, its management, threats of complications, and unmet needs of moral support from family, friends and health care providers have been recognized as diabetes distress. Keeping such factors in mind, this cross-sectional study was conducted to find the prevalence of diabetes related distress among diagnosed type 2 diabetic patients and it’s association with socio-demographic variables, treatment status, glycemic control and complications due to diabetes.

**Material and Methods**

This was a cross-sectional study conducted on already diagnosed patients of type 2 diabetes mellitus aged >40 years residing in field practice area (urban and rural) of Department of Community Medicine, Government Medical College, Amritsar. Patients with diabetes for period of ≥6 months were included in the study. Patients with type 1 diabetes, those suffering from any mental illness, hearing and speech impairment and those who failed to give written informed consent were not included. Time period for study was 1 year (1st March 2021 to 28th February 2022).

**Sample size and sampling technique**

Sample size was calculated using formula for single proportion: $N > Z^2 \times P \times (1-P)/D^2 \times \text{Deff}$ where $N$=required sample size, $Z = 1.96$, $P$ (proportion of interest) =0.08314 (prevalence of diabetes in Punjab was 8.3% in state-wise NCD STEP survey conducted in 2014-2015), $Q= 1-P = 0.917$, $D$ (absolute precision) =0.05, $\text{Deff}=$ design effect for cluster sampling =2. Assuming power of the study to be 80% and Confidence Interval of 95% the required sample size came out to be 234. Probability proportionate to size sampling (PPS) technique was used where each ward/village was considered to be cluster in itself. Assuming the non-response rate to be 10% for study population, sample size of 258 was calculated. In order to increase the validity of study, a total of 300 participants, 150 each from rural and urban area were included for this study.

**Data collection tool**

A pre-tested semi structured questionnaire was used to collect the sociodemographic data, medical history for complications, medications, glycemic control. To measure the distress associated with type 2 DM “Diabetes Distress Screening Scale (DDS17)” was used which consisted of 17 questions. Scoring for each question was done on a Likert scale which ranged from 1-6, where higher the score, higher was the problem/distress. Total score was calculated by summing up all the responses and this total score was divided by no. of items in the scale to get a mean item score. Study participants with mean item score of >3 were labelled as distressed. In this scale, 4 sub scale scores, each addressing a different kind of distress, i.e Emotional burden, Physician-related distress, Regimen-related distress and Interpersonal distress subscale were also calculated. Similar to the mean total score, mean sub-scale score were calculated by adding appropriate item responses and dividing this...
by number of items for each sub-scale. Mean item score for each sub-scale score of > 3 was considered as a level of distress worthy of clinical attention.

**Methodology**

Prior to selection of study participants, a house-to-house visit was made to identify the households with a diabetic patient and a line-list of all the households where a person having type 2 DM for > 6 months and aged > 40 years was made. From this line list, the required study participants of both urban and rural area were selected using Simple Random Sampling. During house-to-house visit, one to one interview was conducted with study participants after obtaining a written informed consent using study tool. If the selected participant failed to give consent or his/her house was found to be locked, a repeated attempt was made but if the study participants was not available on the second visit too, then immediately next participant in line list were included to complete the sample size.

**Operational definitions:**

- **Adequate treatment:** Patient is taking medication for diabetes from last 7 days and his/her RBS < 180mg/dl.

- **Inadequate treatment:** Patient is not taking medication for diabetes from last 7 days and/or his RBS is ≥ 180mg/dl.

- **Controlled diabetes:** if RBS < 180mg/dl.

- **Uncontrolled diabetes:** if RBS > 180mg/dl.

**Statistical Analysis**

Data was compiled using Microsoft Excel and analyzed using Epi-info 7 (CDC USA) freely available online. The distribution of categorical/nominal variables was represented through frequencies and proportions whereas, for continuous variables mean ± standard deviations were calculated. To find the association between different variables the relevant tests of significance were applied, i.e., chi-square for categorical/nominal variables and t-test for continuous variables. Chi-square test and t-test where p-value was less than 0.05 was considered to be statistically significant. If any of the expected cell value of <5 was found then Fisher’s exact test was used.

**Results**

Total 300 study participants were included in the present study, with equal representation from both urban and rural areas (150 each). Approximately three-fourth of study participants (74%) were aged between 50-69 years. 63% of study participants were females. Overall, majority (87 %) of rural study participants belonged to SC/BC/OBC whereas in urban area, majority (62%) of study participants belonged to general caste. Overall, majority of study participants followed Sikh religion (69%). Almost half (52%) of study participants lived in nuclear families. Majority were married (88%).71% of urban belonged to upper class (according to BG Prasad’s classification) whereas most of rural study participants belonged to middle class (40%).

![Figure 1: Distribution of scores of Diabetes Distress Scale 17 (DDS-17) and its subscales among study participants (N=300);](image-url)
The overall mean score of DDS-17 was found to be 1.96±0.85 (figure 1). Highest mean scores were found for Emotional burden subscale, i.e,2.16±1.05, which was followed by Regimen-related burden (2.09±0.99), Interpersonal distress (2.02±0.93) and least was found for Physician-related Distress (1.63±0.67). The scale and all subscales ranged from 1-10.

Table 1: Association of overall scores of Diabetes Distress Scale 17 (DDS-17) and its subscales with place of residence:

<table>
<thead>
<tr>
<th>Scores</th>
<th>Urban (n=150)</th>
<th>Rural (n=150)</th>
<th>(t)</th>
<th>(p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Burden</td>
<td>2.01±1.04</td>
<td>2.31±1.06</td>
<td>-2.55</td>
<td>0.005</td>
</tr>
<tr>
<td>Physician-related Distress</td>
<td>1.79±0.77</td>
<td>1.47±0.51</td>
<td>4.30</td>
<td>0.0001</td>
</tr>
<tr>
<td>Regimen-related Burden</td>
<td>1.99±1.00</td>
<td>2.19±0.99</td>
<td>-1.71</td>
<td>0.043</td>
</tr>
<tr>
<td>Interpersonal Distress</td>
<td>2±1.04</td>
<td>2.05±0.81</td>
<td>-0.43</td>
<td>0.333</td>
</tr>
<tr>
<td>Total scores</td>
<td>1.94±0.94</td>
<td>1.99±0.77</td>
<td>-0.48</td>
<td>0.315</td>
</tr>
</tbody>
</table>

Table 1 shows mean score of DDS-17 (Diabetes Distress Scale -17) which was 1.94 ± 0.94 and 1.99 ± 0.77 for urban and rural areas respectively. The scores of study participants ranged between 1-4 in urban and 1-3.58 in rural areas.

As far as subscale scores were concerned, Physician related distress was found to be significantly higher in urban participants (1.79 ± 0.77) whereas Emotional burden (2.31 ± 1.06) and Regimen-related burden (2.19 ± 0.99) scores were significantly higher among rural study participants.

Table 2: Association of Diabetes related Distress (according to DDS17) in study participants with socio-demographic profile

<table>
<thead>
<tr>
<th>Variables</th>
<th>Distressed (n=53)</th>
<th>Not distressed (n=247)</th>
<th>(\chi^2) (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>06(16)</td>
<td>32(84)</td>
<td>6.24 (0.100) df=3</td>
</tr>
<tr>
<td>50-59</td>
<td>10(11)</td>
<td>80(89)</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>31(24)</td>
<td>100(76)</td>
<td></td>
</tr>
<tr>
<td>≥70</td>
<td>06(15)</td>
<td>35(85)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14(12)</td>
<td>98(88)</td>
<td>2.73 (0.098) df=1</td>
</tr>
<tr>
<td>Female</td>
<td>39(21)</td>
<td>149(79)</td>
<td></td>
</tr>
<tr>
<td>Place</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>23(15)</td>
<td>132(85)</td>
<td>1.46 (0.225) df=1</td>
</tr>
<tr>
<td>Urban</td>
<td>30(21)</td>
<td>115(79)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sikh</td>
<td>43(21)</td>
<td>165(79)</td>
<td>4.96 (0.835) df=2</td>
</tr>
<tr>
<td>Hindu</td>
<td>06(09)</td>
<td>62(91)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>04(17)</td>
<td>20(83)</td>
<td></td>
</tr>
</tbody>
</table>
Overall, 18% of study participants were found to be distressed (i.e., having score ≥ 3 according to DDS 17). Diabetes related distress was not significantly associated with age, gender, place of residence, religion and socio-economic status (table 2).

Table 3: Association of distress among study participants according to various subscales of Diabetes related distress (DDS17) with place of residence (N=300):

<table>
<thead>
<tr>
<th>Distressed (According to subscales)</th>
<th>Urban (n=150)</th>
<th>Rural (n=150)</th>
<th>Total (N=300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Burden</td>
<td>31(21)</td>
<td>59(39)</td>
<td>90(30)</td>
</tr>
<tr>
<td>Physician-related Distress</td>
<td>16(11)</td>
<td>03(02)</td>
<td>19(06)</td>
</tr>
<tr>
<td>Regimen-related Burden</td>
<td>31(21)</td>
<td>41(27)</td>
<td>72(24)</td>
</tr>
<tr>
<td>Interpersonal Distress</td>
<td>31(21)</td>
<td>26(17)</td>
<td>57(19)</td>
</tr>
</tbody>
</table>

(χ² =17.87, p-value = 0.004, df=3)

(Figures in parenthesis are percentages)

Significantly higher proportion of rural study participants (39%) were found to be distressed for emotional burden subscale as compared to urban study participants (21%) (table 3).

Table 4: Association of Distress (according to DDS 17) with diabetes control among study participants (N=300):

<table>
<thead>
<tr>
<th>Variable</th>
<th>Distressed (n=53)</th>
<th>Not distressed (n=247)</th>
<th>χ² (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>10(09)</td>
<td>100(91)</td>
<td>7.87 (0.005)</td>
</tr>
<tr>
<td>Inadequate</td>
<td>43(23)</td>
<td>147(77)</td>
<td></td>
</tr>
<tr>
<td>Glycemic status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlled</td>
<td>11(08)</td>
<td>120(92)</td>
<td>12.62 (0.000)</td>
</tr>
<tr>
<td>Uncontrolled</td>
<td>42(25)</td>
<td>127(75)</td>
<td></td>
</tr>
<tr>
<td>Complications present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37(24)</td>
<td>118(76)</td>
<td>7.62 (0.005)</td>
</tr>
<tr>
<td>No</td>
<td>16(11)</td>
<td>129(89)</td>
<td></td>
</tr>
</tbody>
</table>

(Figures in parenthesis are percentages)

Significantly higher distress levels were observed among study participants who reported inadequate treatment, uncontrolled glycemic status and had complications due to diabetes (table 4).

Discussion

Once a diabetic is always a diabetic but blood sugar levels can be controlled through day-to-day activities and adherence to medication. Therefore,
following fixed day-to-day routines and making dietary modifications (avoidance of sweets, high glycemic index foods) brings in distress among the diabetics which is well proven by our study, where distress was assessed using Diabetes Distress Screening Scale (DDS17). The overall mean score of DDS-17 was found to be 1.96±0.85. Almost 1/5th (18%) study participants had a distress score of > 3, which was labelled as distressed. It was observed that distress was slightly higher among urban study participants (21%) in comparison to rural study participants (15%) but this difference was not found to be statistically significant. A slightly lesser proportion of distress has been reported by a study conducted in Kerala, where prevalence of distress was 13.3%.11 Whereas, similar results were reported from North India by Gahlan, et al, in which prevalence was 18% with highest scores in Emotional burden subscale.12 With DDS17, four subscales measured distress related to emotions, regimen, inter-personal relations and treating physician. In our study, highest scores were found for Emotional burden subscale, i.e., 2.16±1.05 and least was found for Physician-related Distress (1.63±0.67), with 90 (30%) study participants having score of ≥ 3 in Emotional burden subscale and 19 (06%) study participants having score of ≥ 3 in Physician-related Distress subscale.

As the rural study participants were less educated and awareness levels were even lesser, significantly higher proportion were found to be emotionally distressed in comparison to urban (39% v/s 21%). On the contrary, in spite of wider network of physicians in urban areas, physician related distress was higher among urban study participants (11%). Higher levels of inter-personal distress (21%) among urban population could be explained by loose families ties among them. As the availability of treatment modalities in rural area is lesser, this led to increase in regimen-related distress (27%). Inadequate treatment (23%) and poor glycemic control (25%) were found to be associated with higher levels of distress. Subconsciously, diabetics are aware that uncontrolled glucose levels and inadequate treatment would result in complications related to the disease. Due to the same reason, distress levels were higher among those with complications (24%). Complications usually occur due to end-organ/vital organ damage which further increases distress. With increase in complications, treatment costs increases and emotional burden increases which further contributes to distress. A study conducted by Gahlan also proves the association of poor glycemic control with higher Diabetes distress.12 Significant association was also found between distress and diabetes related complications in other study conducted by Fisher.13

**Conclusion**

Distress among study participants was assessed using DDS-17(Diabetes Distress Scale -17) where overall, 18% of study participants were found to be distressed (i.e., having score > 3 according to DDS 17). Distress was slightly higher among urban study participants (21%) in comparison to rural study participants (15%) but this difference was not found to be statistically significant. Using various subscales of DDS-17, it was found that significantly higher proportion of rural study participants (39%) were found to be distressed for emotional burden subscale as compared to urban study participants (21%). Proportion of distress for subscales for Physician-related Distress and Interpersonal distress were relatively higher among urban study participants (11% and 21%) whereas for Regimen-related burden, distress was found to be higher among rural study participants (27%). Significantly higher distress levels were observed among study participants who reported inadequate treatment (23%) and 25% of those having uncontrolled glycemic status were found to be distressed whereas distress levels were only 8% with controlled glycemic status. Distress levels were found to be significantly higher among those having complications (24%) as compared to those who didn’t report any complications (11%).

**Conflict of interest:** the authors declare that there is no conflict of interest

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**Ethical clearance:** from Institutional Ethics Committee (IEC) vide letter no. 3367/D-26/2020
References


