



## “DIABETES MELLITUS: ITS ASSOCIATION WITH STRESS IN RURAL FIELD PRACTICE AREA OF A TERTIARY HEALTH CARE CENTER”

### Community Medicine

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### ABSTRACT

**Background:** Type 2 diabetes is associated with significant morbidity and mortality. There is a clear need to identify additional risk factors for chronic disease prevention. Stress is playing key role in many non-communicable diseases. The aim of this study was to determine association with stress in rural field practice area of a tertiary health care center. **Methodology:** It is a community based cross-sectional analytical study on sample size of 300 adults. Blood sugar level detection was performed in two steps; first by capillary random blood sugar level detection and then by Two hours post load capillary plasma glucose after 75 g oral glucose using glucometer. Stress assessment was done using PSS (Perceived Stress Scale). **Result:** 53 (17.7%) study participants were found diabetic. Present study reported that 16.3% of study participants were having severe stress and 38.7% were having moderate stress. **Conclusion:** Diabetes with stress is a growing public health problem amongst adult population. Present study reported that perceived stress was an important factor which had to be taken care of during management of Diabetes mellitus.

### KEYWORDS

Diabetes Mellitus, Stress, Perceived Stress Scale, Rural area

### INTRODUCTION

Diabetes Mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. Several distinct types of DM are caused by a complex interaction of genetics and environmental factors<sup>1</sup>.

In India, there are estimated 77 million people above the age of 18 years are suffering from diabetes (type 2) and nearly 25 million are prediabetics (at a higher risk of developing diabetes in near future)<sup>2</sup>. More than 50% of people are unaware of their diabetic status which leads to health complications if not detected and treated early. Adults with diabetes have a two- to three-fold increased risk of heart attacks and strokes. Combined with reduced blood flow, neuropathy (nerve damage) in the feet increases the chance of foot ulcers, infection, and the eventual need for limb amputation. Diabetic retinopathy is an important cause of blindness. Diabetes is among the leading causes of kidney failure<sup>2</sup>.

**Stress & Diabetes** - Stress stimulates the release of various hormones, which can result in elevated blood glucose levels. Although this is of adaptive importance in a healthy organism, in diabetes, as a result of the relative or absolute lack of insulin, stress-induced increases in glucose cannot be metabolized properly<sup>3</sup>.

Symptoms of stress includes psychological Symptoms like difficulty in remembering, concentrating, difficulty in taking decisions, constant worrying, inability to relax and feeling lonely. Physical Symptoms like aches and pains, digestive symptoms like diarrhoea or constipation or nausea or increased heart rate. Behavioural Symptoms like changes in appetite, changes in sleep pattern, increased use of alcohol or other substances.

Stress can be acute or chronic. Both can cause a wide range of side effects, but chronic stress can have bad long-term effects on one's health. Glucocorticoids (GC) and catecholamines are the main hormonal response to stress. These hormones do not cause side effects in the acute phase but in the long run may lead to disturbed glucose homeostasis. This disturbed glucose homeostasis can lead to chronic hyperglycaemia, thus leading to insulin resistance and type II diabetes<sup>4</sup>.

### Objectives:

1. To estimate prevalence of diabetes mellitus among adults in rural field practice area of a tertiary health care center
2. To assess stress in rural population and association of diabetes mellitus with stress.

### Methodology:

It is a community based cross-sectional analytical study. It was carried out at the rural area under RHTC (Rural Health Training Centre) of a tertiary health care center. Total population of field area of this RHTC

is 5043. Total Families covered under all 5 Anganwadi are 841 and the adult population is 3535.

All adults (previously diagnosed and undiagnosed Diabetes mellitus) residing in rural field practice area and willing to participate in the study were included. Those critically ill, pregnant females and those who did not give consent were excluded from the study. This study was conducted from November 2021 to October 2022.

Ethical permission was granted from ethical committee of parent medical college dated 21/10/2021. Informed written consent was obtained from each study participant.

Sample size was calculated taking prevalence of diabetes mellitus in rural Rajasthan as reported in NFHS-4. Prevalence of diabetes mellitus in rural Rajasthan as per NFHS-4 is 3.3 for women and 5.7 for men. So, average 4.5 was considered for calculation. Calculated sample size was 278 taking 95% confidence interval and 2.5% allowable error, which was rounded off to 300<sup>5</sup>.

Sampling procedure<sup>6</sup> - Desired sample size was collected from each of the 5 Anganwadis of tertiary health care centre.

- Total Families = 841 (3535 adult population)
- As desired sample size is 300, study participants were selected from each of the Anganwadi
- We chose 60 participants from each Anganwadi by simple random sampling by chit method
- Selection of study participants by applying inclusion & exclusion criteria
- If study participant were not fulfilling inclusion criteria and their houses were locked then we skipped that participant and picked up another chit for next study participant.

Aim and objectives of the study were explained to individual participant in local language during house visit and then written consent was obtained from them. The baseline data was collected from those persons who were aged 18 years and above. Participants were personally interviewed with predesigned and pretested proforma. This was followed by a detailed clinical examination, anthropometric measurements, and investigations. Stress assessment was done using PSS (Perceived Stress Scale).

Initially capillary random blood sugar level was done for all study participants. On next day, participants with RBS  $\geq 140$  mg/dl were revisited for second and confirmatory test. Two hours post load capillary plasma glucose after 75 g oral glucose was done to confirm diabetes. Those having blood sugar level  $\geq 220$  mg/dl were labelled as diabetics<sup>6</sup>.

Mass screening programmes have used glucose measurements of

fasting (FPG), postprandial or random blood sample. The fasting value alone is considered less reliable since true fasting cannot be assured and spurious diagnosis of diabetes may more readily occur. IDF (International Diabetes Federation) has mentioned that using FPG alone may result in up to 25% of true diabetic cases being missed.<sup>7</sup>

As per guidelines of 'National programme for control and prevention of cardio-vascular diseases, diabetes, cancer and stroke,' random blood sugar of 140 mg/dl and above is recommended as initial screening test for referral and treatment. For confirmation of diabetes and epidemiological purposes, the 2-hour value after 75 g oral glucose is considered ideal.<sup>8</sup>

## Study tools

### 1. Proforma

A pre-designed and pre-tested proforma was filled by investigator to obtain information about demographic and socio-economic variables.

### 2. PSS (Perceived Stress Scale)<sup>9</sup>

The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The questions in this scale ask about our feelings and thoughts.

Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.

- Scores ranging from 0-13 are considered mild stress.
- Scores ranging from 14-26 are considered moderate stress.
- Scores ranging from 27-40 are considered severe perceived stress.

**3. Glucometer<sup>10</sup>** - For testing Random Blood Sugar (RBS) of all participants and 2 hours post-load capillary blood glucose after 75 g oral glucose.

## RESULTS:

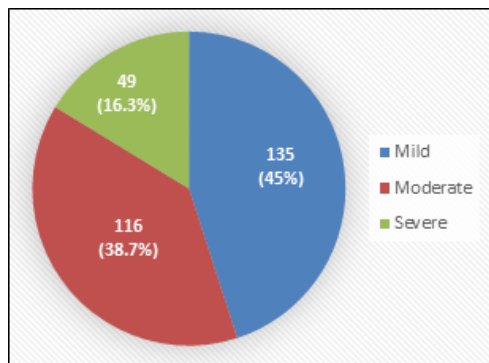
A total of 300 adults were studied in the present study. Table 1 shows that 127 (42.4%) of the study participants were female and 173 (57.6%) were male. 61.4% of females and 39.9% of males belonged to middle age group (36-49 years). Minimum age of study participants was 18 years and maximum age of study participants was 78 years. Mean age of study participants was 45.9 years.

**Table – 1 Distribution Of The Study Participants Based On Age And Gender**

| Age in years | Male        |        | Female      |        | Total       |        |
|--------------|-------------|--------|-------------|--------|-------------|--------|
|              | Numbers (N) | % (N%) | Numbers (N) | % (N%) | Numbers (N) | % (N%) |
| 18-35        | 44          | 25.4   | 12          | 9.4    | 56          | 18.7   |
| 36-49        | 69          | 39.9   | 78          | 61.4   | 147         | 49.0   |
| 50 & above   | 60          | 34.7   | 37          | 29.2   | 97          | 32.3   |
| Total        | 173         | 100.0  | 127         | 100.0  | 300         | 100.0  |

### Prevalence Of Diabetes Mellitus -

Out of total 300 study participants, 53 (17.7%) study participants were found diabetic whereas 247 (82.3) study participants were non-diabetic. Out of 53 study participants who were found diabetic in the current study, newly diagnosed cases and known case of Diabetes were respectively 32 (60.4%) and 21 (39.6%). Prevalence of Diabetes mellitus was found 17.7%.



**Figure – 1 Distribution of study participants based On PSS**

According to the Perceived Stress Scale (PSS), 16.3% of study participants reported experiencing severe stress, while 38.7% and 45%

reported moderate and mild stress, respectively as shown in Figure 1

**Table – 2 Association Of Stress With Diabetes Mellitus**

| Stress assessed by PSS | Non- Diabetic N (N%) | Diabetics N (N%) | Total N (N%) | $\chi^2$ (p-value) |
|------------------------|----------------------|------------------|--------------|--------------------|
| Mild                   | 130 (96.2)           | 5 (3.8)          | 135 (100.0)  | 32.928 (<0.0001)   |
| Moderate               | 86 (74.1)            | 30 (25.9)        | 116 (100.0)  |                    |
| Severe                 | 31 (63.2)            | 18 (36.8)        | 49 (100.0)   |                    |
| Total                  | 247                  | 53               | 300          |                    |

It was observed from above table that, association of Perceived Stress and Diabetes mellitus observed in the study was statistically significant (p value < 0.0001).

## DISCUSSION –

In present study we found, out of total 300 study participants, 53 (17.7%) study participants found diabetic whereas 247 (82.3) study participants found non-diabetic. Study conducted by Zuhara NVF et al.<sup>11</sup>, in Malappuram, Kerala among 798 adults in the age group of 25 to 75 year, found the prevalence of diabetes to be 22.4 %. Other Study conducted by Zaman FA et al.<sup>12</sup>, in the rural field practice area among 1370 participants of age 20 years and above found the prevalence of diabetes to be 19.78%.

Strikingly, current study could identify 32 hidden cases of diabetes, which were then streamlined further for proper management. It was observed from present study, out of 53 diabetics, 18 (33.9%) were having severe stress and 30 (56.6%) were having moderate stress. The Association of Perceived Stress and Diabetes mellitus observed in the study was statistically highly significant. Bhandary B et al.<sup>13</sup> conducted a study on the effect of perceived stress and family functioning on people with Type 2 diabetes mellitus, found significant association between stress levels with Diabetes mellitus (p-value - 0.001). In other study conducted by Kaur G et al.<sup>14</sup> on Depression, anxiety and stress symptoms among diabetics in Malaysia, found significant association between high / very high stress levels in females with Diabetes mellitus (p-value - 0.035). A study conducted by Riaz A et al.<sup>15</sup> on daily stress and glycemic control in Type 1 diabetes found significant association between stress levels with Diabetes mellitus.

### Limitations –

The sample size was small as a result of absolute precision used for calculation of sample size. Reasons for using absolute precision in this study were to reduce cost and to minimize time to complete the study in consideration with time and cost constraints. Further studies can be done on larger population with multicentric approach.

Venous blood samples were not collected for testing sugar level to avoid apprehension among study participants. Though capillary blood samples were taken, appropriate WHO guidelines were followed for classification.

## CONCLUSION –

Present study reported that perceived stress was an important factor which had to be taken care of during management of Diabetes mellitus, as 36.8% of study participants were having severe stress and 25.9% were having moderate stress. Diabetes was significantly associated with moderate and severe stress.

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