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Original Research Article

Stress and Diabetes Mellitus

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ABSTRACT

Diabetes mellitus (DM) is a metabolic disease characterized by chronic hyperglycemia that results from an alteration of the secretion or action of insulin. Modern lifestyle including unhealthy diet, a sedentary lifestyle and stress contribute to T2DM occurrence and development.
The present study has been conducted on 100 clinically diagnosed diabetic patients residing in different localities of Jammu and was visiting Government Medical College /Hospital, Jammu for the treatment of the disease to observe the gender wise prevalence of diabetes among selected patients, occurrence of stress among diabetic patients and also to assess the cause of their stress. The present study results indicate the occurrence of diabetes is more common among females (59.00 per cent) than males (41.00 per cent) and that too in the age group of 40-50 years. The mean age of female and male diabetics was found to be 46.74 and 49.56 respectively. Majority of the diabetics (74.00 per cent) were found to be under stress because of one or the other reasons such as job, money, health, spouse, family while the family issues being the most common cause of their stress.

Keywords: Diabetes Mellitus, metabolic disease, Stress, Depression, Anxiety

INTRODUCTION

Diabetes mellitus is the complicated metabolic disorder represented by severe hyperglycemia resulting due to defects in insulin secretion, insulin action or both. [1] The age standardized occurrence of diabetes globally, was found to be 9.8 per cent in men and 9.2 per cent in women with observed regional inequality. As a result of this, there is higher prevalence of diabetes observed among south Asia, Latin America, The Caribbean, Central Asia, North Africa and the Middle-East. [2] It is estimated that 20% of global burden of DM resides in South East Asia Region (SEAR) area, is likely to triple by 2025 increasing from present estimates of about 30 million to 80 million. In observational and intervention studies obesity and physical inactivity represent the most important modifiable risk factors for DM. [3] It was estimated to 5 – 10 per cent and its incidence among individuals have increased from 153 million in 1980, [2] to 366 million in 2011 which may be further risen to 552 million in the year 2030. [4] It is found that the occurrence of type 2 diabetes and other cardiovascular disease risk factors may increasingly become vigorous among the low socio economic groups in India. [5] A recent meta-analysis of 23 case control and cohort studies and 43 measures of SES diabetes association showed an overall higher risk for T2DM for low SES based on education, Occupation and Income. [6] It is observed that the people who doing manual work for long hours and those who have done low socioeconomic status jobs are highly prone to develop risk of cardiovascular diseases than those who are doing high socioeconomic status (SES)

Jobs. [7] According to International Diabetes Federation Report 2013, it is suggested that 382 million people had diabetes with higher number of them belonging to age group 40-59 years and at about 5.1 million deaths are caused due to diabetes, of which half were of below 60's individuals. [8] It is a social bond and is pillar mechanism for many adults but its detachment either by widowhood, divorce is also common. Married individuals are sharing healthy and supportive environment that increases capacity to regulate and induce good physical and mental health than that of their unmarried companions. [9] It is evident that never entering marriage or marital stoppage by death is responsible for increasing risk of premature mortality and cardiovascular, disease with more marked effect among men. [10] Results of longitudinal studies suggest that not only depression but also general emotional stress and anxiety, sleeping problems, anger, and hostility are associated with an increased risk for the development of type 2 diabetes. [11] There is a well recognized association between diabetes, depression, anxiety and stress and evidence showed that chronic illnesses usually have co-morbid unrecognized mental health disorders. Although depression, anxiety, tension and stress are most commonly undiagnosed or underestimates among DM patients. Several authors have reported that patients with diabetes are at least twice at risk to suffer from depression, anxiety and stress compared to the general population. Multivariable logistic regression analysis based on Turkish population diabetic patients statistical analysis revealed that blood pressure, depression, anxiety, stress, physical inactivity, income, family history of diabetes and sleeping disturbance were significant risk factors for metabolic glycemic control. [12] A huge number of depressed patients are sickened from high degree of diabetes-specific emotional stress. [13,14] The consequences of stress on the endocrine system bring changes in the glucose metabolism processes. Stress in some cases may be beneficial while chronic stress cause insulin resistance and hyperglycemia.[15] The dopamine catecholamine is the most important neurotransmitter and its sustained stimulation is harmful and may lead to hyperglycemia. [16,17] Inspire of it, stress is related with the release of various hormones like cortisol and energy mobilization hormones. The cortisol hormone counteracts with insulin and thus increasing glucose production by hepatic gluconeogenesis and by preventing the peripheral utilization of glucose [18] and leads to the development of metabolic syndrome such as obesity, insulin resistance [19] and the early determination of stress and related disturbances helps to control diabetes. [20] Thus the present study has been planned to observe the gender wise prevalence of diabetes among selected patients, occurrence of stress among diabetic patients and also to assess the cause of their stress.

MATERIALS AND METHODS

The present study has been conducted on 100 clinically diagnosed diabetic patients residing in different localities of Jammu and was visiting Government Medical College /Hospital, Jammu for the treatment of the disease. The questionnaire was developed to collect the information on demographic profile of diabetic patients which included age, occupational status, educational status, total monthly family income and family type of the patient. Information was also collected regarding gender wise prevalence of diabetes, occurrence of stress among diabetics, and the cause of their stress. The collected information has been recorded on the pre-printed proforma for each patient.

Statistical Analysis

The data thus collected has been put to statistical analysis including Mean, Standard deviation (SD), Chi-square test and Pearson's correlation coefficient to compare the occurrence of diabetes and stress among male and female diabetic patients.

RESULTS AND DISCUSSION

Table 1 reveals that majority of the clinically diagnosed diabetic patients selected for the present study were females i.e. 59.00 per cent while 41.00 per cent of them were males and this distribution has been found to be statistically significant.

Table1: Distribution of selected patients on the basis of their Gender.

Gender	Total No. of Patients
Females	59 (59.00)*
Males	41(41.00)
Total	100 (100.00)
Chi-square value = 5.18 p<0.05 Significant	

*Figures in parentheses indicate percentage.

Thus, the occurrence of diabetes is more common among females (59.00 per cent) than males (41.00 per cent) and these findings are in tuned with the findings of other researchers who also reported greater prevalence of diabetes among females (8.3 per cent) than males (3.6 per cent). [3] However, it was found that there is greater prevalence of diabetes (55.5 per cent) among males than the females (45.5 per cent). [21]

Table 2 reveals that majority of the diabetic patients i.e. 42.00 per cent were belonging to 50-60 years of age and 37.00 per cent of them were belonging to 40-50 years of age. 16.00 per cent were belonging to 30-40 years of age, while 3.00 per cent of them were belonging to 60-70 years of age. Only 2.00 per cent were belonging to 20-30 years of age. Among males, the majority of diabetic patients i.e. 46.34 per cent were belonging to 50-60 years age group and 31.71 per cent were belonging to 40-50 years of age. 17.07 per cent were belonging to 30-40 years age group. 4.88 per cent were belonging to 60-70 years of age.

Table2: Distribution of selected patients according to their Age.

Age Groups (Yrs)	Total No. of Patients	Males	Females	r-value
20-30	2	0(0.00)	2(3.39)	-0.32627
30-40	16	7(17.07)	9(15.25)	
40-50	37	13(31.71)	24(40.69)	
50-60	42	19(46.34)	23(38.98)	Non-significant
60-70	3	2(4.88)	1(1.69)	
Total	100	41(100.00)	59(100.00)	
Chi-square value =6.78 p<0.05 Significant				

None of the males were belonging to 20-30 years of age. Among females, the majority of diabetic patients i.e. 40.69 per cent were belonging to 40-50 years of age and 38.98 per cent of them were belonging to 50-60 years of age. 15.25 per cent of female patients were belonging to 30-40 years of age while 3.39 per cent were belonging to 20-30 years of age. Only 1.69 per cent of females were belonging to 60-70 years of age. The chi-square value shows the statistically significant association between the age of diabetic males and females. While the Pearson's coefficient of correlation (r) for the age of diabetic males and females was found to be statistically non-significant.

The mean value for the age of male diabetic patients has been found to be 49.56±9.33 years while that among female diabetics has been found to be 46.74±8.10 years. This difference between the age of males and females has been found to be statistically non -significant.

Table 3: Mean value of Age among diabetic male and female patients.

Variable	Males		Females		Difference	p-value
	Mean	SD	Mean	SD		
Age	49.56	9.33	46.74	8.10	2.82	Non-significant

Thus, it is indicated from the present study results that the occurrence of diabetes is increasing with advancing age, majority being affected between 50-60 years of age. It has been reported that people in their 40's are more prone to develop T2DM. [22]

It is observed from table 4 that majority of diabetic patients i.e. 89.00 per cent were married and 7.00 per cent of them were widowed. 2.00 per cent of patients were unmarried while the rest 2.00 per cent were divorced. Among males, the majority of patients i.e. 97.56 per cent were married and 2.44 per cent were unmarried. None of the male patients were widowed or divorced. Among females, the majority of patients i.e. 83.06 were married. 11.86 per cent of them were widowed. 3.39 per cent of females were divorced while the remaining 1.69 per cent was unmarried. The chi - square value reflects the statistically non-significant association between the marital status of male and female diabetic patients.

Table 4: Distribution of selected diabetic patients on the basis of their Marital Status.

Marital Status	Total No. of Patients	Males	Females
Married	89	40(97.56)	49(83.06)
Unmarried	2	1(2.44)	1(1.69)
Widowed	7	0(0.00)	7(11.86)
Divorced	2	0(0.00)	2(3.39)
Total	100	41(100.00)	59(100.00)
Chi-square value =1.94 p<0.05 Non-Significant			

It can be thus concluded from the present study that the occurrence of diabetes is higher among married patients. Similar type of findings has been reported by other investigators who also found that the prevalence of diabetes was greater among married individuals. [23] It is depicted from Table 5 that majority of the diabetic patients (59.00 per cent) were belonging to joint families while 41.00 per cent of them were belonging to nuclear families. Among males, the majority i.e. 68.29 per cent were belonging to joint families and the rest 31.71 per cent were belonging to nuclear families. Among females also, the majority of diabetics (52.54 per cent) were belonging to joint families while 47.46 per cent of them were belonging to nuclear families. The chi -square value shows the statistically non-significant association between the family type among male and female diabetic patients.

Thus, it is revealed from the present study results that majority of diabetic patients were living in joint families. However, It was reported that majority of the diabetic respondents were belonging to nuclear families. [24]

Table 5: Distribution of selected diabetic patients on the basis of their Family Type.

Family Type	Total No. of Patients	Males	Females
Joint	59	28(68.29)	31(52.54)
Nuclear	41	13(31.71)	28(47.46)
Total	100	41(100.00)	59(100.00)
Chi-square value =3.41 p<0.05 Non-significant			

Table 6 depicts that majority of diabetic patients i.e. 32.00 per cent were qualified up to matric level and 24.00 per cent of them were qualified upto 10+2. 20.00 per cent patients were illiterate while 16.00 per cent were graduates. There were 6.00 per cent of the diabetic patients who had done post-graduation and 2.00 per cent patients were diploma holders. Among males, majority of patients i.e. 34.14 per cent were qualified up to matric level. 26.83 per cent of diabetics were qualified up to 10+2. 17.07 per cent patients were illiterate while 9.76 per cent patients were graduates. There were 9.76 per cent of the diabetic patients who had done post-graduation and 2.44 per cent of them were diploma holders. Among females, majority of patients i.e. 30.57 per cent were qualified up to matric level. 22.03 per cent were qualified up to 10+2. 22.03 per cent female patients were illiterate and 20.34 per cent of them were graduates. There were 3.39 per cent of the diabetic patients who had done post-graduation. The rest 1.69 per cent patients were found to be diploma holders. The chi-square value shows the statistically non – significant association between the educational status of male and female diabetics.

Table 6: Distribution of selected diabetic patients on the basis of their Educational Status.

Educational Status	Total No. of Patients	Males	Females
Illiterate	20	7(17.07)	13(22.03)
Matric	32	14(34.14)	18(30.52)
10+2	24	11(26.83)	13(22.03)
Graduate	16	4(9.76)	12(20.34)
Post-graduate	6	4(9.76)	2(3.39)
Diploma holder	2	1(2.44)	1(1.69)
Total	100	41(100.00)	59(100.00)
Chi-square value = 4.12 p<0.05 Non-significant			

Thus, it has been observed from the present study results that with increase in the level of education the prevalence of diabetes decreases that may be because of increased awareness of the patients regarding disease management and the present study findings are in tuned with the observations of study undertaken by other investigator also reported greater prevalence of T2DM among individuals having lower educational qualifications. [25]

It has been observed from Table 7 that majority (50.00 per cent) of the diabetic patients were skilled workers (Electrician, carpenter, painter, plumber, tailor, beautician, Asha workers, daily wagers, farmers) and 25.00 per cent of them were professionals (Engineer, doctor, lawyer, physician, Tehsildar, Belt force Officers, Chairman, Veterinarians). 12.00 per cent patients were un-skilled workers (Dish washers, sanitary workers, Peon). 8.00 per cent of them were semi-professionals (Nurses, social worker, teacher, librarian) and 3.00 per cent of them were doing clerical job (clerk, secretaries) while the rest 2.00 per cent were shop-owners.

Table 7: Distribution of selected diabetic patients on the basis of their Occupational Status.

Occupation	Total No. of Patients	Males	Females
Professional	25	13(31.71)	12(20.35)
Semi-Professional	8	5(12.19)	3(5.08)
Clerical	3	2(4.88)	1(1.69)
Shop-Owner	2	1(2.44)	1(1.69)
Skilled	50	15(36.59)	35(59.33)
Un-Skilled	12	5(12.19)	7(11.86)
Total	100	41(100.00)	59(100.00)
Chi-square value =8.51 p<0.05 Significant			

Among males, majority of the patients i.e. 36.59 per cent were skilled workers and 31.71 per cent were professionals. 12.19 per cent patients were semi- professionals while another 12.19 per cent were un-skilled workers. 4.88 per cent of the diabetic patients were doing clerical job while the rest 2.44 per cent were shop-owners. Among females also majority (59.33 per cent) of the diabetic females were skilled workers and 20.35 per cent of them were professionals. 11.86 per cent of the diabetic females were un- skilled workers and 5.08 per cent were semi-professionals. While 1.69 per cent of the female diabetics were doing clerical job and the rest 1.69 per cent were shop-owners. The chi-square value shows the statistically significant association between the occupation of male and female diabetic patients.

Therefore, it has been found from the present study observations that majority of diabetic patients were skilled workers and among them majority were females, while the male diabetics in majority were doing professional job. It is observed that people who were doing manual work for long hours and have done low socioeconomic status jobs are highly susceptible to develop risk of CVD diseases. [7]

Table 8: Distribution of selected diabetic patients on the basis of Total Monthly Family Income.

Total Monthly Family Income (In Rs)	Total No. of Patients	Males	Females
1,000- 10,000	25	15(36.58)	10(16.95)
10,000-20,000	41	10(24.39)	31(52.54)
20,000-30,000	13	6(14.63)	7(11.87)
30,000-40,000	3	1(2.44)	2(3.39)
More than 40,000	18	9(21.96)	9(15.25)
Total	100	41(100.00)	59(100.00)
Chi-square =7.09 p<0.05 Significant			

It has been shown from Table 8 that majority of the diabetic patients i.e. 29.00 per cent had their total monthly family income between Rs 10,000-20,000 while 25.00 per cent of them had income between Rs 1,000-10,000. 18.00 per cent patients had total monthly family income greater than Rs 40,000 while the rest 13.00 per cent of them had family income in between Rs 20,000-30,000.Only 3.00 per cent patients had their family income in between Rs 30,000-40,000. Among males, majority (36.58 per cent) had their total monthly family income between Rs 1,000-10,000 and 24.39 per cent of them had income between Rs 10,000-20,000. 21.96 per cent patients had family income greater than Rs 40,000 while 14.63 per cent patients had income in between Rs 20,000-30,000. The remaining 2.44 per cent were having family income in between Rs 30,000-40,000. Among females, maximum number of patients i.e. 52.54 per cent had their total monthly family income between

Rs 10,000-20,000 and 16.95 per cent of them had income between Rs 1,000-10,000. 15.25 per cent patients had more than Rs 40,000 income while 11.87 per cent of them had in between Rs 20,000-30,000. Only 3.39 per cent of the diabetic females had family income between Rs 30,000-40,000. The chi-square value indicates the statistically significant association between total monthly family income among male and female diabetic patients.

Thus, it is analyzed from the present study results that majority of diabetic patients were belonging to those families who had monthly family income in between Rs 10,000-20,000 and among them majority were females. However, majority of male patients were belonging to families having family income in between Rs 1,000-10,000.

Table 9: Distribution of selected diabetic patients on the basis of Occurrence of Stress among Them.

Stress	Total No. of Patients	Males	Females
Yes	74	24(58.54)	50(84.75)
No	26	17(41.46)	9(15.25)
Total	100	41(100.00)	59(100.00)
Chi-square value =7.16 p<0.05 Significant			

It has been observed from Table 9 that majority of the diabetic patients i.e. 74.00 per cent were living under stress while another 26.00 per cent of them were not having any sort of the stress. Among males, majority of the patients i.e. 58.54 per cent reported to be living under stressful conditions while 41.46 per cent of them reported that they were leading stress free life. Among females also majority (84.75 per cent) had been found to be living under stress while 15.25 per cent of them revealed that they were not living stressful life. The chi-square value reflects the statistically significant association between occurrence of stress among both male and female diabetic patients.

Thus, it is analyzed from the present study results that 74.00 per cent of diabetics were living under stressful conditions.

Table 10 depicts that majority of the diabetic patients i.e. 50.00 per cent of patients were taking stress regarding their family issues. 22.98 per cent of them were under stress because of financial issues. 18.91 per cent of the patients were under stress due to their own health conditions followed by 6.76 per cent patients who were living under stress because of their spouse. Only 1.35 per cent patients were living under stress due to their job. Among males, majority of patients i.e. 37.50 per cent of patients were taking family stress followed by 33.33 per cent patients who reported stressful life due to financial crunch in their family. 25.00 per cent of patients were under stress due to their health and 4.17 per cent of them were stressed because of their spouse. None of the male patients were taking stress of their job.

Table 10: Distribution of selected diabetic patients on the basis of Cause of their Stress.

Cause Of Stress	Total No. of Patients	Males	Females
Job	1(1.35)	0(0.00)	1(2.00)
Family	37(50.00)	9(37.50	28(56.00)
Spouse	5(6.76)	1(4.17)	4(8.00)
Financial issues	17(22.98)	8(33.33)	9(18.00)
Health	14(18.91)	6(25.00)	8(16.00)
Total	74(100.00)	24(100.00)	50(100.00)
Chi-square value =6.53 p<0.05 Significant			

Among females also majority of patients i.e. 56.00 per cent were taking family stress while 18.00 per cent patients were taking stress due to financial reasons. 16.00 per cent of patients were taking stress due to their health. 8.00 per cent of the female diabetics were under stress because of their spouse. Only 2.00 per cent patients were living under stress of their job. The association between cause of stress taken among male and female diabetic patients has been found to be statistically significant.

It has been observed from the present study that majority of the diabetic patients both males and females were living under stress. The percentage of females outnumbers the percentage of males, prevalence of stress being found among 84.75 per cent females and 58.54 per cent males.

CONCLUSIONS

The prevalence of diabetes was found to be more among females than males

that too in the age group of 40-50 years. The mean age of female and male diabetics was found to be 46.74 and 49.56 respectively. The vogue of T2DM was found to be higher among the married living in joint family setup having lower educational qualifications i.e. upto matric, and were skilled workers such as Electrician, carpenter, plumber, tailor, beautician, farmers, Asha workers and daily wagers. The preponderance of diabetes was found to be greater among females than males on the basis of their total monthly family income. Majority of the diabetic patients were in stress because of one or the other reasons such as job, financial reasons, health, spouse, family while the family issues being the most common cause of their stress.

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