

# Prevalence and Factors Influencing Depression among Adolescents with Type-1 Diabetes – A Cross-Sectional Study.

Bhavana Naruboina<sup>1</sup>, Kulkarni Praveen<sup>1</sup>, Nagaraj Rashmi<sup>2</sup>

## ABSTRACT

**Background:** Type 1 diabetes is the third most common paediatric endocrine disease. India accounts for most of the adolescents with T1DM in South-East Asia. Adolescents with diabetes are at higher risk of developing several psychological disorders due to the psychosocial stress posed by the condition. Depression is the commonest among these illnesses and necessitates active and early detection by screening strategies. **Materials and Methodology:** This Hospital Based Cross sectional study was conducted for the period of six months. All the Adolescents with Type 1 Diabetes visiting the hospital during the study period were included. Details regarding socio-demographic characteristics, diabetes and glycemic status were collected in a pre tested structured questionnaire by interview technique. Symptoms suggestive of depression were collected using Patient Health Questionnaire – 9 (PHQ-9). **Results:** Among 30 Adolescents with Type 1 Diabetes included in the present study, majority, 18 (60%) were in the age group of less than 14 years and 20 (66.7%) were females. The magnitude of depression among the study subjects was 18 (60%) of which majority of the subjects 12 (80%) were having mild depression. There was a significant association between depression and uncontrolled glycemic status, higher dosage of insulin intake and not strictly following the dietary practices. **Conclusion:** There was a high burden of depression in adolescents with type 1 diabetes. There was a significant relationship between the preventable factors like glycemic control and dietary practices with depression.

**Key words:** Adolescents, Type 1 Diabetes Mellitus, Depression, Phq-9, Glycaemic Status.

## INTRODUCTION

Type-1 Diabetes Mellitus, “still a poor cousin of Type-2 Diabetes Mellitus (T2DM)”, is the third commonest pediatric endocrine disease.<sup>1</sup> T1DM probably accounts for 5 to 10% of all diagnosed diabetes. About 40 to 60% of persons with T1DM are younger than 20 years of age at the onset, thus making diabetes one of the most common chronic diseases of childhood. The worldwide prevalence of T1DM is 0.1 to 0.3%, with 78,000 new cases every year, especially among young individuals (<5 years). Around 79,100 adolescents under 15 years of age are estimated to develop T1DM annually worldwide.<sup>2</sup>

According to International Diabetic Federation (IDF), India accounts for most of the adolescents with T1DM in South-East Asia. On an average 3 new cases of T1DM/100,000 adolescents of 0-14 years are reported from our country annually.<sup>3</sup>

Adolescents with diabetes are in an unenviable situation; on one hand they confront developmental changes and problems, and on the other hand they are trying to learn and improve the control over diabetes, in order to achieve desired quality of life.<sup>4</sup> Various phenomenological studies using conversational interview reveal that median scores of anxiety, depression and total distress are significantly higher in

adolescents with type 1 diabetes mellitus indicating worse psychological adjustment.<sup>1</sup>

Major depressive disorders and subclinical depressive symptomatology are more common in adolescents with diabetes, and the prevalence of sub-clinical depressive symptomatology in patients with diabetes appears to be even greater.<sup>5</sup> Depression in adolescents and adolescents with type 1 diabetes has been associated with negative diabetes related health outcomes such as poorer glycemic control and recurrent diabetic ketoacidosis (DKA) episodes.<sup>6</sup> Few studies evaluating screening programs in diabetes found that psychosocial screening of youth with newly diagnosed type 1 diabetes is feasible, acceptable to families, and able to identify families at risk for early emerging adverse events and nonadherence.<sup>7</sup> Thus screening of adolescents and adolescents with type 1 Diabetes for mental health issues should be incorporated in their regular clinical follow ups so that these morbidities can be detected at the earliest and prompt actions can be attempted for their prevention. In this background the current study was undertaken with the objective to assess the magnitude and factors influencing depression among adolescents with type 1 diabetes attending a tertiary care hospital.

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## METHODOLOGY

This Hospital Based Cross sectional study was conducted at JSS Hospital and Research Centre, Mysuru for the period of Six months after obtaining approval from Institutional Ethics Committee. All the adolescents in the age group of 11-19 years with Type 1 Diabetes who were on treatment for the period of at least one year and visiting the hospital during the study period were included by using consecutive sampling technique. Details regarding Sociodemographic characteristics, history of age at onset, duration of diabetes, treatment, dosage of insulin, glycemic status (most recent HbA1C), place of receiving treatment were collected in a pretested structured proforma by interviewing the adolescents in presence of their parents after obtaining informed consent from both adolescents and parents. Features suggestive of depression were collected using Patient Health Questionnaire -9 (PHQ-9).<sup>8</sup>

**Statistical analysis:** Data collected was entered in MS Excel-2010 and analysed using SPSS version 22. Descriptive statistical measures like percentage, mean and standard deviation were applied. Inferential statistical tests like chi square test was applied for factors associated with depres-

sion among adolescents with diabetes. Association was considered statistically significant at  $P < 0.05$ .

## RESULTS

Among 30 adolescents with Type 1 Diabetes included in the present study, majority 18 (60%) were in the age group of less than 14 years (Mean age  $14.2 \pm 3.3$  years), 20 (66.7%) were females, 19 (63.3%) of the fathers and 17 (56.7%) of mothers of study subjects were literates. 14 (46.7%) of their fathers were involved in agriculture based activities and 24 (80%) of their mothers were housewives. 12 (40%) of subjects were studying in high schools, 26 (86.7%) were members of nuclear families and 27 (90%) were hailing from rural areas. (Table 1)

Among 30 subjects included in the present study, majority 12 (40%) have been detected to have diabetes at the age of 10-12 years. 12 (40%) and 13 (43.3%) were with diabetes for 1 to 5 years and 6-10 years respectively. Most of the subjects 18 (60%) were strictly following diabetic diet and 11 (36.7%) were casual in their dietary practices. 20 (66.7%) were taking two insulin injections a day and 25 (83.3%) used to get treated at private hospital. There was extremes of frequency of visits to hospitals, where 11 (36.7%) use to visit once in 1-4 months and 10 (33.3%) visit almost once a year. Majority 22 (73.3%) of study subjects had uncontrolled glycemic status. (Table 2)

Among 30 subjects with type 1 diabetes included in the present study, 18 were found to have depression as per PHQ-9 questionnaire. Thus prevalence of depression among study subjects was found to be 60%. Among adolescents with depression, majority 13 (72.2%) were having mild and

**Table 1: Socio demographic characteristics of study subjects**

Factor	Frequency	Percentage
<b>Age group (in years)</b>		
<14	18	60.0
15 and above	12	40.0
<b>Sex</b>		
Male	10	33.3
Female	20	66.7
<b>Education of Father</b>		
Non literate	11	36.7
Literate	19	63.3
<b>Education of Mother</b>		
Non literate	13	43.3
Literate	17	56.7
<b>Education status of child</b>		
Higher primary (5-7)	9	30.0
High school (8-10)	12	40.0
PUC\diploma	9	30.0
<b>Occupation of father:</b>		
Professional and Business	6	20.0
Agriculture	14	46.7
Labourer	10	33.3
<b>Occupation of mother</b>		
Working	6	20.0
Not working	24	80.0
<b>Type of family</b>		
Nuclear	26	86.7
Non nuclear	4	13.3
<b>Locality</b>		
Rural	3	10.0
Urban	27	90.0

**Table 2: Distribution of subjects based on Diabetic status**

Particular	Number	Percentage
<b>Age of onset (Years)</b>		
4-6	9	30.0
7-9	9	30.0
10-12	12	40.0
<b>Duration of diabetes (Years)</b>		
1-5	12	40.0
6-10	13	43.3
11-15	5	16.7
<b>Diet being followed</b>		
Strict	18	60.0
Casual	12	40.0
<b>Frequency of insulin intake per day</b>		
Twice	20	66.7
Thrice	10	33.3
<b>Place of treatment</b>		
Govt	5	16.7
Private	25	83.3
<b>Frequency of visit to hospital (Month)</b>		
1-4	11	36.7
5-8	9	30
9-12	10	33.3
<b>Glycemic control</b>		
Controlled	8	26.7
Uncontrolled	22	73.3

**Table 3: Factors influencing Depression among study subjects**

Factor	Category	No Depression	Depression	Total	Chi	P
Sex	Male	5 (50.0)	5 (50.0)	10 (33.3)	0.625	0.429
	Female	7 (35.0)	13 (65.0)	20 (66.7)		
Education (Father)	Not literate	7 (63.6)	4 (36.4)	11 (55.0)	4.043	0.044
	Literate	5 (26.3)	14 (73.7)	19 (45.0)		
Education (Mother)	Not literate	8 (61.5)	5 (38.5)	13 (43.3)	4.434	0.034
	Literate	4 (23.5)	13 (76.5)	17 (56.7)		
Occupation (Father)	Professional / Business	1 (16.7)	5 (83.3)	6 (20.0)	1.94	0.378
	Agriculture	7 (50.0)	7 (50.0)	14 (46.7)		
	Labourer	4 (40.0)	6 (60.0)	10 (33.3)		
Occupation (Mother)	Working	3 (50.0)	3 (50.0)	6 (20.0)	0.313	0.576
	Housewife	9 (37.5)	15 (62.5)	24 (80.0)		
Type of family	Nuclear	11(42.3)	15 (57.7)	26 (86.7)	0.433	0.511
	Non nuclear	1 (25.0)	3 (75.0)	4 (13.3)		
Locality	Rural	1 (33.3)	2 (66.7)	3 (10.0)	0.062	0.804
	Urban	11 (40.7)	16 (59.3)	27 (90.0)		
Age of onset (Years)	< 6	3 (33.3)	6 (66.7)	9 (30.0)	0.238	0.626
	>6	9 (42.8)	12 (57.2)	21 (70.0)		
Duration of diabetes (Years)	<5	6 (50.0)	6 (50.0)	12 (40.0)	0.833	0.361
	>5	6 (33.3)	12 (66.7)	18 (60.0)		
Follow diet	Strict	10 (55.5)	8 (45.5)	18 (60.0)	4.537	0.033
	Casual	2 (16.7)	10 (83.3)	12 (40.0)		
Dosage of insulin (Units)	<40	9 (56.2)	7 (43.8)	16 (53.3)	3.890	0.046
	>40	3 (21.4)	11 (78.6)	14 (46.7)		
Frequency of insulin intake	Twice	10 (50.0)	10 (50.0)	20 (66.7)	2.500	0.114
	Thrice	2 (20.0)	8 (80.0)	10 (33.3)		
Place of treatment	Govt	2 (40.0)	3 (60.0)	5 (16.7)	0.00	1.00
	Private	10 (40.0)	15 (60.0)	25 (83.3)		
Frequency of visit (Numbers)	<4	5 (45.4)	6 (54.6)	11 (36.7)	0.215	0.643
	>4	7 (36.8)	12 (63.2)	19 (63.3)		
Glycemic control	Controlled	6 (75.0)	2 (25.0)	8 (26.7)	5.568	0.018
	Uncontrolled	6 (27.2)	16 (72.8)	22 (27.2)		

5 (27.8%) had moderate depression. 3 out of 18 adolescents had suicidal ideation any time in the past from the time of detection of their illness. Depression was more common in females 13 (65.0%), adolescents of literate fathers 14 (73.7%) and mothers 13 (76.5%), age of onset of diabetes less than six years 6 (66.7%), duration of diabetes more than five years 12 (66.7%), not strictly following the diet 10 (83.3%), taking insulin more than 40 Units 11 (78.6%) and thrice a day 8 (80%). Depression was also common about adolescents with uncontrolled glycemic status 16 (72.8%). Among these factors, educational status of father and mother, age of onset of diabetes, casual in dietary habits and uncontrolled glycemic status were significantly associated with depression. (Table 3)

## DISCUSSION

Type 1 Diabetes Mellitus is a unique condition that has complexities in its presentation, management, behavioural and lifestyle attributes along with familial and societal adjustments.<sup>9</sup> Thus adolescents with Diabetes are at highest risk of health related and ecologically induced stress and

subsequent mental disorders. In the current study, we tried to explore the magnitude and factors associated with depression among adolescents with Type 1 Diabetes attending a tertiary care hospital. In the present study it was observed that, majority of adolescents with type 1 diabetes were in the age group of 11 to 14 years and were females. Karnataka state Type 1 Diabetes Registry reports similar results, where majority of adolescents with diabetes are around 13 years of age and burden in females was higher than males.<sup>10</sup> HOOD KK *et al* in their study have also reported that mean age of adolescents with diabetes to be  $14 \pm 9$  years and 56% of the total subjects were females.<sup>6</sup> Thus the bottom line is type 1 diabetes is more common in mid adolescence and females are the common victims compared to males. Adolescents with Type 1 Diabetes are more at risk of poor glycemic control, the current study also highlighted the same. Similar observations were made by Dusan V in their study, where they have observed that, adolescents with diabetes in the age group of 12 to 14 years had poor metabolic control.<sup>4</sup> Silverstein *et al.* also reported that, HbA1C levels suggested of glycemic control were higher in adolescents

with type 1 diabetes.<sup>5</sup> This poor glycemic control may be attributed to, lack of adequate awareness on need for glycemic control and subsequent consequences, improper or inadequate intake of insulin as well as not adapting to behavioral changes like diet and physical activities.

Magnitude of depression among adolescents with diabetes in the current study was 60%, even though majority of the subjects had mild degree of depression, this burden is quite alarming. Several studies conducted across the world unanimously agree that, the depression is a major mental health problem in adolescents with type 1 diabetes. Dusan *et al.* reports the prevalence to be 38.5%,<sup>4</sup> Niruala *et al* reports 40.3%,<sup>11</sup> Hood *et al* reports 15.2%,<sup>6</sup> Sendela J *et al* reports 17%,<sup>12</sup> and Silverstein J reports that depression is two times more common in subjects with type 1 diabetes compared to type-2 diabetes.<sup>5</sup> This wide variation in the prevalence across the studies may be due to variety of scales available and differences in the modes of administration. In the current study, we have used, PHQ-9 tool which is a highly sensitive and less time consuming screening tool which can detect, even minor degree of depression compared to other scales.<sup>8</sup>

We did not find any significant difference in the proportion of depression between genders, this is a contrasting observation because many studies report higher prevalence of depression among females with diabetes, but a study conducted by Sendela J *et al* observed similar results to us.<sup>12</sup> One of the reason for this observation could be larger female representation in present study, geographical differences in the perception of illness and higher sense of adaptability by girls compared to boys.

Majority of the studies categorically declare that, there is a significant relationship between glycemic control in type-1 diabetes and depression. This is also an important finding in the current study. Hood KK reports that, there were significantly higher levels of HbA1C in diabetic adolescents with depression.<sup>6</sup> Sarah D also reports that there was a statistically significant correlation between HbA1C levels and depression.<sup>13</sup> This relationship between metabolic control and depression may be attributed to the vicious nature of the two conditions. A depressed adolescent may not have behavioral modifications and insulin intake leading to poor glycemic control and poor glycemic control in turn increase the psychological stress leading to precipitation of depression.

In the present study there was also a significant association between dietary control and depression similar to the observations made by Sendela J.<sup>12</sup> Improper dietary habits associated with obesity and other eating disorders increase the chances of insulin resistance and also lower the glycemic control. In the present study we have also observed that there is a significant association between insulin dosage and depression. This is in similar lines with the observations by Dusan V *et al*<sup>4</sup> and Sendela J *et al*, in their studies they infer that, the adolescents with depression tend to have eating disorders that leads to increased insulin requirements.<sup>12</sup>

We did not observe any significant association between depression and duration of diabetes. This is in contrast to observations of proponents of burnt out syndrome, which says that the patients with type 1 diabetes tend to often develop reluctance to insulin intake over a period of time.<sup>12</sup>

## CONCLUSION

The present study revealed that large numbers of adolescents with type 1 diabetes are concentrated around mid adolescence and there is higher female representation. The prevalence of depression is quite high in adolescents with diabetes and most of the depressed subjects were having mild degree of depression. There was a statistically significant associa-

tion between depression, glycemic control, higher dose of insulin intake and not following diabetes diet. This high burden of depression necessitates regular screening of these vulnerable groups using simple and feasible screening tools in order to provide adequate care and support to prevent the long lasting consequences.

## Limitation

The potential limitation of the study is generalisability of its findings due to lower sample size. We basically concentrated on the number of subjects attending our teaching hospital in stipulated time in order to recommend the need for regular screening of adolescents with diabetes for depression.

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## CONFLICT OF INTEREST

NIL.

## ABBREVIATION USED

**T1DM:** Type 1 Diabetes Mellitus; **PHQ-9:** Patient Health Questionnaire – 9; **HbA1C:** Glycosylated Hemoglobin.

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