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Original Article

Paediatrics Section

Psychosocial Illness in Children with Type 1 Diabetes Mellitus: Prevalence, Pattern and Risk Factors

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ABSTRACT

Introduction: Type 1 Diabetes Mellitus (T1DM) and psychosocial illness influence each other in multiple ways. The extent of psychosocial disorders in children with T1DM remains largely unstudied in India.

Aim: To assess the prevalence, severity, pattern and variables affecting psychosocial illness in children with type 1 diabetes mellitus.

Material and Methods: This observational study included 84 children (6-14 years of age) having T1DM at least for 1 year and 100 non diabetic children for comparison. "DSM-5 parent/guardian-Rated Level 1 & 2 Cross-Cutting Symptom Measure –Child age 6-17" was used to assess psychosocial illness, specific domains and severity. Socio-demographic variables were studied and HbA1c levels were measured.

Results: Significantly higher prevalence of psychosocial illness was observed in children with T1DM as compared with non diabetic group (55.95% vs 20%; p<0.0001). The prevalence for mild, moderate and severe psychosocial illness was 8.33%, 27.38% and 20.24% respectively in diabetic children. Most common psychosocial abnormality was irritation (38.1%), followed by depression (36.9%) and anxiety (32.1%). The prevalence of psychosocial illness was significantly higher in T1DM patients with poorer metabolic control (HbA1c>7.5, p=0.014). Significant association of psychosocial illness was also noticed with poor dietary compliance (p=0.021) and higher mean HbA1c level (p<0.001).

Conclusion: This study established T1DM as a risk factor for development of psychosocial illness. Irritation, depression and anxiety were most common abnormalities. Significant association of psychosocial illness with poor dietary compliance and poor metabolic control was observed. Psychosocial assessment of every diabetic child is suggested for optimal management.

Keywords: Dietary compliance, DSM-5, Irritation, Metabolic control

INTRODUCTION

T1DM is one of the most common paediatric illnesses, affecting nearly 500,000 children below the age of 15 years. Of these, almost every fifth child is Indian [1]. The development of type 1 diabetes entails a lifelong sentence to a difficult therapeutic regimen which includes several daily insulin injections, blood glucose monitoring, a prescribed meal plan and regular exercise; and still these measures may be only partially effective in preventing acute and chronic complications [2].

The management of children and young people with diabetes pose additional challenges in the form of emotional and psychological difficulties. Stress, in itself, may dysregulate diabetes through psycho-physiological processes or associated changes in self-management behaviours [3]. Diabetic treatment guidelines include metabolic goals, as well as facilitation of normal social and emotional development [4], however, the psychological aspect of the disease is often missed with major emphasis being given on the strict maintenance of blood glucose levels only.

Diabetes has been reported to be a risk factor for psychiatric disorders in adolescence, especially for internalizing behaviour problems like depression [5,6]. Co-existence of diabetes and depression in adolescence has been described in many studies [7-11] although this is not always the case [12]. Externalizing behaviour problems have been found to result in poorer glycaemic control [13], and diagnoses of pre-existing externalizing behaviour problems were associated with poorly controlled diabetes and externalizing behaviors in adolescence [6]. The mental health problems experienced by children and adolescents with T1DM need to be studied, in order to improve the management of patients. This study was undertaken to assess the burden of psychosocial illness experienced by diabetic children in comparison to healthy peers. Additionally, the nature and severity of the illness and how these are affected by socio-demographic factors and metabolic control, was also studied.

MATERIALS AND METHODS

This was a cross sectional, comparative study, carried out in a tertiary care hospital of North-West Rajasthan. Source of data was patients presenting to the paediatric hospital from September 2014 to August 2015. After obtaining approval from the institutional ethical and research committee and taking written informed consent from parents/guardians, 84 children were enrolled in the study by convenience non-probability sampling. Patients of either gender, presenting to paediatric hospital with diagnosis of T1DM, fulfilling all of the following criteria were enrolled: 1) Age group 6-14 Years; 2) Diagnosed for diabetes mellitus type 1 at least one year earlier; 3) He/she has been living with a parent(s) or parent surrogate longer than the last 12 months.

A control group of 100 children, between 6-14 years, of either gender presenting to the hospital either for minor acute illness or accompanying other patients were enrolled for comparison. Patients with any nervous system disease, psychiatric disease (before the diagnosis of T1DM) or any chronic disease other than T1DM (congenital or acquired) were excluded from the study. Patients' parents were explained about the study and were asked to sign a written informed consent.

All the parents of the patients in study group were subjected to detailed history taking using a self designed proforma regarding their socio-demographic details (age, gender, caste, residential address etc.,), onset and duration of disease, number of times patient has been hospitalized for diabetic ketoacidosis or episodes of hypoglycaemia. Proforma also included family history

	Children with T1DM			Control group		
	Total (n=84)	Males (n=55)	Females (n=29)	Total (n=100)	Males (n=68)	Females (n=32)
Psychosocial illness	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Somatic symptoms	13 (15.47)	10 (18.18)	3 (10.34)	6 (6.00)	2 (2.94)	4 (12.50)
Sleep problems	2 (2.38)	1 (1.81)	1 (3.44)	0	0	0
Inattention	5 (5.95)	5 (9.09)	0	0	0	0
Depression	31 (36.90)	21 (38.18)	10 (34.48)	6 (6.00)	4 (5.88)	2 (6.25)
Anger	22 (26.19)	13 (23.63)	9 (31.03)	6 (6.00)	2 (2.94)	4 (12.50)
Irritation	32 (38.10)	20 (36.36)	12 (41.38)	8 (8.00)	6 (8.82)	2 (6.25)
Mania	0	0	0	0	0	0
Anxiety	27 (32.14)	20 (36.36)	7 (24.14)	8 (8.00)	4 (5.88)	4 (12.5)
Psychosis	0	0	0	0	0	0
Repetitive thoughts	0	0	0	0	0	0
Suicidal ideation	0	0	0	0	0	0

[Table/Fig-1]: Pattern of psychosocial illness in children with type 1 DM and control group.

of diabetes, family structure, attitude of family and friends toward the disease, caregivers' literacy status and their knowledge of the disease and its management, compliance for the advised diet, insulin regime and other relevant information. Compliance for diet was judged as good, fair or poor by the interviewer according to their reported adherence to the prescribed dietary plan. Patients who strictly followed the prescribed diet plan, were recorded as good compliant; who sometimes did not follow the diet plan (approximately 3-4 times a month) were considered as fair and those who mostly/regularly did not follow the diet plan were considered as poor compliant. Metabolic control was assessed according to their HbA1c levels and defined as good (6.0-7.5), fair (7.6-9.9) and poor (>10) [14]. For psychosocial impairments, "DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) parent/guardian rated Level 1 Cross-Cutting Symptom Measure–Child age 6-17" [15] was used to assess mental health domains that are affected. This is a measure offered by American Psychiatric Association (APA) which was developed to be administered at the initial patient interview and to be used for research purpose. There were 12 domains which were studied in this measure: Somatic symptoms, sleep problems, inattention, depression, anger, irritability, mania, anxiety, psychosis, repetitive thoughts and behaviours, Substance use and suicidal ideation/ suicide attempts.

After interviewing the parents, each item of the domain was scored on a 5 point scale. If the highest score for the domain exceeded the threshold score, further inquiry for that domain was done using the "DSM-5 Level 2 Cross-Cutting Symptom Measure" [15] according to which the domain could be categorised into mild, moderate or severe. Highest severity in any domain was taken into account for categorization of illness. Similar tools for assessment of psychosocial problems were administered on control group too. Relevant socio-demographic details were also collected for the control group.

Data of study and control group were collected, compared and inferences were drawn after statistical analysis. Chi-square test (with or without Yates' correction), Fisher's exact test and student t-test were applied as appropriate to compare the variables. Difference was considered significant when p-value was <0.05.

RESULTS

A total of 84 T1DM children and 100 non diabetic children were evaluated for the presence of psychosocial illness. Mean age for the study population was 11.10±2.54 years and there were 55 (65.48%) males and 29 (34.52%) females. Mean age of non diabetic group was 10.72±2.39 years and there were 68 (68.00%) males and 32 (32.00%) females. Mean BMI of study group was 16.36±3.42 and that of control group was 16.97±2.64.

Out of 84, 47 children (55.95%) were found to have at least one psychosocial disorder while the prevalence was only 20 (20%) in the non diabetic group, the difference being highly significant (p<0.0001). Amongst children with T1DM, 17 (20.24%) had severe grade of illness while 23 (27.38%) and 7 (8.33%) exhibited moderate and mild grade symptoms respectively. In the non diabetic group, the majority belonged to mild (8.00%) and moderate (10.00%) grades of illnesses and only 2.00 % had severe grade.

The most common disorder observed in the children with T1DM was irritation (38.1%), followed by depression (36.9%). In the control group anxiety (8.00%) and irritation (8.00%) were the two common disorders [Table/Fig-1]. Severe psychosocial illness was significantly associated with poor dietary control. A total of 35.29% of type 1 diabetics, having severe psychosocial illness, had poor compliance for diet as compared to 10.45% of those not suffering from these (p=0.021) [Table/Fig-2].

Age and gender were not found to be significantly affecting the prevalence of psychosocial illness. The prevalence was lower in those having onset of diabetes after the age of 10 years as compared to those having onset before 5 years and 6 to 10 years of age, however, the difference was insignificant. The duration of diabetes was not found to affect the prevalence of psychosocial disease. Type of family (nuclear vs. joint) and caregiver's literacy status also did not affect the occurrence of psychosocial illness significantly, although lower prevalence was noticed in children whose caregivers were graduate/post graduate [Table/Fig-3].

The mean HbA1c (8.71±1.10) in children with type 1 DM having psychosocial illness was significantly higher than the mean HbA1c (7.90±0.98) in those without psychosocial illness (p<0.001).

The prevalence of psychosocial illness was significantly higher (63.64%) in children with fair to poor metabolic control than in children with good metabolic control (27.78%; p=0.014) [Table/Fig-4].

Children who had only mild grade of psychosocial illness, their parents/guardians were educated in detail regarding the disease, diet plan, regular monitoring of random blood sugar, importance of mental health and timely follow-up. Children, who showed moderate to severe grades of illness, were sent to psychiatrist

Severe psychosocial illness	Compliance for diet				Total
	Poor		Good to fair		
	No.	%	No.	%	
Present	6	35.29	11	64.71	17
Absent	7	10.45	60	89.55	67
P	0.021				

[Table/Fig-2]: Association of severe psychosocial illness with compliance for advised diet

Variables		Total no. of subjects	Psychosocial illness		χ^2	p
			Present No. (%)	Absent No. (%)		
Age in years	6-10	29	14 (48.28)	15 (51.72)	0.637	0.425
	11-14	55	33 (60.00)	22 (40.00)		
Gender	Male	55	31 (56.36)	24 (43.64)	0.016	0.899
	Female	29	16 (55.17)	13 (44.83)		
Age of onset of diabetes (years)	<5	21	12 (57.14)	9 (42.86)	3.488	0.174
	6-10	55	33 (60.00)	22 (40.00)		
	>10	8	2 (25.00)	6 (75.00)		
Duration of diabetes (years)	1-3	41	22 (53.66)	19 (46.44)	0.188	0.910
	3-5	22	13 (61.90)	9 (38.10)		
	>5	21	12 (57.14)	9 (42.86)		
Type of family	Nuclear	52	27 (48.02)	25 (51.92)	0.521	0.470
	Joint	32	20 (62.50)	12 (37.50)		
Caregiver's literacy status	Illiterate	14	7 (50.00)	7 (50.00)	3.408	0.450
	<5th std.	22	15 (68.18)	7 (31.82)		
	6th-12th std.	39	22 (56.41)	17 (43.59)		
	Graduate/ postgraduate	9	3 (33.33)	6 (66.67)		

[Table/Fig-3]: Prevalence of psychosocial illness in relation to different variable among the T1DM children.

Psychosocial illness	Metabolic control			
	Good (HbA1C≤7.5) n=18		Fair to Poor (HbA1C > 7.5) n=66	
	No.	%	No.	%
Present	5	27.78	42	63.64
Absent	13	72.22	24	26.36
P	0.014			

[Table/Fig-4]: Prevalence of psychosocial illness in relation to metabolic control among the T1DM children

for further work up and treatment in the form of behaviour/ pharmacological therapy, as considered appropriate.

DISCUSSION

This study reported 55.95% prevalence of psychosocial illness in type 1 diabetic children as per "DSM-5 parent/guardian-Rated Level 1 & Level 2 Cross-Cutting Symptom Measure–Child age 6-17" which was almost three times that observed in non diabetic children (20%). In a recent study by Agrawal J et al., 20 % prevalence of psychosocial problems was noticed, using Childhood Psychopathological Measurement Schedule (CPMS) questionnaire [16]. Sultana S et al., detected T1DM to be associated with a lower general self esteem score and higher lie scale score indicating defensiveness [17]. A quite similar prevalence (58.2%) of DSM-IV disorders was noticed by Maronian et al., in type 1 diabetics [18]. Northam et al., showed that 37% of adolescents with diabetes met the criteria for a DSM-IV psychiatric disorder [6]. McGrady and Hood found in their study that adolescent with type 1 DM had depressive symptoms with prevalence rates at least twice those in medically well adolescents [9]. So far, the association between diabetes and behavioural problems has been established using various psychiatric tools and study designs which differed in respect to the ill targeted spectrum of illness as well as their sensitivity. DSM-5 is an evidence based revision of DSM-IV and this study is the first to use DSM-5 in assessment of psychosocial problems in diabetic children.

In the control group, 20% prevalence was detected which was higher than expected which could be because of over-apprehension in parents/ guardian as they were interrogated in the hospital based setting. Moreover, using DSM-5, even mild grades of a wide spectrum of psychosocial disorders were picked up. Of note, severe psychosocial problems were noticed only in 2% children of the control group.

Categorisation of symptoms according to their severity was also possible using DSM-5 tool. Out of the children with type 1 DM, 8.33% were suffering from mild psychosocial illness. A total of 27.38% children showed at least one moderate grade disorder and rest 20.24% were suffering from one or combination of severe grade disorders. We could not find any other study, which categorised psychosocial illness according to severity in children with T1DM.

Analysing the occurrence of symptoms of individual domain, irritation was found to be the most common problem affecting 38.1% children with type 1diabetes, followed by depression, anxiety, anger, somatic symptoms, inattention and sleep problems respectively. Kovacs et al., found major depression to be the most prevalent (27.5%) disorder [19] whereas the main disorders found in a retrospective study by Maronian et al., were anxiety disorders (19%) and eating disorders (18%) [18]. Maia AC et al., identified generalised anxiety disorder (22.7%) as the most common problem, followed by dysthymia (18.2%), panic disorder (8.2%) and social phobia (5.5%) [20]. Although the disorders studied by various researchers were different as were the tools used to assess them which makes it hard to compare the pattern between these studies.

Adolescence is a period thought to be especially prone for mental illnesses, and most researchers focussed on this age group [21-23]. Although, in our study, no significantly higher prevalence was noticed in adolescence (11-14 years) as compared to middle childhood (6-10 years). Gender was also an insignificant factor to affect occurrence of psychosocial illness in our study. In contrast, Lawrence JM et al., found a higher mean CES-D (Center for Epidemiologic Studies Depression Scale) score in females than males in their study [24].

A lower prevalence of psychosocial illness was observed in children with later onset of diabetes (age>10 years), although not statistically significant. No significant association of psychosocial illness was observed with type of family or duration of diabetes. A lower prevalence was noticed in children having caregivers with higher education but the difference was insignificant. However, literacy could affect the attitude and in turn detection of psychosocial problems as well and this might act as a confounding factor in finding the relation between caregiver's literacy status and occurrence of psychosocial illness. A significant association was noticed between psychosocial illness and poor dietary compliance. The fact was supported by Ciechenowski et al., who showed depressive symptom severity to be associated with poorer diet

adherence [25]. Puri K et al., also found older age at onset and lower maternal educational level to be associated with higher prevalence of various psychological and cognitive problems [26].

This study found significant association between psychosocial illness and metabolic control. However, a meta analysis found only two out of eight studies (1990-1999) to support this association [27]. Additionally, Northam et al., Bryden et al., and Leonard BJ et al., also emphasized the relation of behavioural problems with poor metabolic control [6,28,29]. In contrast, Akbas et al., did not find such association [30].

LIMITATION

This was a cross sectional study, so the attributable risk could not be calculated. The study was conducted in a hospital based setting. Sample collection from a more diverse setting can improve the accuracy of data. Further, the used questionnaire was parent/guardian rated carrying an inherited risk of subjective bias.

CONCLUSION

This study establishes T1DM as an important risk factor for development of psychosocial illness in children. Almost every fifth child with T1DM (20.24%) exhibited psychosocial illness of severe grade. Severe psychosocial illness in T1DM was also found to be significantly associated with poor dietary compliance. Significant association was also observed between presence of psychosocial illness and poor metabolic control. This study emphasizes that in children with T1DM, presence psychosocial illness should be recognised and addressed therapeutically for optimal management.

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