

Study on Behavioural and Emotional Disorders in Children with Type 1 Diabetes Mellitus: A Cross-Sectional Study

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ABSTRACT

Objectives:

1. To assess the profile of behavioural and emotional disorders in children with type 1 diabetes mellitus.
2. To evaluate the association between behavioural and emotional disorders and glycaemic control as measured by HbA1c levels.

Methodology: A hospital-based cross-sectional observational study was conducted in the Department of Paediatrics, Vanivilas Hospital, Bangalore Medical College and Research Institute (BMCRI), Bengaluru, from March 2024 to August 2025. Forty children aged 2–17 years with confirmed type 1 diabetes mellitus (T1DM) were enrolled using consecutive sampling after obtaining informed consent. Socio-demographic and clinical data were collected using a structured case record form. Behavioural and emotional problems were assessed using the parent-completed Strengths and Difficulties Questionnaire (SDQ). Glycaemic control was evaluated using glycated haemoglobin (HbA1c) levels and categorised as good (<7.5%) or fair/poor (≥7.5%). Data were analysed using SPSS version 20.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were summarised as frequencies and percentages. Associations between behavioural and emotional disorders and glycaemic control were analysed using the Chi-square test or Fisher's exact test, with a p-value <0.05 considered statistically significant.

Results: Children with poor glycaemic control demonstrated significantly higher behavioural and emotional difficulties compared to those with good control. Elevated HbA1c levels were associated with increased SDQ total difficulty scores, particularly in emotional and peer problem domains ($p < 0.05$). Assessment using the Strengths and Difficulties Questionnaire (SDQ) showed a mean total difficulties score of 16.07 ± 7.45 . Behavioural or emotional disorder was identified in 55.0% of participants, with psychiatry referral recommended for the same proportion. No significant association was found between behavioural/emotional disorder and sociodemographic variables, dietary compliance, or disease duration ($p > 0.05$). However, behavioural/emotional disorder was strongly associated with poor glycaemic control, being present in 78.6% of children with fair-to-poor glycaemic control and in none with good control ($\chi^2 = 17.898$, $p < 0.001$). Children with behavioural/emotional disorder had significantly higher random blood glucose levels (263.57 ± 52.40 vs. 183.61 ± 41.56 mg/dL), HbA1c ($10.07 \pm$

1.15% vs. $7.18 \pm 0.62\%$), and SDQ total difficulties scores (22.14 ± 3.06 vs. 8.67 ± 3.18) than those without behavioural/emotional disorder (all $p < 0.001$).

Conclusions: Behavioural and emotional disorders are highly prevalent among children with T1DM and are significantly associated with poor glycaemic control. Routine psychological screening using tools such as the SDQ should be incorporated into pediatric diabetes care. Early identification and timely psychosocial interventions may improve both mental health outcomes and metabolic control.

Keywords: Type 1 diabetes mellitus; behavioural disorders; emotional disorders; HbA1c; glycaemic control

INTRODUCTION

Type 1 diabetes mellitus (T1DM) is one of the most common chronic endocrine disorders affecting children and adolescents. It is characterized by autoimmune destruction of pancreatic β -cells resulting in absolute insulin deficiency and lifelong dependence on exogenous insulin therapy [1]. Advances in insulin delivery systems, glucose monitoring techniques, and structured diabetes care have significantly improved survival and reduced acute complications [2]. However, the psychosocial burden associated with T1DM during childhood and adolescence remains substantial [3].

Children with T1DM are exposed to continuous treatment demands, including multiple daily insulin injections, blood glucose monitoring, dietary restrictions, and fear of hypoglycaemia and long-term complications [4,5]. These factors may adversely affect emotional well-being and social functioning [6]. Studies have shown that children with T1DM are at increased risk of anxiety, depression, conduct disorders, attention difficulties, and peer relationship problems [7,8].

Psychological morbidity in T1DM has important implications for metabolic control. Poor emotional adjustment and behavioural problems may reduce treatment adherence, resulting in suboptimal glycaemic control and increased risk of diabetic ketoacidosis and long-term complications [9,10]. Conversely, persistently poor glycaemic control may worsen emotional distress, creating a bidirectional relationship between metabolic and psychological outcomes [11].

Although international studies have demonstrated significant associations between behavioural disorders and glycaemic status, hospital-based Indian data remain limited [16]. Therefore, this study was undertaken to assess behavioural and emotional disorders among children with T1DM and to evaluate their association with HbA1c levels.

MATERIALS AND METHODS

Study Design and Setting

This hospital-based cross-sectional study was conducted in the Department of Paediatrics at a tertiary care teaching hospital.

Study Population

Children diagnosed with type 1 diabetes mellitus attending the pediatric endocrinology clinic during the study period were included.

Inclusion Criteria

- Children diagnosed with T1DM
- Age group 2-17 years
- Children and parents willing to participate

Exclusion Criteria

- Children with pre-existing psychiatric illness diagnosed before T1DM
- Children with chronic neurological disorders, other chronic medical conditions.

Sample Size

A total of 40 children with T1DM were included in the study.

Data Collection

Sociodemographic and clinical details were collected using a structured proforma. Data included age, sex, duration of diabetes, insulin therapy, dietary compliance, socioeconomic status, and HbA1c levels.

Behavioural and emotional disorders were assessed using the Strengths and Difficulties Questionnaire (SDQ), which evaluates:

- Emotional symptoms
- Conduct problems
- Hyperactivity
- Peer relationship problems
- Prosocial behaviour

Glycaemic Control

Glycaemic control was assessed using HbA1c values. Participants were categorized into good, fair to poor glycaemic control according to standard guidelines.

Statistical Analysis

Data were analysed using appropriate statistical software. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were expressed as frequencies and percentages. Associations between behavioural disorders and glycaemic control were analysed using chi-square test and independent t-test. A p-value <0.05 was considered statistically significant.

Ethical Consideration: Ethical approval for this study was obtained from the Institutional Ethics Committee of Bangalore Medical College and Research Institute, Bangalore (Ref No: BMCRI/PG/338/2023-2024)

RESULTS

A total of 40 children with type 1 diabetes mellitus (T1DM) were included in the study. The mean age of the participants was 12.18 ± 3.25 years, with the majority belonging to the 11–14 years age group (50.0%), followed by 15–17 years (27.5%). The cohort had equal sex distribution, with males and females contributing 50.0% each. Most participants were from urban areas (52.5%), and the majority belonged to the upper-lower socioeconomic class (52.5%).

The mean age at diagnosis was 7.70 ± 2.11 years, while the mean duration since diagnosis was 4.74 ± 2.69 years. The mean random blood glucose level was 228.68 ± 61.54 mg/dL and the mean HbA1c was $8.77 \pm 1.73\%$, indicating overall suboptimal glycaemic control. Good glycaemic control was achieved in only 12 participants (30.0%), whereas 28 participants (70.0%) had fair-to-poor glycaemic control as represented in figure 1. Partial dietary compliance was the commonest pattern observed (40.0%), followed by complete compliance (37.5%).

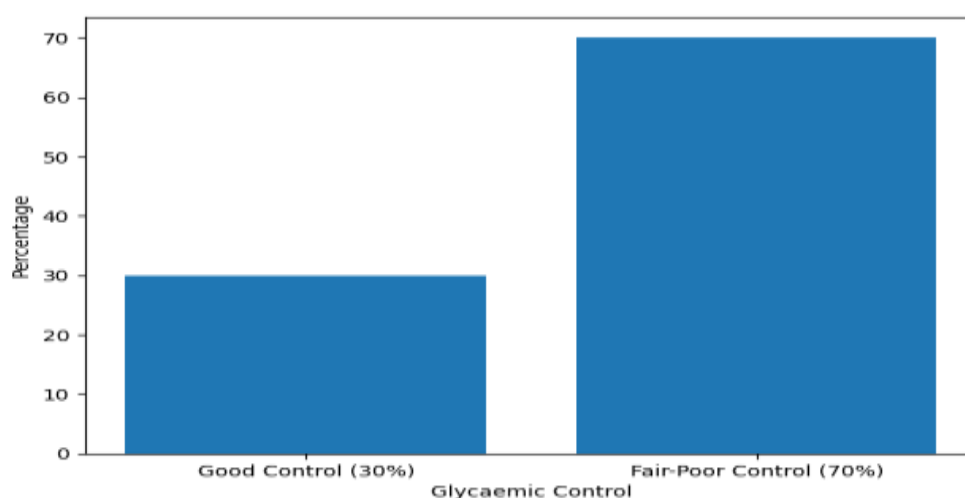


Figure 1: Glycaemic status of participants

Assessment using the Strengths and Difficulties Questionnaire (SDQ) revealed a mean total difficulties score of 16.07 ± 7.45 . Close to average SDQ category was observed in 18 participants (45.0%). Very high total difficulty scores were present in 17 participants (42.5%), while 5 participants (12.5%) belonged to the high category. Thus, more than half of the cohort had elevated total difficulties on SDQ screening as

depicted in figure 2. Among the SDQ domains, hyperactivity (5.33 ± 2.14) and emotional symptoms (4.45 ± 2.70) had the highest mean scores. The mean internalising and externalising scores were 7.60 ± 4.19 and 8.47 ± 3.69 respectively. Elevated psychosocial difficulties were common, with 42.5% of participants belonging to the “very high” category and 12.5% to the “high” category.

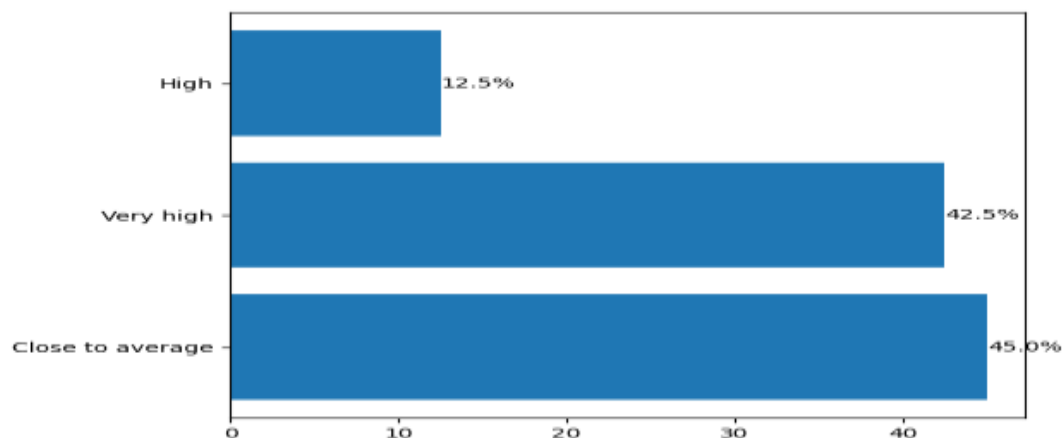


Figure 2: SDQ Total category distribution.

Behavioural or emotional disorder was identified in 22 participants (55.0%), while 18 participants (45.0%) had no disorder on screening. Psychiatry referral was advised for the same proportion of children, indicating that more than half of the cohort required mental health evaluation. All participants with good glycaemic control were free of behavioural/emotional disorder,

whereas 78.6% of those with fair-poor control had disorder. This association was highly statistically significant (Chi-square = 17.898, $p = <0.001$). The findings strongly suggest that poorer glycaemic control is linked with higher behavioural/emotional morbidity in this dataset as depicted in figure 3.

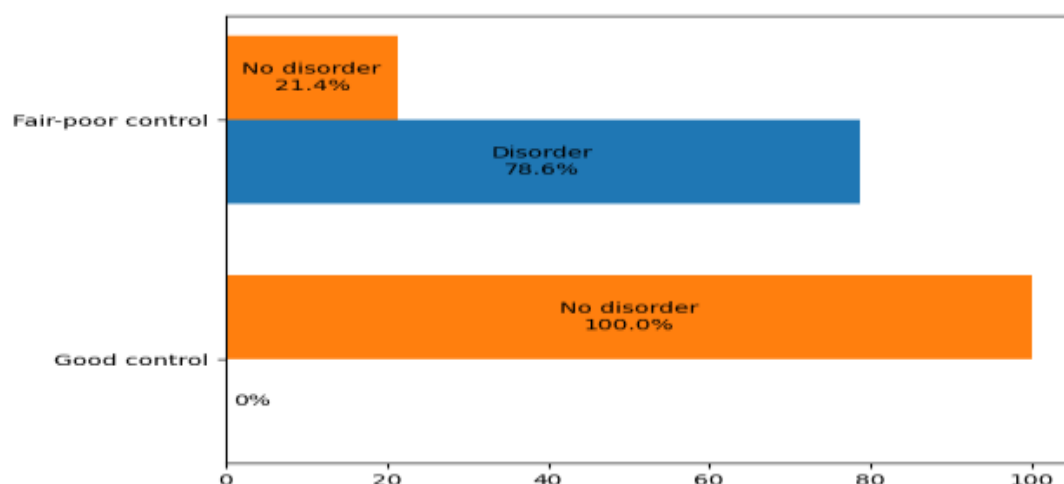


Figure 3: Association between HbA1c category and behavioural/emotional disorder

No statistically significant association was observed between behavioural/emotional disorder and sex ($p = 0.751$), age group ($p = 0.291$), residence ($p = 0.770$), socioeconomic status ($p = 0.290$), dietary compliance ($p = 0.274$), or duration of disease ($p = 0.490$). However, behavioural/emotional disorder was numerically more frequent among older adolescents, children with poorer dietary compliance and those with longer disease duration.

A strong association was observed between glycaemic control and behavioural/emotional disorder. Among children with fair-to-poor glycaemic control, 78.6% had behavioural/emotional disorder, whereas none of the participants with good glycaemic control demonstrated disorder (Chi-square = 17.898, $p < 0.001$).

Comparison of continuous variables according to behavioural/emotional disorder status demonstrated no significant difference in age or duration since diagnosis between the two groups. However, children with behavioural/emotional disorder had significantly higher mean random blood glucose levels (263.57 ± 52.4 mg/dL vs 183.61 ± 41.56 mg/dL), higher HbA1c values ($10.07 \pm 1.15\%$ vs $7.18 \pm 0.62\%$), and markedly elevated SDQ total difficulties scores (22.14 ± 3.06 vs 8.67 ± 3.18) compared with those without disorder (all $p < 0.001$).

DISCUSSION

The present study evaluated behavioural and emotional disorders among children with type 1 diabetes mellitus (T1DM) and examined their association with glycaemic control. Behavioural or emotional disorder was identified in 55.0% of participants, while psychiatry referral was advised in an equal proportion, indicating a substantial psychosocial burden in this cohort. The mean HbA1c was $8.77 \pm 1.73\%$, reflecting overall suboptimal glycaemic control. On SDQ assessment, the mean total difficulties score was 16.07 ± 7.45 , with hyperactivity and emotional symptoms emerging as the predominant domains [11,12].

The prevalence of psychosocial morbidity observed in the present study is comparable with previous Indian studies. Chatterjee et al. reported psychosocial morbidity in 53.85% of children with T1DM, closely paralleling the findings of the current study [15,16]. Similarly, Hadad et al. [17] and de Wit M et al. [18] demonstrated significantly higher emotional, behavioural and total difficulty scores among children with T1DM compared with healthy controls. These findings suggest that psychosocial dysfunction is highly prevalent among children and adolescents with diabetes and constitutes an important component of disease burden [13,14].

Hyperactivity and emotional symptoms were the most prominent SDQ domains in the current study. Similar findings have been reported in previous studies, suggesting that children with T1DM experience a broad spectrum of psychological difficulties including anxiety, emotional dysregulation and attentional problems [8]. The chronic demands of diabetes management, including repeated glucose monitoring, insulin administration, dietary restrictions and fear of hypoglycaemia, may contribute significantly to this psychosocial stress [19]. One of the most important findings of the present study was the strong association between behavioural/emotional disorders and poor glycaemic control. Among children with fair-to-poor glycaemic control, 78.6% had behavioural or emotional disorder, whereas none of the children with good glycaemic control demonstrated such disorder. In addition, children with behavioural/emotional disorders had significantly higher random blood glucose and HbA1c levels compared with unaffected children. The mean HbA1c among affected children was $10.07 \pm 1.15\%$, compared with $7.18 \pm 0.62\%$ among unaffected children. These findings indicate a close relationship between psychosocial morbidity and metabolic instability.

The observed association is consistent with existing literature demonstrating that depression, anxiety and behavioural difficulties adversely affect adherence to

insulin therapy, dietary compliance and glucose monitoring, thereby contributing to poor glycaemic outcomes [15]. Conversely, persistent hyperglycaemia and fluctuating glucose levels may themselves increase psychological stress, suggesting a bidirectional relationship between mental health and metabolic control [13]. Similar associations have been reported by Ali et al. and Hadad et al. further supporting the importance of psychosocial assessment in routine diabetes care [16,17].

The present study did not identify statistically significant associations between behavioural/emotional disorders and demographic variables such as sex, age group or socioeconomic status. However, clinically relevant trends were observed, particularly among older adolescents and children with poorer dietary compliance. The lack of statistical significance may be related to the relatively small sample size.

Overall, the present study demonstrates that behavioural and emotional disorders are highly prevalent among children with T1DM and are strongly associated with poor glycaemic control [2]. These findings highlight the importance of integrating routine psychosocial screening into pediatric diabetes management. Early identification and intervention may improve adherence, glycaemic outcomes and overall quality of life in children with T1DM [4].

CONCLUSION

Behavioural and emotional disorders were highly prevalent among children with Type 1 Diabetes Mellitus, affecting 55.0% of the study population. Hyperactivity and emotional symptoms were the most prominent SDQ domains, with elevated total difficulties scores observed in a substantial proportion of children. Psychosocial morbidity showed a strong association with poor glycaemic control, as affected children had significantly higher random blood glucose and HbA1c levels. Notably, behavioural and emotional disorders were absent among children with good glycaemic control. Demographic variables were not

significantly associated. These findings highlight the need for routine psychological screening in paediatric diabetes management.

Declaration by Authors

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