

# Psychological Impact of Type 1 Diabetes in Children Followed up at the Pediatrics Department of the Bouaké University Hospital

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## Abstract

**Introduction:** Type 1 diabetes is a chronic disease whose daily management can cause stress and affect the child's mental health. The aim of this study was to assess self-esteem, depression and emotional distress in diabetic children followed up at Bouaké University Hospital. **Methods:** This was an analytical cross-sectional study conducted during a holiday camp organised for diabetic children. The variables studied were socio-demographic, clinical and psychological (Rosenberg self-esteem scale, Hamilton depression scale and Diabetes Distress Score). Factors associated with self-esteem, depression and emotional distress were investigated using Fisher's exact test with a significance threshold of  $p < 0.05$ . **Results:** A total of 22 diabetic children were included. The male-to-female ratio was 0.47. Their mean age was  $14.5 \pm 3.3$  years. The mean duration of the disease was  $4.2 \pm 3.2$  years. The children were in secondary school (54.5%), lived in Bouaké (72.7%) and self-injected insulin (90.91%). Self-esteem was very high in 36.4% of cases. Depression was found in 69.2% and emotional distress in 72.4%. No factor was statistically associated with self-esteem, depression or emotional distress. **Conclusion:** Although the self-esteem of diabetic children is high overall, they show significant depression and emotional distress. Psychological support is crucial to improving their quality of life.

## Keywords

Diabetes, Child, Depression, Emotional Distress, Côte d'Ivoire

## 1. Introduction

Type 1 diabetes (T1DM) is a chronic autoimmune disease characterised by destruction of the beta cells of the pancreas, requiring lifelong daily treatment with insulin. Its incidence is rising worldwide, particularly in children and adolescents [1]. By 2021, around 1.5 million children and adolescents under the age of 20 were living with type 1 diabetes worldwide [2]. Moreover, an overall increase in the incidence rate, of the order of 3% to 4% per year, has been observed over the last few decades [3]. The diagnosis, often made in childhood, comes at a time of critical psychological, social and emotional development [4]. The daily lives of these children are profoundly altered, with dietary restrictions, daily injections and constant blood sugar monitoring [5] [6]. This can lead to significant distress, low self-esteem and depressive symptoms [6]. Studies have shown that children and adolescents with diabetes have a significantly higher prevalence of depressive disorders compared to their non-diabetic peers [7]. These disorders range from fear and tiredness to anger and depression, and are not without consequence [7]. They are associated with poor compliance with treatment, glycaemic instability and an increased risk of long-term complications [8]. Mental health therefore appears to be a key factor in the overall management of paediatric diabetes [9]. In Sub-Saharan Africa, studies on the psychosocial repercussions of type 1 diabetes in children are still limited. However, clinicians frequently observe signs of social withdrawal, anxiety or sadness in these young patients [10]. In Bouaké, Côte d'Ivoire's second largest city, the paediatric diabetology unit at the university hospital is a reference centre for the care of diabetic children. A recent study there revealed that more than three-quarters of children had poor glycaemic control, with adolescents, who are particularly vulnerable emotionally, being the most affected [11]. This finding highlights the influence of psychological factors on the course of the disease. However, the psychological dimensions of these diabetic children remain largely unexplored. This study was initiated to help improve the quality of care for these children. The aim was to assess the level of self-esteem, depression and emotional distress in diabetic children followed at the Bouaké University Hospital.

## 2. Methods

This was a cross-sectional analytical study. It took place from 21 to 23 December 2024 at the Diocesan Centre in Bouaké, during a holiday camp organised for diabetic children and adolescents under the aegis of the CDiC project. The CDiC project ("Changing Diabetes in Children") is a global initiative led by Novo Nordisk, in partnership with local governments and NGOs, to improve access to diabetes care and education for children in low-resource countries. It focuses on providing insulin, medical supplies, and training for healthcare professionals, while also supporting awareness and psychosocial support programs. The initiative aims to reduce disparities in diabetes management and ensure better long-term health outcomes for affected children. This holiday camp made it possible to observe the children outside the hospital setting, in a more relaxed environment conducive to ex-

ploring the psychological aspects of their illness. The study population was made up of children and adolescents with type 1 diabetes who were regularly monitored in the diabetology unit at Bouaké University Hospital. Children and adolescents older than 8 years, able to understand and answer the questions, followed by type 1 diabetes, and whose parents' or legal guardians' consent had been obtained by verbal assent, were included. Children who were uncooperative or had a major cognitive disorder that rendered the psychological evaluation uninterpretable were not included. Sampling was complete. All children meeting the criteria and present during the study period were included. Data were collected using a pre-established self-questionnaire including the study variables. These variables were *socio-demographic* (gender, age, level of education, place of residence, person with whom the child lived, previous participation in the camp), *clinical* (age at diagnosis, duration of progression, type of treatment, person injecting insulin, practice of self-monitoring of blood glucose) and *psychological*, in particular self-esteem, depression and diabetes-related emotional distress. Psychological data were collected using three standardized scales. Self-esteem was assessed using the Rosenberg Self-Esteem Scale, with scores categorizing self-esteem as very low (<25), low (25 - 31), average (31 - 34), high (34 - 39), and very high (>39). Depression was evaluated using the Hamilton Depression Rating Scale, with thresholds indicating mild depression (10 - 13), mild to moderate depression (14 - 17), and moderate to severe depression (>18). Diabetes-specific distress was measured using the Diabetes Distress Scale (DDS), where an average score < 2 indicated little or no distress, between 2.0 and 2.9 moderate distress, and >3 high distress. Data were analysed using Statistical Package for the Social Sciences (SPSS), version 22.0 (IBM Corporation, Somers, NY, USA). Continuous variables were expressed as the mean with standard deviation and extremes. Categorical variables were expressed as proportions. Factors associated with self-esteem, depression and emotional distress were investigated using Fisher's exact test. The significance threshold was set at  $p \leq 0.05$ . Before carrying out the study, authorisation was sought from the local administrative authorities, under cover of the Head of the Paediatrics Department of the Bouaké University Hospital. The confidentiality of the information collected was strictly respected by assigning an anonymous number to each survey form. No nominative data were used in the analyses.

### 3. Results

#### 3.1. Socio-Demographic Characteristics

A total of 22 diabetic children were included in the study. The sex ratio was 0.7. The mean age was  $14.2 \pm 3.5$  years, with extremes of 8 and 19 years. The children were over 10 years of age in 86.4% of cases. They had secondary education in 54.5% of cases. They lived in the town of Bouaké (59.1%) with both parents in 36.4% of cases. They had already attended a holiday camp for diabetic children in 59.1% of cases. The socio-demographic characteristics of the children are shown in **Table 1**.

**Table 1.** Socio-demographic characteristics of diabetic children surveyed.

Variable	Frequency	Percent
<b>Sex</b>		
Female	13	59.1
Male	9	40.9
<b>Age</b>		
8 - 9 years old	3	13.6
10 - 14 years old	11	50.0
15 - 19 years old	8	36.4
<b>Level of education</b>		
Primary	4	18.2
Secondary	12	54.6
Not in education	6	27.3
<b>Home</b>		
Bouaké	13	59.1
Outside Bouaké	9	40.9
<b>Person with whom the child lives</b>		
Both parents	8	36.4
One parent	5	22.7
Grandparent	4	18.2
Uncle or aunt	3	13.6
Brother or sister	2	9.1
<b>Previous participation in a holiday camp for children with diabetes</b>		
Yes	13	59.1
No	9	40.9

### 3.2. Clinical Characteristics

The mean age at diagnosis was  $10.5 \pm 3.2$  years, with extremes of 3 and 15 years. The diagnosis was made after the age of 10 in 63.6% of cases. The mean duration of the disease was  $3.3 \pm 3.1$  years, with extremes of 0 to 11 years. The disease had progressed for at least 3 years in 59.1% of cases. All the children were receiving 3 injections of insulin. Insulin was injected by the child himself in 72.7% of cases, by a parent in 22.7% of cases, or by a guardian in 4.5% of cases. Self-monitoring of blood glucose was practised in 77.3% of cases.

### 3.3. Psychological Characteristics

Among diabetic children, 36.4% had very high self-esteem. Depression affected 69.2% of participants, 60.0% of whom had a mild form. Emotional distress affected 72.7% of the children, including 93.8% with significant distress. The psychological characteristics of the children are shown in **Table 2**.

**Table 2.** Psychological characteristics of diabetic children surveyed.

Variable	Frequency	Percent
<b>Level of self-esteem</b>		
Very low/low	2	9.1
Moderate	7	31.8
High	5	22.7
Very high	8	36.4
<b>Depression</b>		
Present	15	68.2
Absent	7	31.8
<b>Level of depression</b>		
Slight	9	60.0
Moderate	3	20.0
Severe	3	20.0
<b>Emotional distress</b>		
Present	16	72.7
Absent	6	27.3
<b>Level of emotional distress</b>		
Moderate	1	6.3
Significant	15	93.8

### 3.4. Factors Associated with Self-Esteem, Depression and Emotional Distress

No factor was statistically associated with self-esteem, depression or emotional distress. The analysis of the factors is shown in **Table 3**.

**Table 3.** Factors associated with self-esteem, depression and psychological distress in diabetic children surveyed.

Variables	Self-esteem* high [n = 13] vs low [n = 9]	Depression present [n = 15] vs absent [n = 7]	Emotional distress significant [n = 16] vs absent [n = 6]
Female gender	53.8% vs 66.7% (p = 0.68; OR = 0.58) IC95%: [0.10 - 3.38]	66.7% vs 56.2% (p = 1.00; OR = 1.56) IC95%: [0.27 - 9.08]	66.7% vs 42.9% (p = 0.38; OR = 2.67) IC95%: [0.36 - 19.70]
Age ≥ 10 years	92.3% vs 77.8% (p = 0.56; OR = 3.43) IC95%: [0.26 - 45.05]	100% vs 81.2% (p = 0.55; OR = 1.23) IC95%: -	93.3% vs 71.4% (p = 0.22; OR = 5.60) IC95%: [0.54 - 58.27]
Secondary level	61.5% vs 44.4% (p = 0.67; OR = 2.00) IC95%: [0.36 - 11.23]	33.3% vs 62.5% (p = 0.35; OR = 0.30) IC95%: [0.05 - 1.91]	53.3% vs 57.1% (p = 1.00; OR = 0.86) IC95%: [0.13 - 5.49]
Lives with 2 parents	46.2% vs 22.2% (p = 0.38; OR = 3.00) IC95%: [0.44 - 20.32]	16.7% vs 43.8% (p = 0.37; OR = 0.26) IC95%: [0.03 - 2.33]	33.3% vs 42.9% (p = 1.00; OR = 0.67) IC95%: [0.10 - 4.60]

**Continued**

Previous camp attendance	69.2% vs 44.4% (p = 0.39; OR = 2.81) IC95%: [0.48 - 16.42]	33.3% vs 68.8% (p = 0.17; OR = 0.22) IC95%: [0.04 - 1.40]	60.0% vs 57.1% (p = 1.00; OR = 1.13) IC95%: [0.17 - 7.54]
Self-injection of insulin	76.9% vs 66.7% (p = 0.66; OR = 1.67) IC95%: [0.25 - 11.09]	50.0% vs 81.2% (p = 0.14; OR = 0.23) IC95%: [0.04 - 1.42]	73.3% vs 71.4% (p = 1.00; OR = 1.10) IC95%: [0.14 - 8.42]
Self-monitoring of blood glucose	84.6% vs 66.7% (p = 0.60; OR = 2.75) IC95%: [0.36 - 21.30]	66.7% vs 81.2% (p = 0.58; OR = 0.46) IC95%: [0.08 - 2.72]	73.3% vs 85.7% (p = 0.63; OR = 0.44) IC95%: [0.05 - 3.79]
Progression time ≥ 3 years	61.5% vs 55.6% (p = 1.00; OR = 1.28) IC95%: [0.23 - 7.19]	66.7% vs 56.2% (p = 1.00; OR = 1.56) IC95%: [0.27 - 9.08]	66.7% vs 42.9% (p = 0.37; OR = 2.67) IC95%: [0.36 - 19.70]

\*High = very high + high; Low = medium + low/very low.

## 4. Discussion

This was a cross-sectional analytical study conducted in Bouaké from 21 to 23 December 2024 as part of a holiday camp organised for diabetic children and adolescents. The aim of the study was to assess the level of self-esteem, depression and emotional distress in diabetic children treated at the Bouaké University Hospital. This study revealed a significant prevalence of emotional distress and emotional depression, as well as an overall satisfactory level of self-esteem. However, this study has several limitations that should be highlighted. Due to the limited sample size, the study's statistical power was reduced, which may account for the absence of significant results and its findings cannot be extrapolated to the broader population of diabetic children in Bouaké. In addition, the particular context of the holiday camp, although conducive to group evaluation, could influence the children's responses and does not necessarily reflect their experiences outside this setting. Furthermore, data collected by self-questionnaires may be subject to social desirability bias or to variable comprehension depending on the age of the participants. Despite these limitations, this study represents an important step towards addressing the mental health of diabetic children in Bouaké. It therefore raises the following points for discussion.

### 4.1. Socio-Demographic Characteristics

The study shows that women predominate. The majority of children (86.4%) were in their teens. More than half (59.1%) had already attended a holiday camp. Alehegn *et al.* [12] reported that 75.2% of the children were adolescents, with a slightly male sex ratio (1.1) and 81.6% living with both parents. Adolescence, marked by hormonal and emotional upheaval, often complicates the management of diabetes [11]. In this context, educational camps play a key role in providing psychosocial support and encouraging children's autonomy, which facilitates better management of the disease [13].

## 4.2. Clinical Characteristics

In more than half (59.1%) of cases, the disease had been progressing for at least 3 years. All the children received 3 injections of insulin with a high degree of autonomy (self-injection in 72.7% and self-monitoring in 77.3% of cases). These data are similar to those of Alehegn *et al.* [12], who found that 47.1% of children had been receiving insulin for more than 5 years and 69.4% were self-injectors. These results show that empowering children with diabetes, particularly in adolescence, is an objective frequently achieved in the context of regular follow-up.

## 4.3. Psychological Characteristics

In psychological terms, more than a third of the children had high self-esteem. However, the majority suffer from depression (69.2%) and emotional distress (72.4%). In the literature, the prevalence of depression in children and adolescents with type 1 diabetes varies from study to study, ranging from 6.3% to 46.3% [14]. Some data indicate rates of distress and depressive symptoms of 27.8% and 38.3% respectively [15]. Jabeen *et al.* [16] in their study noted that diabetes-related distress affected 34.2% of children. Other studies have reported distress rates of between 20% and 30% [17] [18]. These results confirm that type 1 diabetes exposes children to a high risk of psychological disorders linked to the day-to-day management of the disease and its social constraints [5] [6]. It is therefore crucial to integrate psychological support to improve their well-being and adherence to treatment [18]-[20].

In this study, no factor was statistically associated with the psychological disorders observed. This could be attributed to low statistical power resulting from the small sample size. Butwicka *et al.* [7] also reported in their study that there was no significant association between the presence of psychological disorders and factors such as gender, parental education, age of the child, age at diagnosis of diabetes mellitus or duration of the disease. Although the observed differences did not reach statistical significance in this study, they suggest clinically relevant trends. As far as self-esteem is concerned, it appears that family structure plays a decisive role. Children living with both parents had significantly higher self-esteem than those from single-parent households (46.2% versus 22.2%, OR = 3.00). This observation suggests that the stability and emotional support provided by a two-parent household fosters the development of a positive self-image [21]. Furthermore, previous participation in camps appears to be strongly associated with improved self-esteem (69.2% vs. 44.4%, OR = 2.81). These group trips probably offer children the opportunity to feel understood, to share their experiences with their peers and to strengthen their sense of belonging [13]. Furthermore, self-management of diabetes, through self-monitoring of blood glucose (84.6% versus 66.7%) and self-injection of insulin (76.9% versus 66.7%), is also correlated with higher self-esteem. This underlines the importance of promoting autonomy in therapeutic management as a means of boosting self-confidence in these children [22].

With regard to depression, certain factors appear to be potentially protective. Previous participation in camps was associated with a lower prevalence of depres-

sive symptoms (33.3% versus 68.8%, OR = 0.22). This result could be explained by the beneficial effect of social interaction and the sense of normalisation experienced during these stays [13]. Therapeutic autonomy also seems to play a role. Children who inject their own insulin have fewer depressive symptoms (50.0% versus 81.2%, OR = 0.23). This autonomy, by fostering a feeling of control over the disease, may reduce emotional vulnerability [22]. Furthermore, children showing signs of depression are less likely to go to secondary school (33.3% vs. 62.5%), which may reflect the impact of depression on their school career [23].

As for emotional distress, several factors appear to play a decisive role. The chronicity of the disease seems to play an important role, with distress more frequent in children with diabetes that has been progressing for more than three years (66.7% versus 42.9%, OR = 2.67). This observation highlights the cumulative emotional impact of prolonged daily management of the chronic disease [16]. Age also appears to be an influencing factor, with adolescent girls aged 10 and over being significantly more affected by emotional distress (93.3% versus 71.4%, OR = 5.60). This increased vulnerability could be explained by the emotional upheavals specific to adolescence, exacerbated by the constraints associated with the disease [4]. Lastly, females were associated with greater distress (66.7% vs. 42.9%, OR = 2.67), which is consistent with data in the paediatric mental health literature indicating a greater prevalence of emotional disorders in girls [16].

## 5. Conclusion

This study shows that diabetic children present with marked emotional distress and depression despite generally preserved self-esteem. Although no factor showed a significant association, trends suggest that therapeutic autonomy (self-injection) and participation in camps could exert a protective effect. These findings highlight the need for systematic psychological support in pediatric diabetes care, particularly through the integration of mental health screening into routine clinical consultations and the delivery of targeted interventions via holiday camps. They further justify larger-scale studies to validate these preliminary observations and optimize psychosocial care approaches.

## Authors' Contributions

All authors participated intellectually in the preparation and revision of the manuscript prior to submission.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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