



## Study of the Epidemiological Profile of Type 1 Diabetes in Children Consulting the Military Hospital of Rabat

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### KEYWORDS

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Mass Index (BMI) ,  
Diabetic ketoacidosis .

### ABSTRACT:

**Introduction:** Type 1 diabetes (T1D) is one of the most common chronic diseases in children. This condition is characterized by a combination of genetic, immunological, and environmental factors. The study aims to establish the epidemiological profile of children with T1D consulting at the Military Hospital of Rabat.

**Objectives:** The main objective of this study is to investigate the epidemiological profile of children aged 10 to 18 years with T1D, evaluating the impact of diabetes age on glycemic stability, HbA1c value, and the intensity of complications.

**Methods:** This is a cross-sectional descriptive study involving 30 children with T1D. Sociodemographic, anthropometric, and clinical data were collected and analyzed using appropriate statistical tests.

**Results:** The findings of this study show that 63.3% of children have developed type 1 diabetes for less than a year, and 83.3% of them were hospitalized due to glycemic imbalance. Furthermore, 83.3% of children had an HbA1c level above 7%, indicating a high risk of long-term complications.

Regarding the anthropometric characteristics, 33.3% of children are underweight, while 2 children are overweight. These data emphasize the importance of nutritional monitoring for these sick children.

Additionally, the study reveals that 13.33% of children developed diabetic ketoacidosis, a severe complication requiring rapid management. This alarming situation highlights the need for close monitoring and appropriate interventions to prevent long-term complications in these patients.

Overall, these results demonstrate the vulnerability of children with type 1 diabetes and the necessity for health authorities to pay particular attention to their follow-up and comprehensive management. 13.33% of children developed diabetic ketoacidosis, a serious complication requiring rapid management.

**Conclusions:** This study highlights the need for appropriate management of children with T1D to prevent long-term complications. Health authorities should be more involved in the follow-up and support of these sick children.

### 1. Introduction

Type 1 diabetes is a chronic metabolic disorder characterized by a combination of factors such as genetic predisposition, dysregulation of the immune system, and exposure to triggering environmental factors [1]. Type 1

diabetes is the main form of the disease in children and adolescents, with its highest incidence at the age of 12. It is estimated that approximately 8.42 million people worldwide were living with type 1 diabetes (T1D) in 2021 [2]. In children under 15 in France, the incidence of



type 1 diabetes is 18 per 100,000 over the period 2013-2015 (according to the National Health Data System), which corresponds to an approximate prevalence of 1.3 per 1,000 [3]. The incidence has increased, particularly in children under 5 years old. Although type 1 can appear at any age, it typically manifests between 4 and 6 years or between 10 and 14 years. The complications associated with type 1 diabetes are cardiovascular diseases, neuropathy, diabetic kidney failure, eye conditions, and amputations [4] [5]. Other manifestations such as diabetic ketoacidosis, which results in tachypnea and digestive signs in addition to the cardinal syndrome [6]. Coronary artery disease was the most frequent degenerative complication found at the time of diagnosis of diabetes. Diabetic foot infection was the most common infectious complication. Insulin therapy was prescribed in 76.9% of patients at discharge [7]. To fight against type 1 diabetes, the best way is to apply intensive insulin therapy adjusted according to careful self-monitoring of blood glucose [1]. In this study, we proposed to establish the epidemiological profile of children with type 1 diabetes and to list the complications associated with this type of diabetes.

## 2. Objectives

The main objectives of this study were to establish the epidemiological profile of children and adolescents with type 1 diabetes (T1D) consulting at the Military Hospital of Rabat, as well as to list the complications associated with this condition.

More specifically, the researchers aimed to assess the impact of the age of diabetes onset on glycemic stability and hemoglobin A1c (HbA1c) values on the one hand, and on the intensity of the complications caused on the other.

HbA1c is an essential marker in diabetes monitoring, allowing the evaluation of glycemic control over a period of 1 to 3 months. An HbA1c level less than or equal to 7% is generally considered a good indicator of well-controlled diabetes. Beyond this value, the risk of long-term complications, such as cardiovascular diseases, kidney lesions, or retinopathy, increases significantly. It is therefore crucial to maintain an HbA1c level within the target range to reduce the risk of these complications.

The study also aimed to provide a detailed overview of the sociodemographic, anthropometric, and clinical characteristics of this population of diabetic children. The collected data allowed the analysis of elements such as the distribution by age, gender, diabetes duration,

circumstances of diagnosis, family history, body mass index (BMI), and any potential complications developed. This comprehensive approach was motivated by the desire to better understand the various factors that can influence the experience and evolution of diabetes in children treated at the Military Hospital of Rabat. Indeed, a better knowledge of the epidemiological and clinical profile of these young patients is essential to optimize their management and effectively prevent short- and long-term complications.

Beyond the analysis of the local situation, the results of this study could also contribute to a better understanding of type 1 diabetes in children and adolescents in a broader context. The obtained data could be compared to those of other studies conducted in different regions, allowing the identification of possible trends and regional specificities.

In summary, the objectives of this research aimed to draw a detailed portrait of children with type 1 diabetes followed at the Military Hospital of Rabat, in order to guide future efforts in terms of prevention, early detection, and appropriate management of this chronic condition in the youngest patients.

## 3. Methods

To evaluate the frequent complications of type 1 diabetes in children, this cross-sectional descriptive study aims to investigate the epidemiological profile of this disease. The study aims to assess the impact of diabetes age on glycemic stability and HbA1c values, on the one hand, and on the intensity of the complications caused, on the other.

A total of 30 children aged 10 to 18 years, diagnosed with type 1 diabetes and consulting the endocrinology department of the Military Hospital of Rabat, were recruited for this study.

The data were collected from the patients' medical records. The information gathered included sociodemographic characteristics (age, sex, family history, etc.), anthropometric parameters (weight, height, body mass index), and clinical data such as HbA1c levels and the presence of complications.

After entry into an Excel spreadsheet, the data were filtered and coded before being analyzed using SPSS software. Qualitative variables are expressed as percentages, while quantitative variables are presented as mean  $\pm$  standard deviation.



To investigate the relationships between the different variables, the chi-square test was chosen, with a significance threshold set at 5%.

This methodological approach allows obtaining a detailed picture of the epidemiological profile of children with type 1 diabetes in the context of the Military Hospital of Rabat. The analysis of the patients' sociodemographic, anthropometric, and clinical characteristics, as well as the evaluation of associated complications, provide essential information to better understand the challenges related to the management of this chronic condition in children.

The results of this study can thus guide future efforts in terms of prevention, early detection, and improvement of type 1 diabetes management in pediatric populations.

## 4. Results

### 4.1. Sociodemographic Characteristics of Children /Adolescents with Diabetes

The distribution of children with type 1 diabetes according to age reveals an average of  $14.60 \pm 0.36$  years, with a minimum age of 10 years and a maximum age of 18 years. This distribution showed normality, with a skewness coefficient of 0.57. When analyzing the distribution according to age groups, we observe that more than 63% of these children have developed diabetes for less than a year. Additionally, it is important to note that 83.3% of these diabetic children were hospitalized due to glycemic imbalances. Regarding the circumstances of diagnosis of diabetes in these children, the results indicate that 55.2% presented symptoms such as polyuria and polydipsia, 37.9% had a fortuitous diagnosis, and 6.9% were diagnosed following diabetic ketoacidosis (DKA). This diversity of circumstances underscores the importance of increased awareness about the symptoms of diabetes in children.

Concerning family history, nearly half of the diabetic children (46.7%) reported having a family history of diabetes, while 23.3% reported medical histories related to other health conditions. These figures highlight the potential influence of family history in the development of type 1 diabetes in children, thus emphasizing the importance of regular monitoring and follow-up for children with a history of diabetes. [Table 1]

**Table 1:** Sociodemographic characteristics of children with type 1 diabetes

variable	modality	ni(%)
<b>SEX</b>	Female	16 (53,3%)
	Male	14 (46,7%)
<b>Age</b>	<12	5 (16,7%)
	12<>14	6 (20,0%)
	14<>16	13 (43,3%)
	>16	6 (20,0%)
<b>Age of diabetes</b>	<1 year	19 (63,3%)
	1<>4 years	9 (30%)
	>4 years	2 (6,7%)
<b>Reason for hospitalization</b>	Unbalanced diabetes	25 (83,3%)
	Balanced diabetes	5 (16,7%)
<b>circumstances in which diabetes is discovered</b>	incidental	11 (37,9%)
	polyuro polydipsia	16 (55,2%)
	diabetic foot	0
	x "rotomy	0
	DAC	2 (6,9%)
<b>Family history</b>	yes	14 (46,7%)
	no	16 (53,3%)
<b>Medical history</b>	yes	7 (23,3%)
	no	23 (76,7%)

### 4.2. Anthropometric Characteristics of Children with Type 1 Diabetes

The distribution of diabetic children according to their weight and height reveals interesting data. The average weight of these children is  $51.35 \pm 1.81$  kg, with a minimum of 30 and a maximum of 76 kg. We observe a symmetrical distribution of weights, indicating a certain homogeneity within the sample. The skewness coefficient of 0.435 confirms this observation.

Regarding the height of diabetic children, the average is  $1.61 \pm 0.01$  meters, with a variation ranging from 1.33 to 1.75 meters. Therefore, there is a certain diversity in the heights of children, with a relatively stable average.

The mean body mass index (BMI) of these children is  $19.62 \pm 0.42$ , with a minimum BMI of 16.65 and a maximum of 26.30. The mean BMI of 19.62 indicates a normal body weight for most diabetic children in the sample.

By analyzing the distribution of BMIs of diabetic children according to the WHO classification, we find that 33.3% (n=10) of children are underweight. It is important to closely monitor these children to prevent any complications related to insufficient weight.



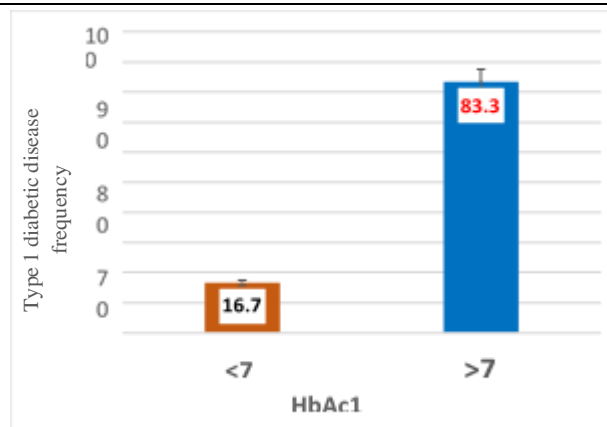
Furthermore, 60% (n=18) of children have a normal body weight, which is an encouraging result in terms of the overall health of diabetic children.

Two diabetic children in the sample are overweight, which presents an additional challenge in terms of managing their diabetes and overall health. It is essential to support these children and their families in strategies aimed at improving their diet and physical activity to prevent any complications related to being overweight.

#### 4.3. Clinical Characteristics of Children with Type 1 Diabetes

Glycated hemoglobin (HbA1c), also known as glycohemoglobin, is an important indicator in the follow-up of patients with diabetes. It allows for the evaluation of glycemic control over a period of 1 to 3 months, providing an indication of the average blood glucose level during this period. Generally, an HbA1c level less than or equal to 7% is considered a good indicator of well-controlled diabetes. Beyond this value, the risk of long-term complications, such as cardiovascular diseases, kidney lesions, or retinopathy, increases significantly. It is therefore essential to maintain an HbA1c level within the target range to reduce the risk of these complications.

In our sample, the mean HbA1c level in diabetic patients was 9.14% with a variation of 0.46%. The observed values range from a minimum of 0.09% to a maximum of 13%. These figures highlight the diversity of situations encountered in diabetic patients and underscore the importance of regular and personalized follow-up for each individual. Furthermore, 16.7% of diabetic children achieved an HbA1c level below 7%, suggesting good control of their disease. However, 83.3% of children had an HbA1c level above 7%, indicating an increased risk of long-term complications [Figure 1]. It is crucial to intervene quickly for these children to improve their glycemic control and reduce the risk of future complications.



**Figure 1:** Distribution of sick children according to HbA1c

#### 4.4. Complications Resulting from Diabetes in Our Sample

The distribution of patients according to the complications that appear during the disease is essential to better understand the impacts of the disease on the health of individuals. The collected data are represented in Table (2), which allows a clear and precise visualization of the different types of complications observed.

According to the provided information, it appears that 10% of children reported repercussions on their general health. This highlights the importance of evaluating not only the specific symptoms of the disease but also the overall impact on the health of patients. It is crucial to take these repercussions into account to ensure appropriate and comprehensive care for patients.

Moreover, it is alarming to note that two children presented neurological complications. Neurological complications can have serious and lasting consequences on health and quality of life. It is therefore essential to closely monitor these complications and implement appropriate interventions to limit damage.

On the other hand, only one person developed gynecological complications. These complications can be particularly delicate to manage and require specialized care. It is crucial to ensure that patients presenting with gynecological complications receive careful and tailored follow-up based on their specific needs.

Regarding the oral-dental status of the children, the majority indicated that their condition is quite good to good. It is encouraging to note that most children seem to maintain good oral-dental health despite the disease. It is important to promote good oral-dental hygiene habits



to prevent potential complications and ensure a better quality of life for patients.

In our sample of children with type 1 diabetes, four children developed a complication known as diabetic ketoacidosis. Diabetic ketoacidosis is a serious condition that occurs when the body does not have enough insulin to properly metabolize glucose and instead uses fats as an energy source. This process leads to the formation of ketone acids, such as acetone, which can be harmful to the body.

**Table 2:** Type 1 Diabetes and Its Complications

Variable	Modality	Frequency	Valid percentage
<b>Impact</b>	yes	3	10,0
	no	27	90,0
<b>Neurological</b>	yes	2	6,7
	no	28	93,3
	Total	30	100,0
<b>Gynecologica l</b>	yes	1	3,3
	no	29	96,7
	Total	30	100,0
<b>Oral condition</b>	quite good	20	66,7
	good	10	33,3
	Total	30	100,0
<b>Ketoacidosis</b>	yes	4	13,33
	no	26	78,78

## 5. Discussion

The study we conducted focuses on children with type 1 diabetes consulting at the Military Hospital of Rabat. The purpose of this work is to establish the epidemiological and clinical profile of these patients. In our sample, 63.3% of children with T1D developed diabetes within less than a year, and 83.3% of children had an HbA1c level above 7%. This result is slightly higher compared to the findings of [8], where 22% of patients showed an HbA1c level above 7%. Similarly, a study by Pelicand, J et al., 2012, showed that children aged 13 to 15 had problems with HbA1c [9]. In our sample, the prevalence of underweight children is 33.3%, which is a relatively high value. However, according to a study in India, it was observed that 6.4% of children and young people with type 1 diabetes were undernourished, and 3.4% were considered severely undernourished [10]. An additional study conducted in Iran revealed that low weight gain

during the first two years of life increased the risk of developing type 1 diabetes in children [11]. Furthermore, research conducted in the United States found that children with type 1 diabetes and low weight had higher HbA1c levels than those with normal weight [12]. In our study, 4 children developed diabetic ketoacidosis, representing a prevalence of 13.33%. Moreover, diabetic ketoacidosis is a frequent complication in children with newly diagnosed type 1 diabetes mellitus (T1D) [13]. The prevalence of diabetic ketoacidosis (DKA) at diagnosis varies, with rates ranging from 33.2% to 46.2% [14].

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