

Diabetes knowledge and associated factors in adolescents and young adults with type 1 diabetes in Ouagadougou (Burkina Faso)

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Abstract

Background

Type 1 diabetes (T1D) in youth is becoming a public health problem in Sub-Saharan Africa, including Burkina Faso. However, little is known about the level of knowledge of these patients on T1D. This study aimed to evaluate the knowledge of diabetes in adolescents and young adults about the disease, and identify the factors associated in Burkina Faso.

Methods

A cross-sectional survey was conducted from April to June 2020 among youth with T1D, aged 10 to 30 years, and regularly followed in the internal medicine department of Yalgado Ouedraogo University Hospital of Ouagadougou, Burkina Faso. Data was collected using the French AJD validated diabetes knowledge and skills (DKS) questionnaire, which brings together several themes as generalities of diabetes, hypoglycemia and hyperglycemia, the management of insulin treatment, and self-monitoring blood glucose (SMBG). DKS level was determined by calculating the scores, and univariate and multivariate logistic regression were used to explore factors influencing DKS scores.

Results

Sixty-three participants with a mean age of 19.05 years and a sex ratio (W/M) of 1.17 were included in our study. The mean HbA1c level at the last contact was 9.79%, and 43 (68.23%) patients had an insufficient DKS level. About the sections of the DKS questionnaire, the mean score of each theme was respectively 50% for the item “generalities of diabetes”, 32.4% for the item “hypoglycemia and hyperglycemia”, 67.72% for the item “diet”, 37.34% for the item “management of insulin treatment” and 44.97% for the item “SMBG”. In univariate analysis, a better patient score was associated with university education and long duration (> 10 years) of follow-up ($p < 0.05$). Only age remain associated with a better knowledge score ($p < 0.05$) in multivariate analysis.

Conclusion

The study identified a significant need to develop relevant therapeutic education program on T1D for youth in Burkina Faso to help them manage the condition hence averting long term complications.

Background

Type 1 diabetes (T1D) is the most frequently type of diabetes in youth [1]. Most of youth with T1D do not meet recommended glycemic targets [2].

As part of insulin treatment, achieving good glycemic target requires a comprehensive diabetes education. Therapeutic patient education (TPE) allows patients to improve their knowledge and skills both on their illness and their treatment. It brings a better quality of life with greater therapeutic compliance and a reduction in complications.

In Africa, several studies assessed diabetes knowledge in adults' patients with type 2 and type 1 diabetes [3,4,5,6,7,8], showing the insufficient level of knowledge. But very few were interested to young people with T1D [9,10]. In Burkina Faso there is only one study on this topic for type 2 diabetes [11] but none for young people with T1D.

In Burkina Faso, because of limited access to insulin and high prices, most of young people with T1D benefit from the Life for a Child (LFAC) program at the internal medicine department (the main referral center for diabetes in the country) of Yalgado Ouedraogo Teaching Hospital (CHU YO) in Ouagadougou. This program commenced an intervention to provide care for all young people < 26 years of age with diabetes in Burkina Faso in 2013, donating insulin and glucose-monitoring supplies. These young people followed in the CHU YO have been seen as routine visit every three or four months. They come from all regions of the country except western and south-western regions where there is another hospital with the LFAC program. As of April 1, 2020, out of 143 patients aged 26 and under were followed in Burkina Faso throughout LFAC program, 108 (75.52%) were followed at CHUYO center.

Since the implementation of the program in Burkina Faso, prevalence of people with T1D < 25 years rose from 0.14/100,000 in 2013 from 1.36/100,000 by 2021 [12]. The internal medicine department of the CHU YO also usually follows people with T1D over the age of 25 years who previously benefit from the LFAC program.

All young people followed in the CHU YO center benefit from therapeutic education for diabetes monitoring, which has remained mainly individual, not formalized, with a few group sessions since the end of 2018. This effort made by the team care for these young people was still not been evaluated. So, we aimed to assess diabetes knowledge of all young people with T1D in this center.

Methods

This was a single center observational study conducted from April 1st to June 30th, 2020. The study population included adolescents and young adults with T1D, aged 10 to 30 years, and regularly followed in the internal medicine department of CHUYO for at least one year. People with another type of diabetes, and those with mental deficiency were excluded. The study was performed during regular outpatient consultations or hospitalizations in this center.

We used the AJD (Aide aux Jeunes Diabétiques) diabetes knowledge and skills (DKS) French questionnaire for children and adolescents with type 1 diabetes [13]. This questionnaire is composed of 50 true-false questions, which brings together several themes: 6 questions on the generalities of diabetes,

12 on hypoglycemia and hyperglycemia, 9 on diet, 17 on the management of insulin treatment and 6 about self-monitoring blood glucose (SMBG).

Following information and written consent, the AJD DKS questionnaire was completed by the patient, as well as by the parent(s) or care provider(s) who accompanied the youth. In case of French language obstacle, the questionnaire was administered by the interviewer (doctor) with translation of the questionnaire into the two most national languages speaking ("Dioula" and "Mooré"). It was the same interviewer for all patients.

Each correct answer was scored as "1" and each incorrect answer scored as "0". We associated the choice answer option "I don't know" to optimize the rate of correct answers.

The level of knowledge was judged by a score of correct answers. The level was good when at least 80% of the answers were correct and insufficient when the correct answers were less than 50%.

For each patient, the consulting physician completed a file to collect the following data: date of first insulin injection, height, weight, number of consultations in the last 12 months, number of daily injections, times of injections (breakfast, lunch, afternoon snack, dinner, and bedtime) and types of insulin (fast-acting, long-lasting, and premixed).

The comparison of the means was carried out by the Student test and that of the qualitative variables by the Fisher test with a significance level of 0.05.

Information collected about patients was treated confidentially.

Free and informed verbal consent from the youth included, or from their parents or guardians for young people under 18, was obtained before their inclusion in the study. The patient's refusal to participate in this study in no way prevented his treatment and follow-up in the center.

Results

Sixty-three participants with a mean age of 19.05 years and a sex ratio (W/M) of 1.17 were included in our study. Forty-six (73.02%) of them were schooled, 50 (78.24%) lived in urban areas and 40 (63.5%) lived with both their two parents. More than 20 kilometers separated the home from the monitoring center for 33.33% of youth.

The mean age at the discovery of diabetes was 14.88 years and the circumstance of discovery was ketoacidosis in 50% of cases. After the initial hospitalization, 26 (41.27%) of patients were re-hospitalized at least once for a total of 31 acute complications, including 9 cases (34.61%) of severe hypoglycemia and 22 cases (84.61%) for ketoacidosis.

The mean HbA1c level at the last contact was 9.79% with an average insulin dose of 0.78 IU/kg/day.

Regarding the PTE, 32 patients (67%), felt well to very well educated.

DKS level

Forty-three (68.23%) patients had an insufficient level of knowledge on their illness and their treatment.

The mean global score of good answers was 23.63/50 (47.26%).

About the sections of the DKS questionnaire, the mean score of each theme was respectively 50% for the item “generalities of diabetes”, 32.4% for the item “hypoglycemia and hyperglycemia”, 67.72% for the item “diet”, 37.34% for the item “management of insulin treatment” and 44.97% for the item “SMBG” (Table 1).

Table 1
Adolescents and young adults DKS score

	Number of questions	Score [range], (%)
Global score	50	
Good answers	-	23,63 [23–41] (47.26)
Bad answers	-	11,42 [4–25] (22.85)
No answer	-	14,93 [1–31] (29.08)
Score per item		
Generalities of diabetes	6	3.49 [1–5] (50)
Hypoglycemia and hyperglycemia	12	4.41 [1–10] (32.4)
Diet	9	3.33 [1–7] (67.72)
Management of insulin treatment	17	7.28 [2–13] (37.34)
Self-monitoring blood glucose	6	2.31 [0–6] (44.97)
DKS, Diabetes Knowledge, and skills		

In univariate analysis (Table 2), a better patient score was associated with university education and long duration (> 10 years) of follow-up ($p < 0.05$). There was no significant difference in score according to sex, age, urban or rural origin, parental situation, feeling of being well educated or having a good glycemic control ($p > 0.05$).

In multivariate analysis (Table 3), only age was associated with a better knowledge score ($p < 0.05$). There was no difference in score between patients according to their glycemic control, sex, and family status.

Table 2
Associations between the youth DKS score and clinical, HbA1c and
sociofamilial characteristics in univariate analysis

Variable	n	DKS score, %	p
Sex			
Girls (29)	29	47.44 ± 12.43	0.9
Boys (34)	34	47.11 ± 12.6	
Age class, years			
[10 à 19]	25	45.84 ± 12.5	0.08
≥ 20	38	51.48 ± 12.45	
Residency			
Urban	59	48.36 ± 12.43	0.6
Rural	4	45.50 ± 12.62	
Schooling			
Not schooled	17	41.73 ± 12.64	-
Primary or secondary school	38	48.91 ± 12.43	0.06
University degree	8	58.85 ± 12.56	0.005
Family situation			
Lives with both parents	40	47.93 ± 12.43	-
Lives with one parent	4	51.5 ± 13.25	0.3
Lives with a guardian	19	48.82 ± 12.64	0.7
Follow up duration, years			
[1–4]	38	48.06 ± 12.43	-
[5–9]	20	47 ± 12.42	0.7
≥ 10	5	64.50 ± 12.48	0.008
Feeling to have a good DKS	36	50.12 ± 12.69	0.2
Feeling to have a good glycemic control	25	46.45 ± 12.68	0.7
HbA1c < 8%	8	48.50 ± 12.77	0.7

DKS, Diabetes Knowledge, and skills; HbA1c, glycated hemoglobin

Table 3
Associations between the youth DKS score and clinical, HbA1c and sociofamilial characteristics in multivariate analysis

Variable	Relative SD [95% CI]	p
Sex	0.03 [-0.06; 0.12]	0.555
Age	0.02 [0.01; 0.03]	0.004
Living with parents	-0.05 [-0.15; 0.05]	0.326
Schooling	0.06 [-0.04; 0.16]	0.245
Follow up duration	0.08 [-0.06; 0.21]	0.253
HBA1c	-0.01 [-0.03; 0.01]	0.485

CI, confidence interval; HbA1c, glycated hemoglobin; SD, Standard Deviation

Discussion

Some limitations of this study may be sources of bias. First our study was limited to the single center of the CHU YO, not taking into account patients from the western and south-western regions of the country. The translation of the questionnaire from French into the national languages "Dioula" and "Mooré" for its administration to young people who did not understand French language could be the source of misunderstandings. At last, in our analysis we did not make a distinction on the origin of young people between rural and urban areas.

Nevertheless, the CHU YO being the center receiving most people T1D in the country, the results of this study could be able to guide the initiation of therapeutic education programs for the benefit of all people with T1D.

With a rate of 47.26% of correct answers, the level of knowledge of adolescents and young adults with diabetes was insufficient. This level of knowledge is also found insufficient in another sub-Saharan African country like Malawi [9] but with not the same questionnaire as ours. Our rate is near to the same of 48.2% found in Saoudi Arabi [14] but less than those found in others settings such as 67.5% in Kuwait [15] and 86% in the USA [16], all with also a different questionnaire than ours. We used the same questionnaire as in France where the level of knowledge is 75% [17].

As in our study, it has been shown that there is a significant relationship on education [9,17,18] and knowledge on diabetes. Nevertheless, in multivariate analysis, we only found age as the factor associated with the DKS. Age is also described as an associated factor in other studies [9,15,17]. Other social and demographic factors associated are urban residency [18] and socioeconomic status [16]. Considering that most of young people in our study where schooled and lived in urban areas, the lack of knowledge could be explained by the lack of TPE.

Glycemic control was not correlated with knowledge of diabetes as it is shown in another study in Brazil [19] where they also found a significant correlations between HbA1c and resilience, anxiety and depression. However, studies in the USA and France found that better diabetes knowledge is associated with glycemic control [16,17], which may suggest the involvement of others factors like socioeconomic status or illness perception for example. It was described in South Africa that adolescents with at-risk glycemic control believed that T1D is difficult to manage, leading to a largely negative perception of the disease [20].

Among the subsections of the DKS questionnaire, there was an average level of knowledge for the item “generalities” and a weak level for the other items (hypoglycemia, hyperglycemia, insulin treatment, SMBG). These findings are in agreement with the findings in Malawi [9], what contributes to poor glycemic control. It is recommended that SMBG is essential for diabetes management for all children and adolescents with diabetes and an inability to articulate symptoms of hypoglycemia impose to set higher HbA1c goal [2]. Moreover, management of insulin must be supported by comprehensive education, whatever insulin regimen is chosen [21].

There was a good knowledge for the item “diet”, which item is already found to be associated with a better diabetes knowledge in youth with T1D and their caregivers [16].

Conclusion

The DKS was insufficient. This research is an important first step in identifying a significant need to develop relevant TPE on diabetes for children, adolescents, and their parents within Burkina Faso to help them manage the condition hence averting long term complications.

List Of Abbreviations

AJD, Aide aux Jeunes Diabétiques; CHU YO, Yalgado Ouedraogo Teaching Hospital; DKS, diabetes knowledge and skills; HbA1c, glycated hemoglobin; LFAC, Life for a Child; TPE, therapeutic patient education, W/M, women/men.

Declarations

Ethics approval and consent to participate

This study was performed in accordance with the principles of the Declaration of Helsinki. The study was approved by the national ethic committee of Burkina Faso. Informed consent was obtained from all subjects and their legal guardians.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

Conceptualization, OG; validation, TMY, SAK, and OG; formal analysis, DZ, YS; investigation, DZ, DPS, ST, and YS; data curation, DZ; writing—original draft preparation, DZ; writing—review and editing, YS; supervision, TMY, SAK, and OG. All authors have read and agreed to the published version of the manuscript.

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