

Original Research Article

Self-management practices among children and adolescents presenting with type 1 diabetes attending selected health facilities in Nairobi city county

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Received: 18 March 2024

Revised: 07 May 2024

Accepted: 13 May 2024

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ABSTRACT

Background: Diabetes is a high prevalence non-communicable disease (NCD), with its highest burden in low- and middle-income countries. The International Diabetes Federation estimates that the global prevalence of diabetes is approximately 537 million people. By 2030, this figure is expected to rise to nearly 643 million, and by 2045, it is projected to reach 783 million. In sub-Saharan Africa, an estimated 24 million adults have diabetes, with a regional prevalence of 4.5%. Children with diabetes in this region often remain undiagnosed, and even if diagnosed, many lack access to essential services and resources such as insulin, syringes, and monitoring equipment, leading to avoidable deaths.

Methods: The study design was a descriptive cross-sectional study. The study was conducted between September 2021 and September 2022 among children and adolescents with type 1 diabetes who attended selected facilities in Nairobi City County, Kenya. Qualitative and quantitative data were obtained using a self-administered semi-structured questionnaire, focus group discussions, and key informant interviews with the participants. The data was cleaned and then exported to SPSS V.23 for analysis.

Results: The study investigated the demographic and socio-economic profiles of children and adolescents with type 1 diabetes in the study area, their level of knowledge regarding self-management practices, the self-management practices carried out by these respondents and explored the relationship between demographic and socio-economic factors, knowledge levels, and self-management practices among children and adolescents with T1D.

Conclusions: The study findings will be of great importance for health professionals and policymakers in designing appropriate interventions to improve self-management practices among children with T1D.

Keywords: Type 1 diabetes, Knowledge levels, Self-management practices

INTRODUCTION

'Diabetes mellitus' is a severe and chronic condition that occurs when raised blood glucose levels occur because the body cannot produce enough of the hormone insulin or cannot effectively use the insulin it produces.³⁶ Inadequate insulin secretion and diminished tissue

responses to insulin result in deficient insulin action on target tissues, which leads to abnormalities in carbohydrate, fat, and protein metabolism.²⁴ Insulin is an essential hormone produced in the pancreas and allows glucose from the bloodstream to enter the body's cells, where it is converted into energy or stored.¹⁹ A person with diabetes does not absorb glucose properly, and

glucose remains circulating in the blood in a condition referred to as hyperglycemia, which damages body systems over time.¹⁹ This damage can lead to disabling and life-threatening health complications as well as diminished quality of life.²⁷

The burden of diabetes has been on the rise over the years, afflicting approximately 537 million people worldwide, and this number is expected to rise to 643 million in the year 2030 as well as rise to 783 million by the year 2045 if no preventive measures will be put in place.¹⁹ Much of this increase will occur in developing countries due to population aging, unhealthy diets, obesity, and sedentary lifestyles.³⁶ In sub-Saharan Africa, an estimated 24 million adults have diabetes, with a prevalence of 4.5%. The prevalence ranges between countries in the region, reflecting the rapid socioeconomic and demographic transitions faced by communities throughout the region. Data on the incidence of type 1 diabetes in children and adolescents are scarce; hence, children and adolescents with T1D in the region often go undiagnosed.¹⁹ Many diabetic patients face significant challenges accessing diagnosis and treatment, which contributes to the high mortality and prevalence of complications observed.³⁶

In Kenya, the burden of diabetes has been on the rise over the years, with an estimated 1,426,929 of the adult population living with diabetes.¹⁹ This prevalence could be an underestimate since the majority of those with the disease are yet to be diagnosed. Similarly, the above figure excludes the number of children below 20 years, estimated at 5,279. Furthermore, estimates indicate that the national prevalence of diabetes in Kenya is 3.0%.¹⁹

Diabetes complications can lead to severe morbidity and mortality. The essential principle in preventing such complications is achieving as near standard glycemic control as possible through intensive education and treatment from diagnosis.¹

Although diabetes has been more common in adults, the rate among children has increased; the number of newly diagnosed children and adolescents in Africa is estimated to be 19,700 every year, leading to an estimated 59,500 children with diabetes globally.¹⁹ Diabetes requires consistent and dedicated self-management to achieve optimal treatment goals.³ Due to the changing needs as a child develops, self-management responses are promoted in young people with diabetes, posing unique challenges for the child, their parent(s), families, healthcare providers, and communities.²⁹ Self-management has been primarily focused on T2D, in which the burden and cost of illness and disability are increasingly evident.¹⁹ However, the economic and quality-of-life costs of illness and disability in children are equally burdensome and costly. Hence, establishing self-management practices among children may prevent or mitigate complications and costs as the children transition into adulthood.²⁵ Children with T1D must leave with their condition even

when in reasonable control or remission. Diabetes management requires a complex balance of medication dosing, diet, exercise, and frequent self-monitoring of blood glucose levels to achieve reasonable glucose control while avoiding hypoglycemia.¹⁰ The study will be essential to children with diabetes and their families as they manage this chronic disease and its health consequences (e.g., chronic kidney disease and end-stage renal disease), as self-management is crucial to improving health outcomes and quality of life, as well as to preventing numerous diabetic-related complications. Self-management among children with T1D is the key to good physical and psychological outcomes of the disease, yet little is known about how they carry out these practices.¹³

The objectives of this study were to establish the demographic and socioeconomic profiles of children and adolescents with T1D who present to selected health facilities in Nairobi City County, Kenya. Also, to determine the level of knowledge on self-management practices among the children and adolescents with T1D in selected health facilities in Nairobi City County, Kenya. Additionally, to establish self-management practices by children and adolescents presenting with T1D in selected health facilities in Nairobi City County, Kenya. Moreover, to determine the relationship between demographic, socioeconomic, knowledge, and self-management practices among the children and adolescents with T1D in selected health facilities in Nairobi City County, Kenya.

METHODS

The study employed a descriptive cross-sectional design, utilizing both qualitative and quantitative research methods. It was conducted between September 2021 and September 2022 among children and adolescents with type 1 diabetes who attended selected facilities in Nairobi City County, the capital and largest city in Kenya, situated in South-Central Kenya. The study population comprised boys and girls aged between 8 and 18 years, diagnosed with type 1 diabetes (T1D), seeking medical care at selected health facilities within Nairobi City County. Out of a total of 420 children, 273 (65%) were girls, and 147 (35%) were boys. Proportion to sample size was used to allocate the sample size of 221 per gender, resulting in 144 girls and 77 boys. Nairobi City County was purposively selected to ensure a representative sample, with the sample distributed proportionately among clinics offering changing diabetes in children services in the County. Participants were randomly selected. Data collection techniques included surveys, interviews, focus group discussions, and content analysis, chosen based on the target population, available resources, and ethical considerations. Quantitative data analysis involved editing completed questionnaires to minimize errors, followed by data entry into Microsoft Excel and SPSS version 23.0 for processing, cleaning, and analysis. Qualitative data were analyzed using data

reduction, display, conclusion drawing, and verification, with results presented in narrative form, guided by evaluation objectives. Integration of both qualitative and quantitative data was undertaken, ensuring complementarity and triangulation of information. Inclusion criteria encompassed consenting and assenting children and adolescents with T1D aged 8-18 years, CDiC coordinators, healthcare providers, and principal/primary caregivers in Nairobi City County. Exclusion criteria included chronically very sick children and adolescents with T1D whose caregivers did not provide consent.

RESULTS

The response rate among study participants

The response rate was (94.6) where 137 girls and 72 boys responded. The findings were based on information from questionnaires for a representative sample of 209(94.6%) children and adolescents at the study site and consultative discussions using 9 out of 10 Key Informant (KI) interviews (response rate of 90%) and 4 Focus Group Discussion (100% response rate).

Table 1: Demographic and socio-economic profiles of the children and adolescents presenting with t1d in Nairobi city county.

Variable	Frequency	Percentage	Mean (where applicable)
Sex			
Male	72	34.4	
Female	137	65.6	
Age (in years)			
<10	20	9.5	14.67±3.153
10-15	78	37.1	
>15	111	53.4	
Highest level of education attained/completed			
Pre-primary	73	34.8	
primary	119	57.0	
secondary	17	8.1	
Settlements/residence			
Informal	82	39.4	
Lower class	97	46.2	
Middle class	30	14.5	
Marital status			
Never married	6	3.2	
Married	154	73.8	
Separated	14	6.8	
Widowed	35	16.6	
Employment of caregiver			
Civil servant	39	18.6	
Private sector employee	23	10.9	
Self-employed	122	58.4	
Unemployed	25	12.2	
Under 18 living in the household			
None	26	12.7	2.03±1.291
1	41	19.5	
2	78	37.1	
3	43	20.4	
4	7	3.6	
5	14	6.8	

Table 2: Knowledge of self-management practices among children and adolescents with T1D.

	Able identity (%)	Not able identify (%)
Aware of the self-management practice of T1D	200 (95.9)	9 (4.1)
Able to identify healthy eating practices	96 (45.8)	113 (54.2)
Able to identify blood glucose target goals	64 (30.7)	145 (69.3)
Able to identify physical activity	129 (61.8)	80 (38.2)

Continued.

	Able identity (%)	Not able identify (%)
Able to identify medication compliance	29 (13.7)	180 (86.3)
Able to identify healthy coping skills	7 (3.3)	202 (96.7)
	Knowledgeable	Not knowledgeable
Aspects of healthy eating	90 (43.0)	119 (57.0)
Aspects of blood glucose target goals	97 (46.2)	112 (53.8)
Aspects of medication compliance	134 (64.3)	75 (35.7)
Aspects of healthy coping skills	73 (34.8)	136 (65.2)

Table 3: Self-management practices among the children and adolescents with T1D (n/%).

Variable	No (%)	Yes (%)	Total (%)	χ^2	df	P value
Good problem-solving skills						
No	110 (67.4)	53 (32.6)	163 (77.8)	26.268	1	<0.001
Yes	12 (26.5)	34 (73.5)	46 (22.2)			
Healthy coping skills						
No	109 (74.2)	38 (25.8)	147 (70.1)	53.473	1	<0.001
Yes	13 (21.2)	49 (78.8)	62 (29.9)			
Healthy eating						
No	92 (82.4)	20 (17.6)	112 (53.8)	61.026	1	<0.001
Yes	30 (30.4)	68 (69.6)	97 (46.2)			
Compliant with medications						
No	50 (73.6)	18 (26.4)	68 (32.6)	10.208	1	<0.001
Yes	72 (51.0)	69 (49.0)	141 (67.4)			
Risk reduction behaviours						
No	55 (76.3)	17 (23.7)	72 (34.4)	15.350	1	<0.001
Yes	67 (49.0)	70 (51.0)	137 (65.6)			
Monitoring of blood sugar daily						
No	68 (72.8)	29 (30.4)	97 (46.6)	16.564	1	<0.001
Yes	51 (45.8)	61 (54.2)	112 (53.4)			
Being physically active						
No	84 (71.2)	34 (28.8)	118 (56.6)	19.490	1	<0.001
Yes	38 (41.7)	53 (58.3)	91 (43.4)			

Table 4: Relationship between demographic, socio-economic, and knowledge with self-management practices among children with T1D.

Variable	No (%)	Yes (%)	χ^2	df	P value
Sex					
Male	43 (60.1)	28 (39.5)	0.221	1	0.638
Female	78 (57.1)	59 (42.8)			
Age (in years)					
<10	20 (95.1)	1 (4.8)	Fisher exact (P<0.001)		
10-15	51 (65.9)	26 (34.1)			
>15	52 (46.6)	59 (53.4)			
The highest level of education attained					
Pre-Primary	50 (68.8)	23(31.2)	6.954	2	0.031
Primary	60 (50.8)	59 (49.2)			
secondary	11 (66.7)	6 (33.3)			
Residence					
Informal	45 (55.2)	37 (44.8)	5.428	2	0.066
Lower class	63 (65.7)	33 (34.3)			
Middle class	14 (43.8)	17 (56.3)			
Marital status					
Never married	0 (0)	8 (100)	Fisher exact (p<0.001)		
Married	105 (68.7)	48 (31.3)			

Continued.

Variable	No (%)	Yes (%)	χ^2	df	P value
Separated	4 (26.7)	11 (73.3)	29.751	3	<0.001
Widowed	12 (36.1)	21 (63.9)			
Employment of caregiver					
Civil servant	27(68.2)	13 (31.7)			
Private sector employee	7 (29.2)	16 (70.8)			
Employed	83 (68.2)	38 (31.8)	29.751	3	<0.001
Unemployed	6 (22.2)	19 (77.8)			

Significant results in bold at alpha of 0.05; df=degree of freedom

Table 5: Knowledge influence on self-management practices among children and adolescents with T1D.

Variable	No (%)	Yes (%)	χ^2	df	P value
Knowledge Assessed by The Spoken Knowledge in Low Literacy in Diabetes (SKILLD) questionnaire					
Healthy eating					
Knowledgeable	95 (81.5)	22 (18.5)	61.936	1	<0.001
Not knowledgeable	27 (28.9)	65 (71.1)			
Blood glucose target goals					
Knowledgeable	93 (62.8)	55 (37.2)	4.321	1	0.038
Not knowledgeable	29 (47.7)	32 (52.3)			
Medication compliance					
Knowledgeable	113 (62.0)	69 (38.0)	7.839	1	0.005
Not knowledgeable	9 (34.5)	18 (65.5)			
Healthy coping skills					
Knowledgeable	122 (60.3)	81 (39.7)	Fisher (p<0.002)		
Not knowledgeable	0 (0)	6 (100)			
Physical activity					
Knowledgeable	55 (64.4)	30 (35.6)	2.305	1	0.129
Not knowledgeable	67 (54.2)	57 (45.8)			

DISCUSSION

The study provided important demographic information on the respondents and their primary caregivers, which was relevant for understanding the self-management practices among type 1 diabetes children and adolescents. This was well observed in a study that found no significant relationship between participants' gender and adherence to self-management among adolescents with T1D. The majority were adolescents with a mean age of 14 and was a homogeneous group of individuals regarding age, with most respondents falling within about three years of the mean age. The highest level of education attained by the respondents was the majority, 43.7%. Education level was subjected to bivalent analysis using the Chi-square test and Fisher test, where subjects were less than 5, to show the influence of the factors on self-management practices, and they were found to have a positive association.

The respondents indicated that they could identify self-management practices in general, with a majority of 95.9%; this suggested a relatively high level of awareness about diabetes self-care among the respondents. However, when probed further and asked about specific self-management practices, only 45.8% could identify

healthy eating practices and 30.7% could identify blood glucose target goals. 61.8% were able to identify physical activity, which was higher than all other aspects, only 13.7% could identify medication compliance, a significant concern, as taking prescribed medications correctly is crucial for managing diabetes effectively and 3.3% of the respondents were able to identify healthy coping mechanisms that are essential for managing the emotional and psychological challenges of the condition. The low awareness highlights an area of concern. This was indicated in another study.²⁸

The study findings revealed that self-management practices among the respondents were as follows: only 22.2% had good problem-solving skills, 29.9% had healthy coping skills, 46.2% were able to practice healthy eating, 67.4% were compliant with medications, 65.6% were able to practice risk reduction behaviors, 53.4% were able to monitor their blood sugar daily whereas 43.4% were physically active. The study found that many children and adolescents with type 1 diabetes (T1D) in the study area were not effectively managing their condition. Only 41.6% of the respondents could meet the self-management score, suggesting that many children and adolescents with T1D faced challenges managing their condition.

Other studies have shown that the reasons for the poor self-management practices in the present study could be lower socioeconomic status, substandard dietary habits, adolescent age, negative attitude, and lack of awareness of the disorder.¹⁰

The level of analysis was bivalent, using the Chi-square test and Fisher test, where the number of subjects was less than 5, to show the influence of the association of the factors to self-management practices. There was a positive association between the primary caregivers' age, education level, marital and work status, and self-management practices. However, there is insufficient evidence to suggest that the primary caregivers' age, education level, marital and employment status have a marked influence on self-management practices among children with type 1 diabetes (T1D). Another study indicated adolescence is a period when glycemic control commonly deteriorates.⁷ A combination of non-modifiable and modifiable factors, such as psychosocial and behavioral changes, causes reduced treatment adherence, treatment regimens, and decreased physical activity. Puberty, in addition to the effect of glycaemic control, also increases the risk for the development of diabetic complications.¹⁶

Self-management practices can be best assessed over a prolonged period to determine their impact on glycemic control, however the data was collected from a cross-sectional study and, therefore, could not reveal whether the self-management practices varied over time and had any impact on glycemic control.

The study depicted that while self-management practices are crucial for determining their impact on glycemic control, the limitations of the research should be acknowledged. The data, collected from a cross-sectional study, lacked the ability to reveal how self-management practices varied over time and their direct impact on glycemic control. Additionally, the study highlighted the presence of recall bias among respondents, which led to extensive probing and illustrations, making data collection more time-consuming. Therefore, while the study provided valuable insights, its limitations underscore the need for further research, ideally over a prolonged period, to fully understand the relationship between self-management practices and glycemic control.

CONCLUSION

The findings targeted interventions and educational programs to improve self-management practices among children and adolescents with T1D. These results had significant implications for healthcare providers, policymakers, and caregivers, emphasizing the need for tailored strategies to enhance self-care and ultimately improve health outcomes in this population.

ACKNOWLEDGEMENTS

We would like to thank Above all, I thank the Almighty God who continue to give me strength and wisdom upto this moment. The successful completion of this study is the result of contributions of various persons, most notably, my supervisors Professor Alloys S. S. Orago and Dr. Albert Gachau whose tireless audience, guidance and support all through the study was priceless. Sincere appreciation goes to the Department of Community Health and Epidemiology, School of Health Sciences and the entire Kenyatta University fraternity for the opportunity and support they offered me to successfully undertake this programme. I wish to express my gratitude to members of my family and friends for their invaluable material, moral and spiritual support without which this research thesis would not have been written.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Kenyatta University Ethics and Review Committee (KUERC), the National Council for Science, Technology, and Innovation Authority, Nairobi City County

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Cite this article as: Mugo AW, Orago ASS, Gachau AG. Self-management practices among children and adolescents presenting with type 1 diabetes attending selected health facilities in Nairobi city county. *Int J Community Med Public Health* 2024;11:2152-9.