Original Article

Childhood Diabetes in a Developing Country; How Much Knowledge Can the Clinical Medical Students Offer?

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Abstract

Background: Knowledge of childhood diabetes is not as common as diabetes in adults. Previous studies revealed a gross deficiency in the knowledge of childhood diabetes among the general population. Unfortunately, with the exception of paediatric endocrinologists, many doctors do not have in-depth knowledge of childhood diabetes. Focused attention on medical students becomes necessary since medical students are the future custodians of the medical profession and major disseminators of information. It becomes imperative for them to be knowledgeable of this poorly discussed and neglected disease but still exists among us. The study assesses the depth of knowledge of childhood diabetes among clinical medical students. **Methods:** A cross-sectional interview of consenting final, penultimate, and year four medical students of the University of Nigeria (UNN) was performed in December 2019. A semi-structured self-administered questionnaire was used to assess their knowledge of childhood diabetes. For the purposes of this study, knowledge <50% was graded as poor, equal to 50% and <70% was average and good for equal to and >70%. Data were analyzed using SPSS version 22. Descriptive statistics and Pearson Chi-squared were used as appropriate. **Results:** Seventy-seven percent of the students were aware of childhood diabetes, while 23% had no idea that diabetes could occur in children. Yet, in-depth knowledge of the different aspects of diabetes was deficient among students in successive classes. An average of 17.2%, 24.2%, 11.3%, and 4.8% of the students had good knowledge of the definition, pathophysiology, clinical manifestation, and complications, respectively. All the 4th year clinical students could not define childhood diabetes nor the different types. In general, a positive association existed between the depth of knowledge and the year of the study ($P < 0.001$). **Conclusion:** Among the medical students studied, there is a deficiency in the knowledge of childhood diabetes. This underscores the need for a wider curriculum spectrum in childhood diabetes.

Keywords: Childhood diabetes, knowledge, medical students

Background

The World Health Organization reported a global increase in the burden of diabetes across all age groups.[1] Childhood diabetes is a chronic metabolic disorder associated with life-threatening complications. The burden of childhood diabetes in Nigeria is not known, which may be attributed to under-reporting and lack of diabetes registry,[2] probable consequence of poor knowledge and awareness of the condition.

Childhood diabetes is not as popular as diabetes in adults; it appears alien to many, including health-care professionals. Insights from previous studies[3,4] showed a gross deficiency of knowledge of childhood diabetes in the general population. Similarly, surveys among university students in countries such as the United Arab Emirates, India, central Mexico, and China showed limited knowledge of diabetes among them.[5-8]

For the general public, knowledge of childhood diabetes can be acquired through the media, relatives, or persons suffering from the disease and, most importantly, in the hospital through education given by health-care providers, particularly doctors. However, with regard to health-care professionals, the knowledge of diseases, including diabetes, is acquired during the period of tutelage as medical students and from further post-basic training. Unfortunately, many doctors, who

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supposedly are the main disseminators of health information to the public do not have in-depth knowledge of childhood diabetes.[9-11]

Thus, focused attention on medical students becomes paramount, since medical students are the future custodians of the medical profession and prospective disseminators of information. Clinical medical students sometimes are perceived as doctors by the public, especially in the under-developed economies. This makes them vulnerable and further underscores the need to provide them with enough information; that will improve the management outcome of this poorly discussed and neglected disease. The gross knowledge deficiency in the public[1,2] may be a reflection of the poor knowledge among health personnel, which medical students are the offshoots.

The study aims to assess the depth of knowledge of childhood diabetes among clinical medical students in a developing country and to identify knowledge deficiencies.

Research questions

What is the actual depth of knowledge of childhood diabetes among clinical medical students?

Null: There is a good depth of knowledge of childhood diabetes among clinical medical students.

Alternate: There is no good depth of knowledge of childhood diabetes among clinical medical students.

Methods

Study design, study site, study population, subject selection, and ethical considerations

A descriptive, cross-sectional study was carried out at the University of Nigeria, Ituku/Ozalla campus, located in Southeast of Nigeria. The study was conducted in December 2019 using a nonparametric convenient sampling method.

The study population were clinical medical students in year four, five and six classes. The classes were preinformed about the survey, two days before the survey to ensure the availability of participants. The content of the survey was not disclosed to prevent cross-information and possible prior reading. A day was designated for all the classes, and the students were interviewed simultaneously. Every consenting student who met the inclusion criteria was surveyed. The inclusion criteria were consenting clinical medical students in the designated classes, who were not known diabetics nor had blood relatives suffering from childhood diabetes. This was established by a brief past medical and family history of each student taken after administration of the consent form. Exclusion criteria included those with a positive history of diabetes or family members with diabetes. All eligible students attending the class were interviewed. No attempt was made to interview those who were not available at the time of the study. The participants were assured that the outcome was not for performance appraisal. The survey was time-bound; conducted during their break period, which was between 12 noon to 2 pm. The raters were blinded to the status of the students, and the interview lasted for 15 min for each student. Ethical approval was obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital Enugu Ituku-Ozalla.

Questionnaire design

A self-administered questionnaire was semi-structured after an extensive literature search and review by a group of experts in childhood diabetes. This was done to assess the suitability of the contents, clarity, sequence, and flow of the questionnaire. It was pretested in 20 students in another medical school to correct for irregularities and errors, and the questionnaire was then adapted for final use. A reliability analysis was carried out on the perceived task values scale comprising 15 items. Cronbach's alpha showed the questionnaire to reach acceptable reliability, α = A Cronbach's alpha of 0.881.

The study tool assessed the basic knowledge expected from a medical student in a newly diagnosed case of childhood diabetes. The questionnaire had different sections; biodata, definition, and prevalence of childhood diabetes, types, clinical manifestations, etiology and pathophysiology, complications and treatment.

For the purpose of this study, the different sections were scored and scaled to 100%. Correct answers <50% were graded as poor, equal to 50% and <70% was average and good for equal to and >70%.

Data analysis

Descriptive statistics, which include frequency and percentages, were used to summarize categorical variables such as gender and class category. Associations between categorical variables (gender, class category) and the comparison of proportions of different knowledge levels-were done using Pearson's Chi-squared test. All tests were two-tailed and significant at <0.05 level of significance. Results were presented in tables, prose, and figures as appropriate. The analysis was done using SPSS version 22 (IBM Corp.Q, Armonk, Newyork: USA).

Results

The student population was 366 students. Two hundred and twenty-eight of them were interviewed. One hundred and eight (32%) students were not enrolled due to unavailability at the stipulated survey period, refusal to participate and failure to meet the inclusion criteria. The response rates for students in years 4, 5, and 6 were 73%, 65%, and 72%, respectively, with an average response rate of 70%. There were 142 (62.3%) males. The majority of the participants were within the age group of 21–25 years [Table 1].

More than two-thirds (77%) of the students were aware of childhood diabetes. However, the knowledge on the specific aspects of childhood diabetes such as the definition, pathophysiology, clinical features, and complications were deficient in the various successive (different) classes. A positive association was noted between the depth of knowledge and the

year of study ($P < 0.001$) [Table 2]. The lack of knowledge was marked among the year four students as none was able to define childhood diabetes and the types. There was no association between gender and knowledge of childhood diabetes ($P = 0.08$). However, females had better knowledge of the complications than males ($P = 0.003$) [Table 3].

Table 1: Demographic characteristics of participants

	Frequency (%)
Age group	
≤20	45 (19.7)
21-25	134 (58.8)
26-30	45 (19.7)
>30	4 (1.8)
Sex	
Male	142 (62.3)
Female	86 (37.7)
Year of study	
Year 4	90 (39.5)
Year 5	68 (29.8)
Year 6	70 (30.7)

Table 2: Knowledge of childhood diabetes

Knowledge	Class			χ^2	*P*
	Year 4, *n* (%)	Year 5, *n* (%)	Year 6, *n* (%)		
Definition					
None	90 (100.0)	38 (55.9)	41 (58.6)	54.490	<0.001
Poor	0 (0.0)	0 (0.0)	0 (0.0)		
Average	0 (0.0)	7 (10.3)	11 (15.7)		
Good	0 (0.0)	23 (33.8)	18 (25.7)		
Types					
None	0 (0.0)	2 (2.9)	1 (1.4)	14.908	0.021
Poor	90 (100.0)	59 (86.8)	65 (92.9)		
Average	0 (0.0)	7 (10.3)	3 (4.3)		
Good	0 (0.0)	0 (0.0)	1 (1.4)		
Clinical manifestation					
None	6 (6.7)	0 (0.0)	0 (0.0)	36.274	<0.001
Poor	34 (37.8)	16 (23.5)	9 (12.9)		
Average	35 (38.9)	50 (73.5)	51 (72.9)		
Good	15 (16.7)	2 (2.9)	10 (14.3)		
Pathophysiology/ causes					
None	5 (5.6)	0 (0.0)	0 (0.0)	16.503	0.011
Poor	46 (51.1)	27 (39.7)	26 (37.1)		
Average	18 (20.0)	22 (32.4)	29 (41.4)		
Good	21 (23.3)	19 (27.9)	15 (21.4)		
Complications					
None	21 (23.3)	7 (10.3)	1 (1.4)	28.893	<0.001
Poor	61 (67.8)	47 (69.1)	45 (64.3)		
Average	6 (6.7)	11 (16.2)	16 (22.9)		
Good	2 (2.2)	3 (4.4)	8 (11.4)		
Treatment					
None	1 (1.1)	1 (1.5)	0 (0.0)	29.987	<0.001
Poor	34 (37.8)	14 (20.6)	3 (4.3)		
Average	23 (25.6)	17 (25.0)	18 (25.7)		
Good	32 (35.6)	36 (52.9)	49 (70.0)		

Discussion

The study outcome showed good awareness with poor in-depth knowledge of childhood diabetes among the clinical medical students studied. The final year and the penultimate classes were more aware than the year four students. The minimal awareness exhibited by the year four students may be attributed to their recent transition to clinical sciences from the basic medical sciences. Notwithstanding, the knowledge acquired from the basic medical sciences were meant to add value to the clinical practice.

Despite the awareness base, the medical students, irrespective of their classes, showed deficiency in the knowledge of the definition, etiology, and features of the disease. The poor knowledge of the definition of childhood diabetes by the students, especially the final year students who are close to medical school graduation is worrisome, because the definition of childhood diabetes is needed in making a new diagnosis as well as in self-blood glucose monitoring of already diagnosed patients. The inability to define it would invariably result in the poor evaluation and conceptualization of the disease, which poses a significant threat toward achieving control of the disease. An extrapolation of the definition of diabetes in adults would have been expected since both diabetes in childhood and adults have the same definition.[12] In addition to the fact that awareness and knowledge of diabetes in adults are more common than childhood diabetes.

A similar observation of poor knowledge despite adequate education and information was noticed in China with little or no change in the awareness of diabetes for 20 years despite massive dissemination of information from media and other relevant sources.[13] The authors concluded that people have selective amnesia to information, retaining things of interest while ignoring the rest consciously or unconsciously.

The pathophysiology of childhood diabetes explains the basis of the pathological processes, its relationships and biological importance, which is that 90% of the beta-cells of the pancreas are already lost in Type 1 diabetes mellitus (T1DM) by the time the patient becomes symptomatic.[12] The knowledge of pathophysiology will enable the future doctor to build an individual model of the disease in a given patient. Unfortunately, the knowledge on pathophysiology, types, and causes was lacking among the students, especially the year four and five classes.

The clinical manifestations are usually non specific and mimic other common childhood conditions and treatment is with life-long insulin, dietary control, and regular exercise. The knowledge of the clinical manifestation, as well as the treatment, was good, especially among the year 6 students.

Table 3: Gender distribution on knowledge of childhood diabetes

Knowledge	Gender		χ^2	*P*
	Male, *n* (%)	Female, *n* (%)		
Definition				
None	103 (72.5)	66 (76.7)	0.769	0.681
Poor	0 (0.0)	0 (0.0)		
Average	11 (7.7)	7 (8.1)		
Good	28 (19.7)	13 (15.1)		
Types				
None	2 (1.4)	1 (1.2)	0.916	0.821
Poor	132 (93.0)	82 (95.3)		
Average	7 (4.9)	3 (3.5)		
Good	1 (0.7)	0 (0.0)		
Clinical manifestation				
None	2 (1.4)	4 (4.7)	4.081	0.253
Poor	38 (26.8)	21 (24.4)		
Average	82 (57.7)	54 (62.8)		
Good	20 (14.1)	7 (8.1)		
Pathophysiology/causes				
None	3 (2.1)	2 (2.3)	6.619	0.085
Poor	55 (38.7)	44 (51.2)		
Average	42 (29.6)	27 (31.4)		
Good	42 (29.6)	13 (15.1)		
Complications				
None	11 (7.7)	18 (20.9)	13.844	0.003
Poor	95 (66.9)	58 (67.4)		
Average	24 (16.9)	9 (10.5)		
Good	12 (8.5)	1 (1.2)		
Treatment				
None	1 (0.7)	1 (1.2)	1.206	0.752
Poor	32 (22.5)	19 (22.1)		
Average	33 (23.2)	25 (29.1)		
Good	76 (53.5)	41 (47.7)		

Recognition of the condition by the populace depends to a large extent on awareness of the clinical manifestations. Hence, the need for improved knowledge of the symptoms and signs among the students who are the prospective disseminators of information to the public.

All three classes had poor knowledge of the complications of childhood diabetes, especially diabetes ketoacidosis (DKA). There was a also a deficiency in the knowledge of complications by the public,[3,4] which could be a reflection of the poor knowledge of the health-care professionals, a cause and effect relationship. DKA is a life-threatening, acute complication of T1DM; it accounts for 95% of deaths associated with T1DM.[14] Most of the newly diagnosed children with diabetes present with DKA and most of its clinical manifestations are confused with symptoms of other common childhood diseases. Similarly, poor knowledge of DKA was also noticed in a study among Chinese students.[8] However, Chinese students with medical background had better knowledge, and 72.5% of the males in that study had poor knowledge of the definition. Whereas, in our study, there was really no differential knowledge with regards to gender except in the knowledge of complications. The females had a better idea of the complications ($P = 0.003$), the reason for that was not quite obvious. Previous studies[15-17] have shown an overall low level of diabetes-related knowledge among the youths. By 2030, it is predicted that the number of youths in Africa would have increased by 42% and medical students form a substantial part of this group.[18] Furthermore, following the global prediction of double-fold increase in the prevalence of diabetes, including childhood diabetes by the year 2030.[19] It becomes imperative to assess and address the degree of knowledge deficiency of these important groups of people who are meant to impact the society as the future pillars of the medical profession.

The 2014 ISPAD guideline[20] emphasizes the need for diabetes education by health care providers, which is an integral part of the management of childhood diabetes. It enables individuals to take charge of the management of their diseases, which culminates in better management outcomes.

This study revealed a gap in knowledge of the basic sciences of childhood diabetes and clinical science, particularly among the 4th year students. The curriculum, if revised from the basic sciences, would enable the year four clinical students who just finished their basic sciences have a background knowledge of the condition. There was also knowledge deficiency among year five and final year students despite their clinical exposure. The above observations were also noticed in diabetes-related knowledge assessment studies among medical students in Libya, India, and China.[6,8,19,20]

It is, however, important to know that though knowledge of childhood diabetes is not sufficient, it grew with the duration of their studies. This is not surprising since the content of clinical education includes diabetes in later years of medical school. The unelaborate and not too detailed lecture schedules and clinical exposure of this penultimate and final year medical students could also contribute to the poor in-depth knowledge of the different aspects.

What could have caused the gross knowledge deficiency of childhood diabetes among the students? The answer is not farfetched; in the developing world like Nigeria emphasis is more on infectious diseases. In the authors' opinion, the above observation is also reflected in the curriculum where fewer lecture periods are assigned to non infectious diseases, childhood diabetes inclusive.

Conclusion

This study revealed a knowledge gap in the basic sciences and the clinical science of childhood diabetes, particularly among the 4th year students. Most of the clinical medical students in years five and six were aware that diabetes exists in children. However, in-depth knowledge of the different aspects of childhood diabetes was grossly deficient among them.

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Conflicts of interest
There are no conflicts of interest.

Ethics approval and consent to participate
Ethics approval was obtained from the Health Research and Ethics Committee of University of Nigeria Teaching Hospital Enugu, Ituku Ozalla. Written informed consent was obtained from the medical students.

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