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KNOWLEDGE AND AWARENESS ABOUT DIABETIC KETOACIDOSIS AMONG MEDICAL STUDENTS OF UMM-AL-QURA UNIVERSITY MAKKAH, SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objectives: Diabetes mellitus (DM) is a prevalent metabolic problem worldwide; it has many serious complications. The most severe and fatal metabolic complication of diabetes mellitus is diabetic ketoacidosis (DKA); thus, the present study aimed to assess the level of awareness and knowledge about DKA among Umm Al-Qura medical students.
Methods: The design of this study is cross-sectional, assessing the level of knowledge and attitude towards diabetes and diabetic ketoacidosis among medical students at Umm Al-Qura University, Makkah, Saudi Arabia. Data were collected from September 2023 to November 2023 via an online, self-administered questionnaire that was distributed electronically via social media.
Results: The study enrolled 568 medical students. Regarding basic knowledge about diabetes mellitus, a statistically significant difference between the genders was revealed: 257 (98.5%) of females and 291 (94.8%) of males correctly answered the question of whether diabetes is related to the endocrine pancreas or not (0.021). Moreover, another significant difference between the two genders, 241 (92.3%) females and 266 (86.6%) males, correctly answered the question of whether HbA1c is the best indicator of glycemic control or not with a significant p-value (0.030). However, adequate knowledge about DKA definition and management was found regarding the DKA knowledge questions, and the participants have good expertise.

Conclusions: The study showed that students had a good level of knowledge of basic information related to diabetes and diabetic ketoacidosis definition and management.

Keywords: Medical students, Awareness, Knowledge, DM, DKA

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INTRODUCTION

Diabetes mellitus (DM) is a medical condition marked by elevated glucose levels in the bloodstream (1). There are several types of diabetes mellitus, but type 1 and type 2 are the most common types (2).

Type 2 is the most prevalent type of diabetes. This mainly affects adults and arises from insufficient insulin production or the body's resistance to insulin, which are common factors underlying diabetes. Type 1 diabetes, often referred to as juvenile diabetes, is characterized by little or no pancreatic insulin production. Throughout the past few decades, diabetes has been progressively rising in both incidence and prevalence (1). DM can result in several long-term issues and can lead to death (3). The complication is divided into two main types: microvascular and macrovascular. Microvascular effects on small vessels can lead to retinopathy, neuropathy, and nephropathy. Macrovascular disease affects significant vascular systems, including peripheral artery disease, and can lead to coronary artery disease and cerebrovascular disease (4).

The most severe and fatal metabolic complication of diabetes mellitus is diabetic ketoacidosis (DKA), which is caused by severe hyperglycemia. DKA can happen in people with both type 1 and type 2 diabetes; however, it seems to occur more frequently in young people with type 1 diabetes (5).

According to the guidelines provided by the International Society for Pediatric and Adolescent Diabetes (ISPAD) in 2022, DKA is diagnosed by criteria including hyperglycemia (blood glucose >200 mg/dl), metabolic acidosis (venous pH <7.3 or serum bicarbonate <18 mmol/L), ketonemia (blood beta-hydroxybutyrate ≥3 mmol/L), or moderate to large ketonuria (6).

Saudi Arabia (SA) has a 20.2% prevalence of DM. According to the International Diabetes Federation (IDF), there are 132,600 instances of T1DM globally each year, with SA placing eighth with 2,800 cases annually. Moreover, almost 24% of children with newly diagnosed diabetes have DKA (7). DKA is the primary cause of death in diabetic patients, making it a significant public health problem. Hence, medical students' knowledge, education, and awareness of DKA are essential since they will eventually deal with this serious public health issue (4).

A study conducted among medical students in a tertiary teaching hospital showed that most of the students have basic knowledge regarding diabetes mellitus and clinical features and management, and only 50% of the respondents were aware of DKA (4). Another study at Jazan University in Saudi

Arabia was intended to assess medical students' understanding and awareness of DKA. According to the survey, pupils understood the fundamentals of diabetes and the definition and treatment of DKA well.

However, there is a defect in the information level regarding electrolyte disturbance and fluid replacement in DKA (8). Accordingly, we aim to conduct a cross-sectional study to assess the level of awareness and knowledge about DKA among Umm Al-Qura medical students.

MATERIAL AND METHODS

Study Design and Population:

This is a cross-sectional study to assess the level of knowledge and attitude towards diabetes and diabetic ketoacidosis among medical students at Umm Al-Qura University, Makkah, Saudi Arabia, between September 2023 and November 2023. The inclusion criteria were all clinical years from the fourth to the sixth year, with students aged between 21 and 25, both genders.

Study procedures:

We estimated that the sample size required for the analysis would be 255, calculated by Raosoft, with a confidence level of 95 and a 5% margin of error. Nonetheless, data from 568 participants were ultimately gathered. The sample was evenly distributed among all clinical years.

Data Collection:

The data was collected using an online survey that participants could complete independently. We used a structured questionnaire developed by a previous study, pre-validated with similar objectives (8). divided into four sections, with the first section containing the consent form. The second section consists of the participant's sociodemographic data. The third section assesses the participants' knowledge of DKA. The fourth section assesses the participants' basic knowledge about diabetes. The participants' responses were gathered in the form of either yes or no answers or multiple-choice questions.

Statistical Analysis:

The analysis of the data was done using SPSS version 26. The Chi-square test was utilized to evaluate and compare the data's mean, standard deviation, and statistical significance. The results are considered statistically significant if they are less than 0.05.

Ethics Approval:

The study was conducted following the approval of the Biomedical Research Ethics Committee at Umm Al-Qura University in Makkah City, Saudi Arabia. (Approval No. HAPO-02-K-012-2023-09-1767).
Participants were asked for their consent before completing the questionnaire.

RESULTS

A total of 568 participants agreed to participate in this study; 261 (46%) were females, while 307 (54%) were males. Regarding the students' academic year, a total

Characteristic		Number	%
Gender	Female	261	46.0
	Male	307	54.0
Academic year	Fourth year	192	33.8
	Fifth year	189	33.3
	Sixth year	187	32.9

Table 1: Participants' gender and academic year

Questions	Males n (%)		Females n (%)		P-value
	Correct answers	Incorrect answers	Correct answers	Incorrect answers	
DKA is not an acute complication of diabetes	208 (67.8)	99 (32.2)	186 (71.3)	75 (28.7)	0.411
DKA is seen in both type 1 and 2 diabetes	157 (51.1)	150 (48.9)	144 (55.2)	117 (44.8)	0.354
Decreased blood glucose is not a component of DKA	185 (60.3)	122 (39.7)	160 (61.3)	101 (38.7)	0.863
Electrolyte depleted in DKA is potassium	253 (82.4)	54 (17.6)	203 (77.8)	58 (22.2)	0.171
Fluid should be replaced is NS and DNS	241 (78.5)	66 (21.5)	210 (80.5)	51 (19.5)	0.603
Short acting insulin is used in DKA	257 (83.7)	50 (16.3)	222 (85.1)	39 (14.9)	0.729
IV is the mode of insulin administration	262 (85.3)	45 (14.7)	225 (86.2)	36 (13.8)	0.810
DKA is managed in ICU	228 (74.3)	79 (25.7)	186 (71.3)	75 (28.7)	0.449
Insulin and IV fluids are the first line management of DKA	283 (92.2)	24 (7.8)	239 (91.6)	22 (8.4)	0.878

Chi-square test.

Table 2: Basic knowledge regarding diabetes

of 192 (33.8%) of participants were from the fourth year, and 189 (33.3%) were from the fifth year, while sixth-year students were 187 (32.9%) of the total participants (Table 1). The participants were classified based on their answers into two groups: correct and incorrect. Moreover, the participants' basic knowledge about diabetes mellitus was assessed and shown in (Table 2).

Further analysis revealed a statistically significant difference between the two genders, 257 (98.5%) of females and 291 (94.8%) of males who correctly answered the question of whether diabetes is related to the endocrine pancreas or not (0.021). Moreover, another statistically significant difference between the two genders, 241 (92.3%) females and 266 (86.6%) males who correctly answered the question of whether HbA1c is the best indicator of glycemic control or not with a significant p-value (0.030) (Table 2).

Regarding participants' answers to the DKA knowledge questions, the participants have good knowledge of DKA definition and management. However, there was no statistically significant difference between participants' knowledge of DKA definition and management. All participants' answers are shown in (Table 3).

Questions	Males n (%)		Females n (%)		P-value
	Correct answers	Incorrect answers	Correct answers	Incorrect answers	
Diabetes is related to endocrine pancreas	291 (94.8)	16 (5.2)	257 (98.5)	4 (1.5)	0.021
Symptoms of DKA	284 (92.5)	23 (7.5)	249 (95.4)	12 (4.6)	0.165
HbA1c is the best indicator of glycemic control	266 (86.6)	41 (13.4)	241 (92.3)	20 (7.7)	0.030
A cut-off value of FBS for diagnosing diabetes mellitus	186 (60.6)	121 (39.4)	142 (54.4)	119 (45.6)	0148
Meaning of PPBS	244 (79.5)	63 (20.5)	218 (83.5)	43 (16.5)	0.236

Chi-square test.

Table 3: Knowledge regarding DKA

DISCUSSION

Diabetic ketoacidosis (DKA) is a life-threatening sequela of diabetes, necessitating urgent medical intervention. This study aims to assess the knowledge and awareness of medical students from Umm Al-Qura University regarding DKA. The study included students in their clinical years who had finished studying the theoretical aspects of physiology, pathology, and pharmacology related to diabetes and will soon have the opportunity to encounter real-life clinical scenarios. In these settings, they will come across numerous diabetic patients who are experiencing both acute and chronic complications.

A total of 568 participants agreed to participate in the study, with 46% being females and 54% males. The distribution of participants across various academic years was 33.8% from the fourth year, 33.3% from the fifth year, and 32.9% from the sixth year. The study assessed participants' basic knowledge of diabetes mellitus, and our results are comparable with similar studies conducted at a Saudi University(8). and a Southern Indian University (4). which found students to have good knowledge regarding diabetes definition and clinical features.

This has implications for medical education and curriculum development. Addressing the gaps in knowledge identified in this study between the two genders, particularly in areas related to the endocrine pancreas and glycemic control, could be beneficial in improving the understanding of diabetes among medical students.

It is essential to develop targeted educational interventions that focus on these specific areas to enhance students' knowledge and prepare them for the clinical management of diabetes. Medical students and healthcare professionals play a crucial role as the primary source of information for patients. Therefore, they need to possess elevated levels of knowledge concerning diabetes and

its associated complications, including diabetic ketoacidosis (DKA) (9,10).

Moving on to participants' knowledge of diabetic ketoacidosis (DKA), the results indicated an overall solid understanding and good knowledge of DKA definition and management. However, no statistically significant differences were observed among participants regarding their grasp of DKA definition and management. This suggests that participants, regardless of gender, academic year, or other factors, had similar knowledge regarding DKA.

However, it is essential to note that this study had some limitations. The sample size was confined to MBBS students from a particular institution, potentially limiting the applicability of the findings to a more extensive population. Additionally, the study only assessed the participants' knowledge through questionnaire-based responses, which may not fully reflect their practical skills or clinical decision-making abilities.

CONCLUSION

In conclusion, this study highlighted the knowledge level of MBBS students at Umm Al-Qura University regarding DKA. Gender differences were observed, with females demonstrating a better understanding of certain aspects of diabetes. The findings emphasize the need for targeted educational interventions to improve students' knowledge in specific areas and better prepare them for managing diabetes and its complications in clinical settings. Further research involving more significant and diverse samples would provide a more comprehensive understanding of medical students' knowledge about DKA.

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Conflicts Of Interest

The author declares that there is no conflict of interest.

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