ASSESSMENT OF THE KNOWLEDGE REGARDING DIABETES MELLITUS IN MEDICAL STUDENTS OF NEPAL

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ABSTRACT

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder with a very high prevalence. Adequate knowledge about diabetes mellitus is essential for medical students as they are future frontline warriors for its management. In the present study, we have attempted to assess the knowledge of medical students related to various aspects of DM.

MATERIAL AND METHODS

In this cross-sectional study, 445 medical students studying in the Universal College of Medical Sciences (UCMS), Bhairahawa, Nepal were included. A total of 20 self-designed questionnaires regarding DM were used as a study tool. Each question was allocated a score of one making 20 the highest possible score. The students who scored 13 (65%) or more were regarded as having good knowledge, and those scoring below 13 were considered as having poor knowledge related to DM. Statistical package for social sciences (SPSS) version 16 was used for data analysis.

RESULTS

Among all the participants, 309 (69.4%) were pre-clinical and 136 (30.6%) were clinical students. The mean knowledge score of the total participants was 13.54 ± 3.68. The clinical students (16.23 ± 2.26) was found to have better knowledge about DM than the preclinical students (12.36 ± 3.56). Year wise evaluation showed that, on average, all except first-year students had good knowledge regarding DM, with the final year students having highest mean score (18.80 ± 2.29). No significant difference in the knowledge was found between MBBS and BDS students.

CONCLUSION

The majority of the medical students had good basic knowledge regarding DM. Clinical students had significantly higher knowledge in comparison to preclinical students.

KEYWORDS Diabetes mellitus, Knowledge, Medical students.

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INTRODUCTION

Diabetes mellitus (DM) is a metabolic syndrome that has become a global threat in past few years.[1] It is one of the commonest diseases with high mortality and morbidity.[2] It was estimated that the patients of DM will be doubled between 2000 and 2030 AD with a high impact in Asian countries.[3] DM was not a major health issue for Nepal a few decades back but in recent years the burden of type-2 diabetes has increased rapidly.[4]

Effective management of DM requires a multidisciplinary approach. The modern approach for the management of DM gives more emphasis on patient empowerment by increasing awareness and motivation.[5] Medical students are future doctors who will be the frontline stakeholders for providing education and for the effective treatment of diabetic patients. Many studies have been conducted throughout the world about knowledge, attitude, and practice regarding DM in a different set of the population but only a few studies have been done on medical students and no study has been done so far in Nepal. Hence in this study, we have attempted to assess the baseline knowledge of preclinical and clinical students of Universal College of Medical Sciences, Nepal regarding DM. This study can be highly beneficial to know the effectiveness of curriculum related to DM in medical studies.

MATERIAL AND METHODS

Study design and settings

This study was conducted at Universal College of Medical Sciences (UCMS), Nepal from July to August 2020 AD after taking approval from the institutional review committee (UCMS/IRC/023/20). In this cross-sectional study convenience sampling technique was used and MBBS and BDS students from the first year to the final year were included. The questionnaires along with consent form and well explained purpose of study were distributed through an online Google form.

Development of questionnaire and validation

The questions were developed after extensive study of various questionnaire-based studies on DM.[3,5-9] The questions were thoroughly structured, reviewed, revised, and necessary modifications were made so that it could truly assess the basic knowledge of medical students regarding diabetes. For validation of the questionnaire, a thorough consultation with the experts including physicians, surgeons, and physiologists was done and further necessary customization was also done. Then a pilot study was conducted in 18 students and minor modifications such as rephrasing were done according to their feedback.

Questionnaire content

The first segment of the questionnaire contained demographic details like age, sex, nationality, stream, year of study, and diabetic information about their first degree relatives. The second segment was comprised of 20 questionnaires regarding the knowledge of etiology, risk factors, pathogenesis, symptoms, complications, and management of DM.

Scoring criteria

Each answer was assigned the maximum score of one, making 20 the highest possible score. For most of the questions (17), each correct answer would yield a score of one and an incorrect answer would yield zero. Three questions had multiple answers possible and were informed as such. For these questions, the score for each correct option was equidistributed to yield the total score of one. The students who scored 13 (65%) or more were regarded as having good knowledge, and those scoring below 13 were considered as having poor knowledge.

Data processing and analysis

Statistical package for social sciences (SPSS) version 16 was used for data analysis. The results were expressed in frequency and percentage and a chi-square test was performed to see the association between categorical variables. A p-value of less than 0.05 was considered statistically significant. Independent samples t-test was applied to compare the mean knowledge scores between binary variables

RESULTS

A total of 512 students from MBBS and BDS program were approached among which 445 (87%) students responded. Among them, 282 (63.37%) were females and 163 (36.63%) were males. The participants were grouped as preclinical (first and second year) and clinical (third, fourth, and final year) of which 309 (69.4%) were preclinical and 136 (30.6%) were clinical students. The mean age of the study participants was 21.47 years. The year-wise distribution of the students, along with the programs of study enrolled in, is shown in Figure 1.
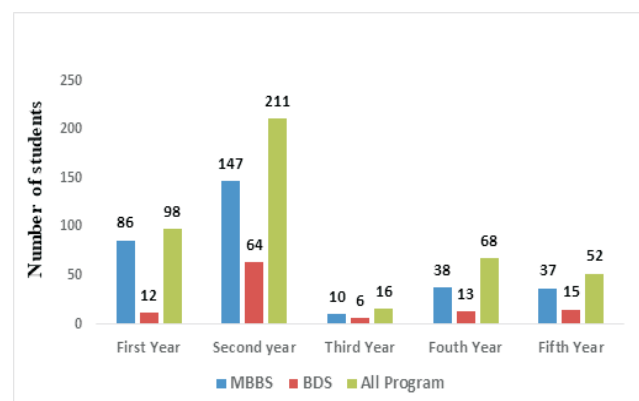

Figure 1. **Study year wise distribution of the study population**

ORIGINAL ARTICLE

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Twenty questions were asked to the participants and their responses are described below, as well as in Table 1. The majority (435, 97.8%) of the students knew that blood glucose is increased in DM and 401 (90.1%) respondents rightly identified that DM is due to dysfunction of pancreas. Most of the students (363, 81.6%) appropriately recognized DM as a chronic disease. Among all the participants, 418 (93.9%) rightly estimated that the prevalence of DM is increasing day by day. The next question was to recognize the risk factors for DM. Five right options were provided (family history, obesity, sedentary lifestyle, stress, and eating high carbohydrate diet) where multiple answers were possible. Only 102 (22.9%) of the participants identified all possible risk factors.

Table 1. Questionnaires for the assessment of knowledge and percentage of correct responses

Questions	Correct answers given by N (%)		
	Total (N = 445)	Preclinical (N = 309)	Clinical (N = 136)
DM is a metabolic syndrome characterized by (increased/decreased) blood sugar level	435 (97.8)	300 (97.1)	135 (99.3)
Dysfunction of which of the following organ leads to DM?	401 (90.1)	272 (88.0)	129 (94.9)
DM is a chronic disease (Yes/No)	363 (81.6)	237 (76.7)	126 (92.6)
Do you think, in general, the prevalence of DM is increasing?	418 (93.9)	285 (92.2)	133 (97.8)
Generally type 1 DM occurs in (Children/Adults)	257 (57.8)	154 (49.8)	103 (75.7)
Immune-mediated process with β-cell auto-antibodies is commonly seen in (type1/type2) DM.	277 (62.2)	168 (54.4)	109 (80.1)
Do you know the WHO diagnostic criteria for DM (Yes/Not sure) /	317 (71.2) /	192 (62.1)/	125 (91.9)/
What is WHO diagnostic criteria for DM?	372 (83.6)	187 (60.5)	125 (91.9)
Are you familiar with the term OGTT?	300 (67.4)	172 (55.7)	128 (94.1)
DKA is more commonly seen in (type1/type 2) DM	269 (60.4)	166 (53.7)	103 (75.7)
Does physical work or exercise and Yoga based life style modification help to prevent diabetic complications?	419 (94.2)	287 (92.9)	132 (97.1)
Most common route of insulin administration	249 (56.0)	141 (45.6)	108 (79.4)
HbA1c (glycated Hb) is an important indicator of long-term glycemic control with the ability to reflect the cumulative glycemic history of (15 days/1-2 months/2-3months/ 3-6 months)	264 (59.3)	168 (54.4)	96 (70.6)
During the surgical procedure of diabetic patient under insulin therapy, the dose of insulin should be (increased/ decreased/ remain same)	87 (19.6)	57 (18.4)	30 (22.1)
Most common adverse effect of insulin therapy	316 (71.0)	204 (66.0)	112 (82.4)
NOT the warning signs of hypoglycemia	223 (50.1)	120 (38.8)	103 (75.7)
Severe form of hypoglycemia treated with	238 (53.5)	146 (47.2)	92 (67.60

Remaining three questions had multiple answers possible, and are described above. OGTT-Oral Glucose Tolerance Test; DKA -Diabetic Ketoacidosis; IV- Intravenous

The next question dealt with the common symptoms associated with DM which also had multiple responses possible. Six options were given of which four (polyuria, polydypsia, weight loss and fatigue, and poor wound healing) were right and two (loss of appetite and abdominal pain) were wrong. Only 113 (25.4%) of the students were able to identify all the right symptoms. In next question, more than half (257, 57.8%) of the students correctly pointed out that type 1 DM occurs mostly in children. Of the total students, 277 (62.2%)

accurately figured it out that immune- mediated destruction of pancreatic beta cells occurs type 1 DM. Of the total participants, 317 (71.2%) claimed to know about the WHO diagnostic criteria whereas 128 (28.7%) were not sure about it. Among all, 372 (83.6%) correctly identified the WHO criteria. Of the total participants, 300 (67.4%) were familiar with the oral glucose tolerance test (OGTT). The next question was about complications of DM and included seven options of which six were correct and one was incorrect. Only 14 (3.1%) of the students correctly identified all of the correct options. In another question, 269 (60.4%) of the participants responded correctly that type 1 DM mostly associated with diabetic ketoacidosis. Majority of the participants 419 (94.2%) rightly responded that physical work, including exercise and yoga would help to prevent DM complications.

More than half (249, 56%) of the respondents correctly specified subcutaneous route as route of administration of insulin. In the next question, we wanted to know the time interval that the glycated hemoglobin (HbA1c) could indicate the glycemic control, and 264 (59.3%) of the students predicted the interval correctly as two to three months. In next question, we found that 87 (19.6%) participants believed that the insulin dose should be increased during surgical procedure. Most of the participants (316, 71%) were able to identify hypoglycemia as the most common adverse effect of insulin therapy. In next question about half (223, 50.1%) of the students rightly identified the hypoglycemic signs. In the last question, 238 (53.5%) participants accurately identified intravenous glucose as the treatment of severe hypoglycemia.

The mean score of the total participants was 13.54 ± 3.68. Final year students had the highest mean score of 18.80 ± 2.29, whereas the first-year students had the lowest mean score of 9.41 ± 2.81. No significant difference in the scores was found between MBBS and BDS students ($p=0.290$). The mean score of clinical students was significantly higher than the preclinical students ($p < 0.001$) as shown in Table 2.

Table 2. Comparison of knowledge score of the participants

Variables		Mean ±SD	Mean Difference	p- Value	95% CI of the Mean difference	
					Lower	Upper
Level	Preclinical	12.36 ±3.56	- 3.87	< 0.001*	- 4.42	- 3.32
	Clinical	16.23 ±2.26				
Program	MBBS	13.66 ±3.67	0.40	0.290	- 0.34	1.17
	BDS	13.25 ±3.69				

* Statistically significant. p-value obtained from independent samples t-test.

From the scores obtained, participants were categorized as having good and poor knowledge about DM, based on the cut-off value of 13 (65% of the highest possible score i.e. 20). Chi-square analysis revealed a significant association of knowledge regarding DM with both years of study and between the preclinical and clinical groups ($p<0.001$). Both BDS and MBBS streams had similar knowledge of DM (Table 3).

Table 3. Association of categorical variables with good and poor knowledge regarding DM

Variables		Knowledge regarding DM		p–value
		Good (N)	Poor (N)	
Study program	MBBS	197	121	0.179
	BDS	72	55	
Level	Pre-clinical	145	164	< 0.001*
	Clinical	124	12	
Year of study	1st Year	11	87	
	2nd Year	134	77	
	3rd Year	15	1	< 0.001*
	4th Year	60	8	
	Final Year	49	3	

*** Statistically significant. *p*-value obtained from chi-square analysis.

DISCUSSION

We found that on average the students had a good knowledge regarding various aspects of DM. It was also observed that clinical students had significantly higher knowledge ($p<0.001$) in comparison to pre-clinical students. However, there was no significant difference ($p=0.179$) in knowledge between MBBS and BDS students.

Most of the medical students had the basic knowledge that DM is caused by an increase in blood glucose level and is due to the dysfunction of the pancreas. Similar findings were found in a study by Singh H[10]. In the present study, most of the students agreed that DM is increasing day by day which indicates their basic awareness toward the present scenario of the prevalence of DM. In total, more than fifty percent of the students knew that Type 1 DM is more common in children and is due to β-cell auto-antibodies. However, in comparison to the preclinical, very high percentage (more than two-third) of clinical students were able to specify the correct answer.

WHO has given much emphasis on the diagnosis of different types of DM and its implication in choosing appropriate treatments.[11] More than sixty percent of preclinical and ninety percent of clinical students answered correctly about the WHO diagnostic criteria for DM[12] which is surprisingly high in comparison to the study done in preclinical and clinical students (6% and 55% respectively) by Mumtaz S[13] in Karachi, Pakistan. In another study by Gosmanova et al[14] in Internal Medicine residents, it was observed that 72.4% of the residents were able to specify the correct answer about the diagnostic criteria of DM.

Yoga-based lifestyle modification and stress management training have shown a very positive impact on the management of lifestyle diseases like DM.[15] In the present study, we observed that more than ninety percent of the future doctors also believe that physical exercise and yogic techniques help in the management of diabetic complications.

Insulin is a double-edged sword as it is not only the most vital therapy for the management of DM but also one of the most

potentially harmful drugs if used carelessly.[16] We found that the overall knowledge of clinical students was better than pre-clinical students in regards to insulin therapy, route of administration, and complication. This shows that both theoretical knowledge as well as practical exposure has a better impact on learning in comparison to theoretical knowledge alone. There was poor knowledge among the medical students in regards to variation in the dose of insulin during surgical procedures as only less than twenty percentage of students indicated that the dose of insulin should be increased during the intra-operative periods.[17]

There was poor knowledge in preclinical students about the warning signs of hypoglycemia but more than two third of clinical students were able to rule out the incorrect warning sign of hypoglycemia. Clinical students had good knowledge about managing hypoglycemic emergency than preclinical. It may be again due to a lack of exposure in such clinical cases in preclinical students.

Three questions having multiple correct answers were also included in the study which inquired about risk factors, symptoms, and complications of DM. Though students were able to identify many correct options in each question, only near a quarter of students were able to identify all the correct answers regarding risk factors and symptoms and only 3.1% of the students were able to specify all the correct options regarding complications. This shows insufficient knowledge among medical students regarding these sections related to DM.

As per the curriculum of Tribhuwan University, diabetes mellitus is not included in the first year in detail. This is the reason behind poor knowledge in most of the first-year students. In the second year, students get theoretical knowledge about DM in an integrated way in different subjects of basic sciences, so more than sixty percent of the students were found to have a good knowledge regarding diabetes. From third year onwards, students are involved in community based family health program where they are encountered with the case study of life-style diseases like DM as a part of their training, and this knowledge is further potentiated by their exposures to the clinical cases in the hospital. Hence, in the clinical category, most of the students had good basic knowledge regarding diabetes mellitus.

CONCLUSION

The majority of the medical students had good basic knowledge regarding diabetes mellitus. However, knowledge of preclinical students was poor compared to clinical students. We strongly recommend that there should be a more clinically oriented approach and problem-based leanings at the preclinical level, which could develop the knowledge and basic idea of approaching different clinical conditions from the root level of student's education.

We acknowledge that this study was limited to a single

medical institution and again there are areas for bias in a questionnaire-based online survey. So we believe that studies with large sample size, including most of the medical institutions of Nepal are the demand of future.

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CONFLICT OF INTEREST

None

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