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Original Article

Education and knowledge in diabetic nephropathy

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A B S T R A C

To describe the knowledge of medical students about diabetic nephropathy (DN), its diagnosis, prevention and guidance on patient self-care. A cross-sectional and observational quantitative study was carried out in which a structured questionnaire was applied to the students of the 2nd year of medical graduation of a Faculty of Central-West Brazil, in 2017, containing 10 closed questions consisting in student identification and their knowledge regarding DN diagnosis, prevention and guidance. Measurements of association between academic knowledge and independent variables (age, gender, complete/incomplete higher education) were adopted, and significance level was set at $p < 0.05$. Although the interviewees initially reported that, they knew DM patients (50.63%), and patients with DN (10.13%), and also that they have knowledge about specificities of this disease, the results showed that reality is divergent. Most of the interviewees failed to characterize the disease, its complications, prevention, risk factors or even tests for evaluation. DN is an important complication of DM, affecting approximately 35% of diabetic patients. Despite their importance, students of the second year of the medical course in the Brazilian Midwest have demonstrated insufficient knowledge about this pathology. A larger study is necessary in the undergraduate courses, to detect deficiencies in the curricular configuration and to guarantee that the medical formation is embracive and universal, but the expectation is that at the end of the graduation this gap is fullfilled.

1. Introduction

According to the Guidelines of the Brazilian Diabetes Society (2015-2016), Diabetes mellitus (DM) presents as a heterogeneous group of metabolic dysfunctions due to defects in secretion and/or action of insulin hormone, resulting in an unusual state of hyperglycemia. Currently an epidemic of this disease is ongoing with approximately 387 million diagnosed individuals, with 80% of them living in developing countries. By 2035, an estimated 471 million individuals are to be diagnosed with DM around the world, with approximately 19.2 million cases being reported in Brazil (Adolfo Milech et al., 2016).

Diabetic Nephropathy (DN) appears as a serious complication of type 2 DM, clinically characterized as a renal micro vascular disorder that progressively increases the urinary albumin excretion associated with elevated blood pressure, leading to a decrease in the rate of Glomerular Filtration (TGF) (Obineche; Adem, 2005). This pathology affects 30 to 50% of patients with DM and is the most common cause of end-stage renal failure in dialysis patients in developed countries (USRDS, 2015; Pinto; Anção; Sakumoto, 1997; Murussi et al., 2008).

The high prevalence of DN directly increases the overall mortality, mainly because the presence of this pathology constitutes an additional independent risk factor for cardiovascular diseases (CVD). Thus, it is essential to establish preventive measures regarding the emergence of this complication, as well as its evolution or even measures to reduce the damages caused by the DN appearance (Anavekar et al., 2004). These preventive measures are possible through the early identification of non-genetic modifiable risk factors such as hyperglycemia, systemic arterial hypertension, presence of micro or macroalbuminuria, elevated levels of glycated hemoglobin, dyslipidemia (Czekalski, 2005) smoking, protein intake, presence of diabetic retinopathy and neuropathy (Murussi et al., 2003).

The medical professional plays a fundamental role in the application of all levels of prevention and evaluation. It´s the medical`s job to explain to the patient about his/her pathology, therapeutics, prophylaxis, complications and, act in health education as a strategy of prevention and health promotion (Murussi et al., 2003). All these measures, especially health education, are highly cost-effective, since they avoid high costs to the public health system and encourage the reduction of high mortality rates (De Zeeuw, 2004).

Pereira et al. (2012) carried out a study in which patients with DM participated in a group of educational activities and the results showed a significant increase in knowledge about diabetes disease. In the control group, which did not receive education about the disease, the observed changes in knowledge were inferior.

In the study by Braga et. al. (2012), in the Department of Endocrinology of the Clinics Hospital of the Faculty of Medicine of the Federal University of Goiás, it was observed that, after adopting an educational booklet and clarifications about the disease, patients with type 2 DM could recognize DN as a serious complication of DM. Before this project, about 68.75% of the patients interviewed did not know about DN.

Based on this information, the purpose of this study was to observe the knowledge about DN among academic students of the 2nd year of a Medical Graduate Course in Center-West of Brazil, in order to infer if such students have sufficient knowledge to perform care and guide their futures patients in endocrinology field.

2. Material and Methods

This is a quantitative, cross-sectional and observational study, with a descriptive approach, which used as a convenience sample, seventy-nine (79) academics enrolled in the second year of an medical graduation course in Brazilian Midwest. The student's knowledge was evaluated through an specific questionnaire about DN, applied to them, developed by the research team and approved by the Local Research Ethics Committee (Protocol CEP 195/11, dated 27th June 2011).

The questionnaires were applied from August 2016 to June 2017 and the inclusion criterion required that the participating students were regularly enrolled in medical school (second year). At the first moment, academics were informed about the objectives, methodology and confidentiality of the research data. In order to meet the requirements of the research protocol, those who agreed to participate signed an Free and Informed Consent Form - FICF (Attachment I) and then, a trained research team member instructed the interviewee to fill in the questionnaire (Attachment II). Students who refused to participate and complete the questionnaire were excluded, even after explaining the research objective.

The research instrument consisted of a structured questionnaire with questions that identified the student's profile regarding to age, progress in the medical course, number of an progress/completed graduations and, in this case, the knowledge field of the previous graduation; if the student already had contact with a patient with DM/DN and his level of relationship with this patient (meaning patient-medical student relationship, close relative, distant family member, known person).

For a second group of questions, five objective questions about DM were formulated, where the students answered whether or not they knew about DM complications, risk factors and prevention. In a third group of questions, the questionnaire contained specific statements about DN and the student should analyze these questions as true or false.

The information collected was tabulated in an Excel database and the statistical analyzes were computed using the RStudio Software. Frequency of knowledge about DM/DN was observed, and then age, gender and level of education (complete or incomplete graduation) were defined as independent variables. The bivariate analysis was performed using the independence test ($\chi 2$). Significance level was set at $p < 0.05$.

3. Results

The results are described in three blocks, according to the question´s divisions in the questionnaire and later the results will be correlated in the discussion.

3.1. Profile of participants

Among the 79 participants, 60.76% were female, 37.97% male and 1.27% did not respond. The mean age of the participants was 23.68 years (± 4.82), the mean age of the female participants was 23.94 (± 4.98) and male participants, 23.27 (± 4, 60) years, respectively. Of the interviewees, 74.68% are attending the first graduation and 24.05% are already graduates, 1.27% did not respond.

Among the participants, 94.94% were in the 4th period of medical school, 3.80% were in the 5th period and 1.27% did not respond; 50.63% of the respondents answered that they know someone with DM, 48.10% do not know and 1.27% chose not to respond. Already for DN, 10.13% reported that they know some patients with DN, while 88.60% do not know and 1.27% did not respond. For cases in which the interviewee knows some DM/DN patient, the level of relationship between the student and the patient was evaluated. All this information is expressed in figures 1-4 and table 1.

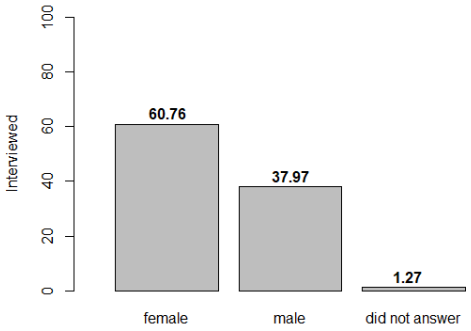

Figure 1- Profile of the students interviewed - Gender (%).

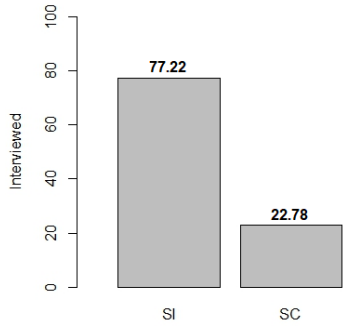

Figure 2 - Profile of the students interviewed – Educational level (%). SI (IG) - Incomplete Graduation; SC (CG) – Complete Graduation; * Among the students already graduated, 12 were Postgraduate (specialization, masters, doctorate)

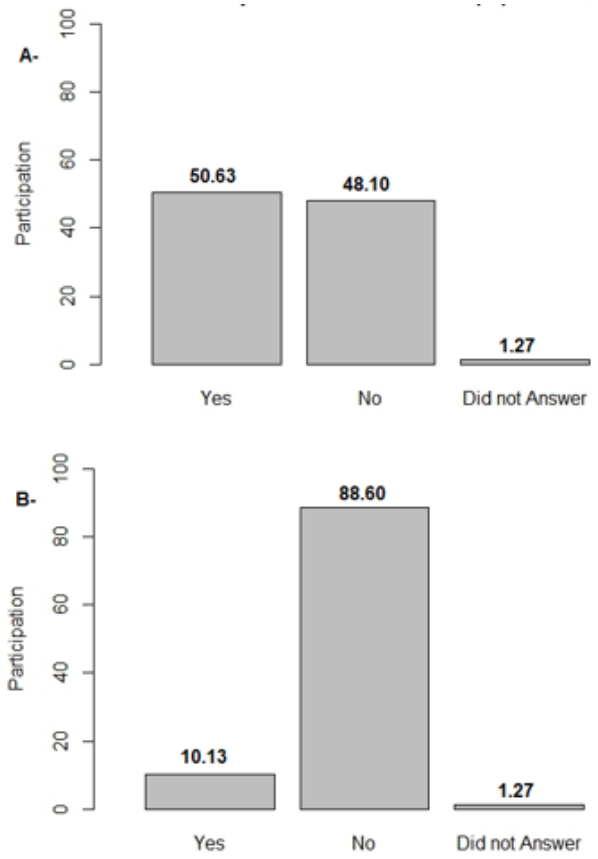

Figure 3 - Knows patients with DM/DN -%. A) Yes = I know a diabetic patient, no = I do not know diabetic patients; B) Yes = I know a patient who is treating DN, no = I do not know a patient who is treating DN. * If the respondent answered YES, the answers were stratified in close relatives (1st and 2nd grade kinship: parents, uncles, grandparents, siblings); distant relative (any kinship other than 1st and 2nd degree) and known (neighbor, co-worker, etc.).

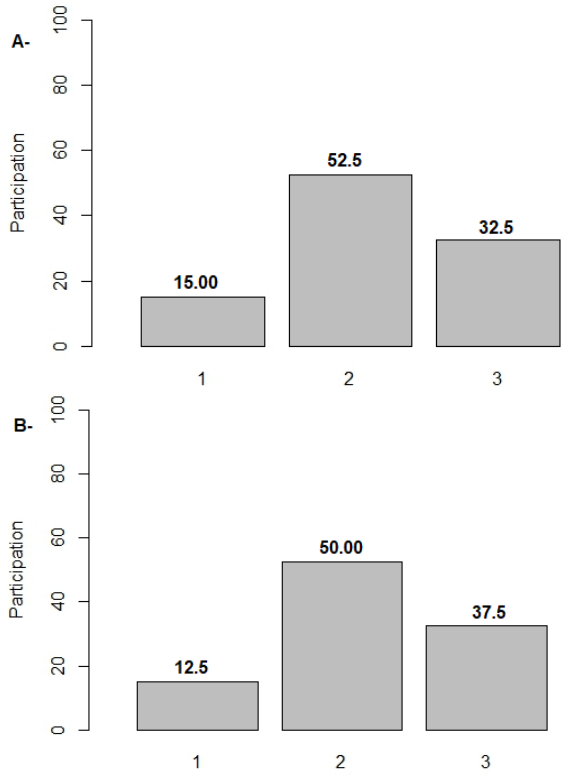

Figure 4 - A) Relationship level with DM patient (%). B) Relationship level with patient ND (%). Possible alternatives: 1- patient, 2- close relative, 3- distant relative or known.

Table 1 – Distribution of medical students of the Faculty in question by self-reported knowledge about what is DN according to independent variables.

Variable	Self-reported knowledge abou		p-value (χ^2
	Yes	No	
University gradua	n (%)	n (%)	
SC/PG	13	1	0,1234
SI	27	10	
Gender			
Female	23	8	0,3596
Male	17	3	
Age (years)*			
< 27 anos	29	10	0,2024
> 27 anos	11	1	

SC/PG- CG/PG Complete Graduation/Post-Graduation; SI- IG Incomplete Graduation; Chi-square test (χ^2) considering p <0.05; * As to age, the interviewees were stratified into two groups whose limiting age was 27 years. This age was defined for being the median between the highest and lowest ages.

3.2. Evaluation of the participants regarding with their knowledge of DM and DN

In the second block of questions, the interviewees would mark if they know about the subject matter (yes), if they do not know (no) or if they are not sure (NS). Questions were asked about self-assessment regarding knowledge about DM and its complications, as well as more specific questions about Diabetic Nephropathy (DN), its risk factors, prevention and tests for assessment. The distribution founded and it´s percentages can be analyzed according to the following Table 2.

3.3. Performance of participants in specific issues about DN

In this block, the respondent should answer 10 questions about DN, marking true (V) or false (F) according to his/her knowledge, or answering that he/she was not sure (NS) about that topic. In question 1, the interviewee would evaluate 9 items that represented or not the complications of DM: 17.72% answered NS, 2.53% opted not to answer this question. Of the 63 who responded, only 3.80% scored all 9 items. Item 2 presented the highest error rate (86.08%), which stated that polyuria, polydipsia and polyphagia are complications of diabetes, with correct feedback been false (F). For the other alternatives, the hit percentages are expressed in Figure 5.

Table 2 - Frequency of answers regarding the knowledge about DM/DN of medical students of a Faculty in the Brazilian Center-West.

Question	Answer	Number de Studen	Percentage
1 - Know the complications of diabetes?	Yes	63	79,75%
	No	1	1,27%
	Not Sure	13	16,45%
	Did not answer	2	2,53%
2 - Do you know what ND is?	Yes	40	50,63%
	No	11	13,92%
	Not Sure	27	34,18%
	Did not answer	1	1,27%
3 - Know the risk factors for ND?	Yes	24	30,38%
	No	17	21,52%
	Not Sure	37	46,83%
	Did not answer	1	1,27%
4 - Can guide the prevention of ND?	Yes	15	18,98%
	No	25	31,65%
	Not Sure	38	48,10%
	Did not answer	1	1,27%
5 - Know the exams to evaluate ND?	Yes	14	17,72%
	No	25	31,65%
	Not Sure	39	49,36%
	Did not answer	1	1,27%

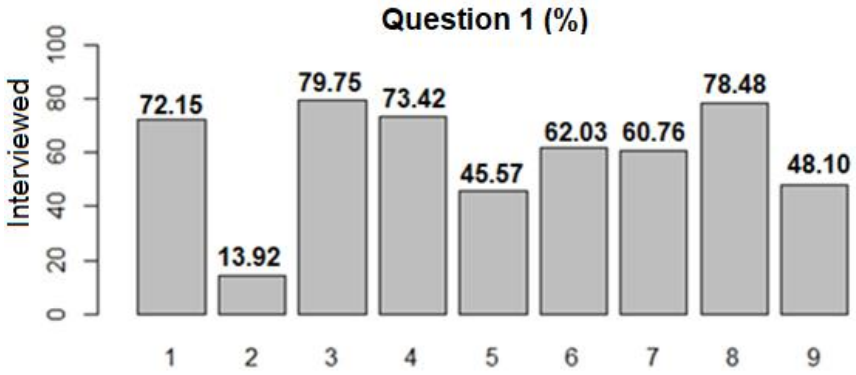

Figure 5 - The possible complications of DM are: 1- diabetes is a disease that does not presents complications; 2 - Polyuria, polydipsia and polyphagia; 3 - Ulcers in extremities (diabetic foot); 4- ketoacidosis; 5- dehydration; 6 - Cardiovascular diseases; 7- diabetic retinopathy; 8 - diabetic nephropathy; 9 - peripheral neuropathy.

In question 2, the interviewee would evaluate 9 items about the characteristic presentation of DN: 34.18% participants have chosen NS and 1.27% chose not to answer this question. Of the 51 who responded, only 2.53% scored the 9 items. Item 5 presented the highest number of errors (88.61%) followed by item 8 (83.54%). Item 5 stated that DN is a kidney disease associated with protein loss and the feedback is false; item 8 stated that DN is a complication that affects only patients with decompensated diabetes, and the feedback is also false. The proportions of correct answers in question 2 are recorded in Figure 6.

In question 3, the interviewee would analyze 12 items that represented or not risk factors for the development of DN: 41.77% answered NS and 1.27% chose not to answer the question. Of the 45 who responded, none scored correctly all the 12 items, and only 5.06% scored 10 items. Item 6 had the highest number of errors (96.20%), followed by item 8 (92.41%). Item 6 affirmed that intense physical exercise is a risk factor for DN and the correct template is true (V); and item 8 stated that acute illness or fever are also risk factors for DN and the correct template is true (V). The correct answer ratios of question 3 is recorded in Figure 7.

In question 4, the interviewee would analyze 9 items that represent or not prevention actions for DN in patients with DM: 34.18% answered NS and 2.53% did not respond. Of the 50 who responded, 11.39% scored correctly all 9 items. Item 6 had the highest percentage of errors (73.42%); followed by item 3 (64.56%). Item 6 stated that decreasing protein intake helps prevent DN and the correct template is true (V). Item 3 stated that increasing water intake helps to prevent DN and the correct template is true (V). The proportion of correct answers in question 3 are recorded in Figure 8.

In question 5, the interviewee would analyze 9 items that represent or not the tests that can be used for detection and/or monitoring DN: 39.24% answered NS and 2.53% did not respond. Of the 46 who responded, none scored correctly the 9 items and only 3.80% scored correctly 8 items. Item 8 had the highest number of errors (93.67%), followed by items 1 and 2 (92.41%). Item 2 stated that the assessment of fasting glycemia assists in detection or monitoring DN and the correct template is false (F). Item 8 stated that the evaluation of glycated hemoglobin is used for detection or monitoring DN and the correct template is false (F). Item 1 stated that renal ultrasound examination is used to detect or monitor DN and the correct template is false (F). The ratio of correct answers in question 5 is recorded in Figure 9.

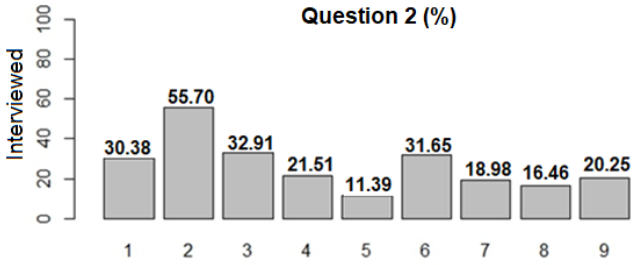

Figure 6 - Diabetic nephropathy is: 1- a complication of patients with renal disease; 2 - a chronic complication of diabetes; 3- an acute complication of diabetes and hypertension; 4- a chronic microvascular complication that can be triggered only by diabetes; 5- a renal pathology associated with urinary protein loss; 6- a more common complication in patients with type 2 diabetes; 7- a more common complication in patients with type 1 diabetes; 8- a complication that affects only patients with decompensated diabetes; 9- a complication that affects any diabetic patient.

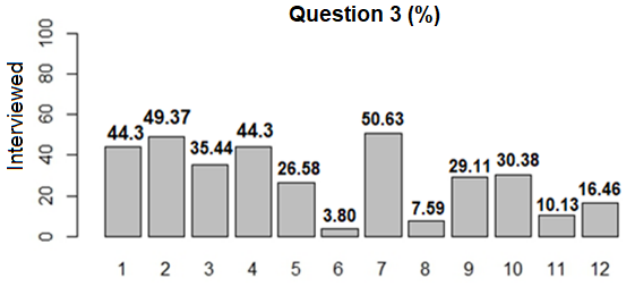

Figure 7- The recognized risk factors for the developing diabetic nephropathy are: 1-genetic predisposition; 2-hyperglycemia, dyslipidemia; 3-systemic arterial hypertension (SAH), heart failure; 4-smoking; 5-urinary tract infection; 6-intense physical exercise; 7-morbid obesity; 8- acute illness or fever; 9-protein overload; 10-gestation or menstruation; 11-black people; 12-use of antihypertensive drugs, such as ACE inhibitors.

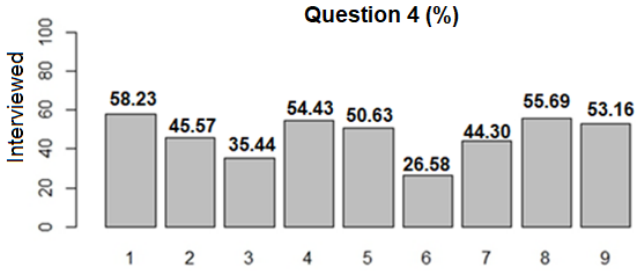

Figure 8 - The prevention of DN can be performed through: 1-glycemic index control; 2-Blood Pressure monitoring; 3-increasing water intake; 4-avoid alcohol abuse and smoking; 5-take the prescribed medication carefully and regularly; 6-decrease in protein intake; 7–lipidemia control; 8-practice of physical activities; 9-performing renal function exams periodically.

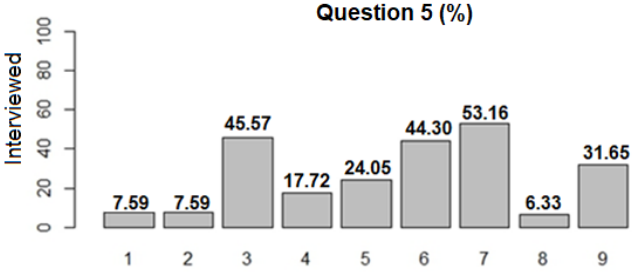

Figure 9 - Early detection or monitoring of diabetic nephropathy can be performed through the following examinations: 1 - renal ultrasound; 2- fasting glycemia; 3- Urine examination (EAS); 4 - AMAP; 5 - evaluation of cardiac enzymes; 6- urinary excretion of albumin; 7- evaluation of the glomerular filtration rate; 8 - evaluation of glycated hemoglobin; 9 - it is not possible to perform early detection of diabetic nephropathy.

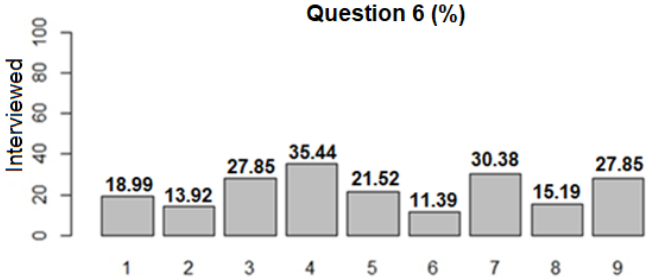

Figure 10 - In relation to the pathophysiology of diabetic nephropathy, the glomerulus is the lesion focus, where mesangial cell proliferation and excessive extracellular matrix production results from: 1 - poor genetic formation of renal tissue; 2- intracellular glucose increase; 3 - excess of extracellular glucose; 4 - chronic hyperglycemia; 5 - injury of renal blood vessels due to arterial hypertension; 6 - angiotensin increase; 7 - glomerular inflammation; 8 - excess of glycated hemoglobin; 9 - excess of protein (albumin, for example).

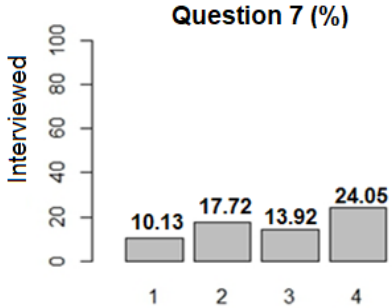

Figure 11- Regarding the screening of DN, microalbuminuria is indicative of glomerular damage resulting from diabetic nephropathy: 1 - in the initial stage; 2- in late stage; 3- at any time of the pathology manifestation; 4 - microalbuminuria is not relevant, only macroalbuminuria.

In question 6, the interviewee would analyze 9 items that represent or not the pathophysiological mechanism or the precipitating factor for glomerular lesion in DN: 54.43% answered NS and 5.06% did not respond. Of the 32 who responded, only 1.27% scored correctly all 9 items. Items 6 (88.61%) and 2 (86.08%) had the highest error rate. The item 2 affirmed that the increase of intracellular glucose is one of the contributing factors to glomerular lesion and the correct template is false (F). Item 6 stated that the increase in angiotensin is one of the factors that trigger glomerular lesion and the correct template is false (F). The ratio of correct answers in question 6 is recorded in Figure 10.

In question 7, the interviewee would analyze 4 items about whether or not microalbuminuria is considered a marker of DN according to DM stage (early or late): 56.96% people answered NS and 5.06% did not respond. Of the 30 students who answered, 5.06% scored all the 4 items. Items 1 (89.87%) and 3 (86.08%) had the highest numbers of errors. Item 1 stated that the presence of microalbuminuria is indicative of early-stage glomerular damage in DM and the correct template is false (F). Item 3 stated that the presence of microalbuminuria is indicative of DN at any time of manifestation of DM and the correct template is false (F). The proportion of correct answers in question 7 is recorded in Figure 11.

In question 8, the interviewee would analyze 8 items about the monitoring of patients with DN, which marker is used and if the monitoring should be done with patients with type 1 DM, type 2 DM or both: 54.43% participants answered NS and 7.59% did not respond. Of the 30 students who responded, none hit the 8 items. Item 6 had the highest number of errors (96.20%). Item 6 stated that patients with type 1 DM should only assess renal function after 5 years of diagnosis and the correct template is true (V). The proportions of correct answers in question 8 is recorded in Figure 12.

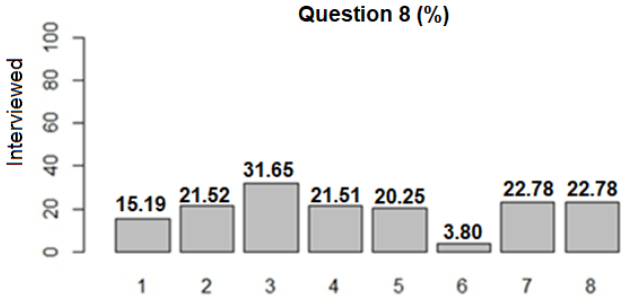

Figure 12 - Regarding urinary albumin monitoring: 1- only microalbuminuria is a marker of nephropathy; 2 - only macroalbuminuria is a marker of nephropathy; 3- Both portions, micro and macroalbuminuria, are markers of nephropathy and should be evaluated in diabetic patients; 4 - normoalbuminuric diabetic patients with altered glomerular filtration rate are at no risk of developing nephropathy; 5 - normoalbuminuric diabetic patients are at risk of developing nephropathy, even without changes in glomerular filtration rate; 6 - Patients with type 1 diabetes should only assess renal function after 5 years of diagnosis; 7- patients with type 2 diabetes do not need to evaluate renal function; 8 - Patients with type 2 diabetes should do renal function screening right after diagnosis, as soon as they gain blood glucose and hypertension control.

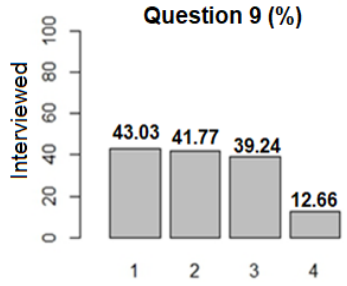

Figure 13 - The prevalence of diabetes mellitus: 1- is unrelated to the course of renal diseases; 2 - causes chronic renal failure and need for dialysis; 3 - increases the mortality of patients with chronic renal failure; 4 - is due to the "epidemic" of obesity.

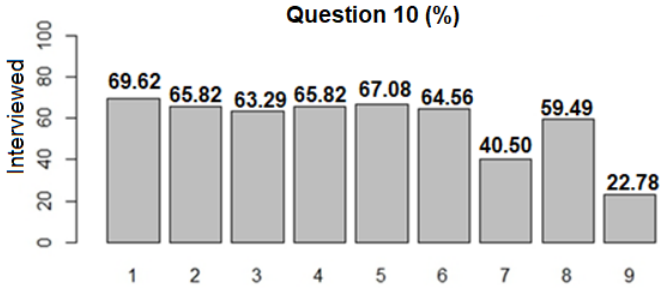

Figure 14 - What are the main aspects to improve the care and reception of diabetic patients: 1- update health professionals about the possible complications of diabetes; 2 - reorganization of health care and diabetic patient care programs; 3 - implementation of care protocols involving monitoring of risk factors and complications of the diabetic patient; 4 - evaluate the patient's knowledge about his illness; 5 - guide the patient about diet and exercise; 6 - insert other health professionals, besides the doctor, in the care of the diabetic patient; 7 - the patient is responsible for his health condition and must question the doctor about necessary care; 8 - the course of the pathology is not influenced by the information offered to the patient, and there is no need for additional guidance during medical appointment; 9 - it is not possible to prevent the complications of diabetes, since these are due to natural evolution of the disease and do not depend on the patient´s behavior or the guidelines offered by the doctor.

In question 9, the interviewee would analyze 4 items about the relationship of DM with renal failure: 34.18% answered NS and 5.06% did not respond. Of the 48 who responded, 7.59% scored correctly all the 4 items. Item 4 had the highest error rate (87.34%) and affirmed that the prevalence of DM is due to the obesity epidemic. The correct template is false (F). The proportion of correct answers in question 9 is recorded in Figure 13.

In question 10, the interviewee would analyze 9 items about the quality of medical care to the patient with DM:

22.78% of the students answered NS and 3.80% did not respond. Of the 58 who responded, 35.44% correctly scored all the 9 items. Item 7 presented the highest number of errors (59.50%). Item 7 stated that the patient should be responsible for his/her state of health and question the doctor about necessary care, the correct template is false (F). The ratio of correct answers in question 10 is recorded in Figure 14.

4. Discussion

4.1. Evaluation of knowledge about DM

Of the 79 respondents, 79.75% answered at the simplified questionnaire that they knew the complications of DM, however, in question 1 of the specific questionnaire concerning about DM, only 49.37% hit between 7 and 9 of the 9 items. Of these, only 28.21% had completed a graduate or postgraduate course.

Of the 79 interviewees, 16.46% (n = 13) scored in the simplified questionnaire that they were not sure about the complications of DM, but in the specific questionnaire, 61.54% (n = 8) of these 13 interviewed matched between 7 and 9 of the 9 items, and only 7.69% (n = 1) had a complete graduate course. From this, we can infer that having a completed university course was not a guarantee of better performance in the questions about the complications of DM, nor did it influence the self-perception of the interviewees about their knowledge.

Among the 79.75% (n = 63) of the respondents who reported knowing the complications of DM, only 49.21% (n = 31) had an excellent performance in the question about this subject, correctly answering between 7 and 9 of all 9 items. Among the 63 interviewees who reported knowing the complications of DM, 53.97% (n = 31) knows a patient with DM. Comparing the group that performed well in the matter of DM complications and those interviewed who said they knew someone with DM, it was noticed that 64.52% (n = 20) of those who performed well knew somebody with DM. Being enrolled in the 2nd year of medical school or already having a complete graduate course did not guarantee good performance in the assessment of knowledge about DM complications, but knowing someone with this disease, apparently did.

If the group of 79 students is enrolled in the same year of the medical course and submitted to the same curricular subjects; and if the fact of having a complete graduate course was not determinant to obtain a higher score in knowledge of DM complications assessment, it can be assumed that the acquisition of knowledge depends on other personal factors (such as monitoring the experience of someone with DM) and not just on academic factors.

DM is becoming an increasingly important disease in the world, considered as a public health problem and reaching increasing proportions with regard to the appearance of new cases. It is one of the main chronic diseases that affects the man, in addition, it involves many costs (Viana; Rodriguez, 2011; Grillo; Gorini, 2007). Due to Its importance in the world health scenario, since it affects all countries at all stages of development, it is essential that health professionals have in-depth knowledge about DM complications, prevention and evaluation, especially the doctor, who is the professional responsible for diagnosis, orientation, treatment and following-up the patients.

National and international entities have been discussing actions that can help controlling the progression of this disease and its complications which are often consequence of a care that does not consider the specificities of chronicity, with inadequate care models and aimed at curing diseases and not for prevention in all its lines of action (primary, secondary and tertiary) (Salci; Meirelles; Silva, 2017).

To prevent complications related to this disease, it is necessary to modify the lifestyle and there is a consensus that educational intervention in the care of diabetic patients is one of the most adequate and indicated strategies in the treatment of the people affected (Grillo; Gorini, 2007).

4.2. Evaluation of knowledge about DN

Of the 79 respondents, 50.63% (n = 40) answered in the simplified questionnaire that they know what DN is, but in question 2 of the specific questionnaire, which concerned about DN, 34.18% (n = 27) answered NS and only 11.39% (n = 9) of the participants scored correctly between 7 to 9 of all the 9 items. Among those interviewed who performed well, 88.89% (n = 8) knew a DM patient, but only 22.22% (n = 2) knew any person with DN. In addition, among the highest-performing participants, only 11.11% (n = 1) had a college degree. Overall, among the 50.63% who reported knowing someone with DM, most of them did not perform well on the issue of DN. It appeared that the participants judged they knew what DN was by responding yes in the simplified questionnaire but did not really know what DN was in the specific questionnaire.

Of the 79 participants, only 11.39% were able to correctly answer more than 7 items about DN, perhaps indicating that students in the 2nd year of medical school have not yet received enough knowledge about such a major DM complication. As only 11.11% of these patients had a complete secondary graduate education, but 88.89% knew some DM patients, knowledge about DN is acquired and influenced by non-academic factors.

Observing the difference between categorized groups of the respondents who reported having knowledge about DN, it can be seen that there is no significant difference between groups that had a complete and incomplete graduate/postgraduate course, female and male, and age greater or less than 27 years. Diabetic nephropathy is a complication that affects about 10% to 40% of patients with DM, and is currently, the pathology which is more associated with new cases of patients with kidney problems who undergo hemodialysis (Braga et al., 2012; Adolfo Milech et al., 2016).

Because ND is related to high mortality and its evolution is susceptible to prevention and regression, depending on a better care and guidance to the patient, it is essential that since its formation, medical professional is aware of this important complication of DM.

4.3. Evaluation of knowledge about risk factors to develop DN

Of the 79 participants, only 24 (30.38%) answered in the simplified questionnaire that they know the risk factors for developing DN, however, in question 3, which concerned about this matter, 41.77% (n = 33) scored NS and 15,19% (n = 12) scored correctly between 8 to 10 of all the 12 items. Of these 12 interviewees who performed highly, 66.67% (n = 8) did not have a college degree; 66.67% (n = 8) knew someone with DM, and only 1 (8.33%) knew someone with DN.

On the other hand, 16.22% (n = 6) of the participants who answered not sure about the risk factors for developing DN in the simplified questionnaire, had a good performance in the specific question of this matter, scoring correctly between 8 to 10 of all the 12 items.

Of all the participants, 58.23% responded been able respond about risk factors for developing DN, while 41.77% chose not to respond any item. The relatively low number of participants who had knowledge about this subject makes it possible to point out that students in this group did not receive this type of knowledge in the second year of medical school.

Considering the complexity of diabetic nephropathy, its prevention and treatment requires multifactorial

intervention in relation to the various risk factors, involving the control of arterial hypertension, hyperglycemia, dyslipidemia, smoking, nephrotoxins as well as the use of nephroprotective agents and changes in lifestyle, contributing for delaying the progression of renal injury and decreasing the risk of cardiovascular morbidity and mortality (Santos et al., 2015; Viana; Rodriguez, 2011).

It is imperative that health professionals are aware of all the factors that predispose to chronic microvascular complications. Among these factors, we highlight the type of treatment, the time that has elapsed since the diagnosis, as well as the nutritional status and behavioral factors (Santos et al., 2015).

The knowledge of the medical professional is essential for the care of patients with DM, and also having time during the medical appointments, so that clarifications and guidelines can be offered. A study realized by Salci et al. (2017) evaluated the care of patients with DM by a family health team, and verified that in most cases, attention to the patients was offered collectively, in order to provide care to a greater number of users, who were enrolled in the System for Registration and Monitoring of Hypertensive and Diabetic. This care was carried out in groups, optimizing the professionals agenda to attend a larger number of people with the same disease in a predefined day and time. In this dynamic, the main activity consisted in the delivery of medical prescriptions and, sometimes, but not in a systematic way, laboratory tests were requested. It was a strictly short period for providing medical care for the patients, which entailed restricting important activities, such as careful evaluation, listening of complaints and doubts, physical examination and individualized guidelines.

It is necessary to involve medical students in the search for the best possible knowledge about the pathologies that most affect the population, since chronic diseases have high potential to develop morbidities that have a negative impact on patients' quality of life, family and socioeconomic organization of the State. It is essential that the Unified Health System restructure the health-supply based on productivity, which makes it impossible having a worthy, complete medical appointment that meets the true proposal of health promotion.

4.4. Evaluation of knowledge about DN

Of the 79 respondents, 18.99% (n = 15) answered in the simplified questionnaire that they knew how to guide patients about DN prevention; however, only 11.39% (n = 9) performed well on question 4 which concerned about this matter, scoring correctly all of the 9 items; 2.53% (n = 2) answered NS. Of the 15 interviewees who considered themselves able to guide DN prevention, 60% (n = 9) had a complete graduate course, 66.67% (n = 10) knew someone with DM and 26.67% (n = 4) knew someone with DN.

In contrast, 48.10% (n = 38) of the interviewees indicated that they were not sure or did not know about DN prevention in the simplified questionnaire. Of these, 36.84 % (n = 14) had a good performance on the specific question 4, correctly answering 7-9 of the 9 items. 21.05% of these students had a university degree and 50% (n = 19) knew someone with DM.

Of all the participants, 67.09% (n = 53) had knowledge to respond about DN prevention, in opposition to the results obtained, since in the previous questions, only 11.39% had a good performance responding about what DN is and only 15, 19% knew how to respond about DN risk factors. It is contradictory that the participants do not know about the definition and risk factors of the pathology but know about its prevention. Probably the knowledge was not acquired among the subjects of the first and second years of medical school, since 32.91% of the group did not have knowledge to answer about DN; leading to consider once again that non-academic factors contribute to the acquisition of knowledge by some students. In relation to the prevention of complications such as DN, the lack of glycemic control leads to oxidative stress and endothelial dysfunction, precursor events of tissue damage and determinants for developing micro and macrovascular renal lesions. It is through oxidative stress and endothelial damage that hyperglycemia, arterial hypertension and dyslipidemia act in the genesis of DN. The persistence of these alterations may be responsible for the appearance of complications, even in individuals who use exogenous insulin (Adolfo Milech et al., 2016).

The insulin-dependent individuals are more predisposed to the occurrence of microalbuminuria, which precedes the onset of DN ((Adolfo Milech et al., 2016; Al-Agha; Ocheltree; Hakeem, 2013). It has to be considered that individuals can use insulin in an inappropriate way, which would be without following medical prescription or even using it to compensate sporadic extravagances (Santos; Marcon, 2014).

Hypertension further damages the kidneys by precipitating and accelerating kidney disease, which can lead to kidney failure if not diagnosed and properly handled. Annual blood and urine tests are the only way to detect the silent onset of diabetic kidney disease 9 (Guidelines, 2017).

Hence, we recognize the importance of orientation regarding lifestyle modification, adequate diet and correct use of medication, so that the patient is aware and able to identify risk factors and behaviors and can prevent complications such as DN. Only with the performance of a professional with good training and engaged in the care of their patients is it possible to offer a care that includes guidelines that will make a difference in the treatment and control of the patient's illness.

Chronic diseases such as DM brings some limitations and new tasks to patients, which are often not accepted and overcomed due a lack of knowledge to deal with them. The integral care to the person with diabetes must comprehend psychosocial and individual aspects to make it possible for the patient to live well with a chronic condition. Every health appointment should reinforced the perception of health risks, the development of self-care skills and the motivation to overcome this risks (Barbosa; Camboim, 2016). The medical professional should, at each visit, increase the patient's arsenal of information about his condition, enabling him to observe the signs of complications; to modify risk factors and to have quality of life, even with limitations.

4.5. Evaluation of knowledge about diagnostic and monitoring examinations of DN

Of the 79 participants, 17.72% (n = 14) answered in the simplified questionnaire that they know the tests for diagnosis and monitoring DN, but in the performance of question 5 that specific evaluate this subject, only 7.59% (= 6) scored correctly 7 out of 9 items. Of these 17.72%, 50% (n = 7) have a complete graduate course; 57.14% (n = 8) knew someone with DM and 28.57% (n = 4) knew someone with DN.

This was one of the subjects that had many items left unanswered or that the respondents did not know how to answer. Having a complete graduate course or knowing someone with the pathology did not influence the performance in the matter.

Diabetic nephropathy is asymptomatic. Its detection is based on laboratory screening (blood and urine). The earliest clinical evidence is the appearance of low but abnormal levels of microalbuminuria. As the disease progresses, clinical proteinuria progresses (Guidelines, 2017; McFarlane et al., 2013).

Close monitoring of blood pressure and blood glucose and the timely use of nephroprotective drugs may decrease or paralyze the progression of DN (McFarlane et al., 2013), and only well-trained professionals can effectively reconcile guidance and intervention.

Adherence to treatment requires the person to take responsibility for his/her treatment by becoming an active participant in the process, which makes it possible to modulate biological states through human behavior. One of the factors to facilitate the acceptance and integration of the therapeutic regimen is the person's knowledge about the disease (Figueira et al., 2017).

5. General Considerations

According to the national curricular guidelines of the medical graduate course, the profile of the doctor to be prepared must be "with a generalist, humanistic, critical and reflective background. Qualified to act in the health-disease process in its different levels of attention, with actions of promotion, prevention, recovery and rehabilitation to health, with a view to integral care, with a sense of social responsibility and commitment to citizenship, as promoter of the integral health of the human being" (BRASIL, 2014).

It´s expected that the physician will be trained with the ability to diagnose, treat, monitor, prevent and guide the patient regarding their health-disease condition, but sometimes the teaching fragments and some aspects of the subjects may be more or less emphasized than others, generating gaps in the academic training of medical students.

The educational program should contain disciplines structured in a logical sequence of development and with increasing complexity of the subjects in its planning. Thus, when defining the objective of a subject, it is also necessary to define what contents are necessary for the student to be able to follow his learning proposal. To identify if the student has mastery of previous learning, it´s suggested performing a diagnostic evaluation, to identify faults to be monitored or remedied (Zeferino; Passeri, 2007).

The learning process can be defined as how humans acquire new knowledge, develop skills, and change behavior. Motivation plays a key role in learning, and each person learns in their own way, style and rhythm (Zeferino; Passeri, 2007). That is why some students can acquire more knowledge than others, because they have a better motivation, perform extracurricular activities, are engaged in social activities, etc; and even though they are enrolled in the same academic class, a group of students will not be in the same level of knowledge. It is believed that this is an important point when looking at the non-linearity performance of the students evaluated in this questionnaire.

However, it is important that a minimum of curricular prerequisites be offered and required of medical students, and that serial assessments be routine, so that a majority or most of the students are in uniformity of performance and knowledge. Thus, it would avoid discrepancies in the medical acts, excess of examinations and delay in the intervention with the patient.

Assessment is a method of collecting data necessary to improve learning. It assists in clarifying goals, in decision-making regarding curricular changes and determines each step of the teaching-learning process, indicating its effectiveness (Havdt, 2000). Learning must be evaluated continuously to provide feedback to the learner, guiding and fixing failures.

It was observed in this study that a group of students can present an extensive variability related to learning and performing, but even if the teaching-learning process is individual, it is necessary that the medical students are trained into professionals in an equitable form, receiving the same orientations and learning opportunities. Regarding DN, we had few participants who really had knowledge about this important complication of DM, but many variables must be considered since the evaluation through questionnaires depends on memory reliability. The participants did not have time to study the subject to answer the questions, as would occur in an academic evaluation. Other points that affect the assessment through questionnaires are failure to understand the information cited in the questionnaire; lack of availability in revealing complete information, lack of interest or lack of time.

It´s known that the application of one single questionnaire cannot accurately determine the amount of knowledge of a group of individuals, but it can provide a parameter for future evaluations and comparisons because it is standardized and its score is not evaluator-dependent.

6. Conclusion

DN is an important complication of DM, responsible for morbid and incapacitating outcomes such as renal failure and cardiovascular disease, but it can be avoided or treated if diagnosed properly. It was observed in this study that the students of the 2nd year of a medical graduate course evaluated have few knowledge about DM, and do not yet have enough knowledge about DN, and it is expected that at the end of the graduation this gap will be filled. It is necessary a larger study to be carried out in medical graduate courses, to detect deficiencies in the curricular configuration and to ensure that medical education is comprehensive and universal.

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