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ASSOCIATION BETWEEN KNOWLEDGE, ATTITUDES AND FOOD HABITS OF PEOPLE WITH DIABETES MELLITUS IN TREATMENT IN PRIMARY HEALTH CARE

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ABSTRACT

Aim*:** Analyzing the association among the knowledge about Diabetes Mellitus, attitudes and food habits of diabetic patients.Method*:** A cross-sectional exploratory study was carried out with 147 diabetic patients registered in the HIPERDIA system of a Brazilian county. Questionnaires about sociodemographic variables, as well as the Diabetes Mellitus knowledge (DKN-A) Attitudes (ATT-19) and Food Frequency (FFQ) questionnaires were applied to these patients. Statistical analyses were based the Chi square test for bivariate analyses, and multiple logistic regression models for the combined analysis of associated factors (significance level was set at 95% and $p<$ 0.05 was statistically significant). ***Results*:** 63.45% of the interviewees were women, 36.55% were men-mean age was 59.54 years; 61.60% of the total interviewees had three meals per day. Patients' diet was the most often response about the main difficulty in the glycemic control treatment (34.25%), 7% of the patients presented positive attitudes towards Diabetes Mellitus and 17.5% showed proper knowledge about it. There was no association among knowledge about Diabetes Mellitus, positive attitudes towards the disease and adequate food habits. ***Conclusions*:** Most participants presented inadequate food habit, poor knowledge about Diabetes Mellitusand its complications, as well as negative attitude towards the disease, fact that reinforced the need of qualifying services focused on health care and education.

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease affecting human patients at global level. It presents high prevalence and morbidity indices due to acute and chronic complications that lead to high hospitalization and significant mortality rates (WHO, 2016). DM accounts for the death of 72,000 people per year (WHO, 2016) in Brazil and often imposes extreme changes in all dimensions of patients' life - such as in eating, therapeutic, medication and exercising habits; thus, it is necessary having coping abilities to make the adjustments necessary to enable satisfactory metabolic control (Molena-Fernades *et al*, 2005; WHO, 2003). Several factors may influence DM patients' adherence to therapy: among them one finds social, economic and cultural factors, along with access to health services, health professionals' competence, comorbidities and prescribed therapy (WHO, 2003). Therefore, patients' adherence to therapy encompasses health-related behaviors that go beyond the consumption of prescribed drugs. Among these behaviors, one finds patients' active participation in following professional prescriptions linked to lifestyle and food habits (WHO, 2011). Although the adherence to an adequate diet is a key part of the treatment applied to DM patients, the literature shows low adherence to the recommended diet (Molena-Fernades *et al*, 2005; Zanetti *et al*, 2015). Although DM is widely studied worldwide, studies

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associating patients' degree of knowledge about the disease with adherence to treatment, attitudes and eating behavior remain scarce. Thus, the aim of this study was to analyze the association among knowledge about DM, attitudes towards the disease and eating behavior in order to broaden this discussion.

MATERIALS AND METHODS

A sectional exploratory population study was carried out with DM (types 1 and 2) patients registered in the Hypertensive and Diabetic Registration and Monitoring System (HIPERDIA - Sistema de Cadastramento e Acompanhamento de Hipertensos e Diabéticos) of the health network of Bodoquena County/MS, Brazil, during follow-up visits from May to September 2016.

Bodoquena County is located in Southwestern Mato Grosso do Sul State, Brazil. At the time we conducted our research, the county had 7,985 inhabitants, recorded 0.666 Municipal Human Development Index (MHDI) - classified as intermediate - and 86.92% Primary Health Care (PHC) coverage through the Family Health Strategy (FHS). We conducted a survey to find information about DM (types 1 and 2) patients registered in HIPERDIA, both in the urban and rural areas of the county. HIPERDIA is a program that registers and monitors the condition of hypertensive and/or diabetic patients in Brazil. The total of 218 diabetic individuals living in Bodoquena County were identified in the HIPERDIA system. The herein identified DM patients were informed about the nature and the aims of the study before being invited to participate in it. They were approached in PHC services or in their homes, when data about the ones who agreed to participate in the research were collected. People who were able to read and write were included in the study, since self-administered questionnaires were the herein adopted research instruments. A systematized script was adopted by taking into consideration the following sociodemographic variables: age, sex, profession, marital status, number of children, number of family members, schooling and family income. The Diabetes Mellitus Knowledge (DKN-A) and Attitudes (ATT-19) questionnaires - translated and validated for the Brazilian population (Torres *et al*, 2005) - were used to collect data on patients' knowledge about, and attitude towards, the disease, since these instruments are easily understood.

The DKN-A is a self-administered questionnaire comprising 15 items of multiple-choice answers associated with the general knowledge about DM. The questionnaire presents five broad dimensions: 1) basic physiology; 2) hypoglycemia; 3) food groups and their substitutes; 4) DM management and the incidence of other diseases; 5) general DM care principles. The measurement scale ranges from 0 to 15; each item scores 1 (correct answers) or zero (incorrect answers). Scores higher than 8 indicate proper knowledge about DM. The ATT-19 is a self-administered questionnaire comprising 19 items associated with patients' psychological adjustment to DM; this questionnaire emphasizes the need of assessing psychological and emotional aspects associated with the disease (Curcio *et al*, 2011). The items evaluated in the questionnaire comprise six factors: stress associated with DM, responsiveness to DM treatment, trust in the treatment, personal performance, perception about the disease and social acceptance. Questions 11, 15 and 18 start with reverse score. Each response is measured through the 5-score Likert scale and the total score ranges from 19 to 95 points; scores higher than 70 indicate positive attitude towards the disease. The food intake reported by the interviewees was analyzed through the Food Frequency Questionnaire (FFQ), which was adapted from Guandalini (2013). Food items were divided in five groups, based on their similarity: 1) greens, fruits, vegetables and lean meats; 2) light and diet food; 3) food rich in saturated fats; 4) food rich in simple carbohydrates; 5) caloric and industrialized food. Results of the eating habit analysis were categorized as follows: adequate eating habit for high means of group 1-food intake and inadequate eating habit for the intake of food belonging to groups 2, 3, 4 and 5. The Chi square test for bivariate analyses, and multiple logistic regression models for the combined analysis of associated factors ($p < 0.05$), were used to investigate the relation among DM patients' knowledge about, and attitudes towards, the disease and their food habits. The crude Odds Ratio (OR) was calculated for each variable at 95% confidence interval. The research variable 'adequate food habit' was classified as dependent variable, whereas income, schooling, age, among others, were classified as independent variables. Therefore, Odds Ratio (OR) values identified risks for, or trend to, adequate food habits: the lower the OR values, the higher the risk of developing inadequate food habits. Statistical analyses were performed in the Stata statistical software version 13 (Statacorp, CollegeStation, USA); p values < 0.05 were statistically significant. Our research was approved by the Research Ethics Committee of Federal University of MatoGrosso do Sul (n. 1045240) and interviewees signed a Free and Informed Consent Form to participate in the study.

RESULTS

Two hundred and eighteen (218) diabetic patients living in Bodoquena City were identified in the HIPERDIA system. One hundred and forty-seven (147) of them were included in the study – there was 32.5% loss of registered patients due to death, change of address and/or refusal to participate in the study. Among the 147 interviewees, 63.45% were women and 36.55% were men (mean age 59.54 years). The most often reported family income was one-to-two minimum wages (66.89%), 54.49% of the interviewees were in the labor market (non-retirees), 82.75% lived in the urban area, 71.3% lived in their own homes, 51.73% had more than three children and 75.16% were married or had a stable relationship with their partners. With respect to schooling, almost half (44.13%) of the participants had incomplete elementary education. Systemic arterial hypertension was associated with DM in 57.24% of the interviewees. The use of medications and nutritional care were the most often reported glycemic control treatments. With respect to the number of daily meals, 61.60% of the participants had three meals per day and 76.73% said they never add extra salt to the already cooked meals, i.e., they only consume the salt used at food preparation time. Accordingly, 95.20% of the participants reported to believe that good nutrition can help improving their health status. Diet was the most often response (34.25%) about patients' main difficulty in the glycemic control treatment; great emphasis was given to the ban on the consumption of sweet products (34.25%) as a strong obstacle to the accomplishment of a successful diet. As for water intake, 67.81% of the interviewees reported to drink more than one liter of water per day. Another relevant result concerns the high intake of food classified as inadequate eating habit (81.63%), as shown in Table 1. The sociodemographic variables associated with the adequate eating habit in the bivariate analysis (Table 2) were: living in the rural area of the county ($p < 0.002$), family

income from 3 to 8 minimum wages ($p < 0.05$), having completed the elementary school ($p < 0.05$), not having DM-associated diseases ($p < 0.05$) and having six meals per day ($p < 0.002$). Table 3 shows results of the application of DKN-A and ATT-19 questionnaires.

Table 1. Intake of food groups by diabetic patients, Bodoquena County, MatoGrosso do Sul state, 2016

Food Habit	%	CI 95%	
Adequate food habit	18.37	12.85	25.55
Inadequate food habit	81.63	74.44	87.14

CI 95%=Confidence interval at 95%.

Table 2. Bivariate analysis of the adequate eating habit and sociodemographic variables of diabetic patients living in Bodoquena County, MatoGrosso do Sul state, 2016

Sociodemographic variables	OR	CI 95%		p
Sex				
Female	1			
Male	1.49	0.56	4.27	0.38
Area				
Urban	1			
Rural	0.24	0.08	0.71	0.002
Family income				
Lowerthan 1 minimumwage	1			
1 to 2 minimumwages	0.57	0.13	1.54	0.43
3 to 8 minimumwages	0.23	0.03	0.98	0.05
Marital status				
Single	1			
Married/stable relationship	0.9	0.08	4.73	0.62
Divorced	0.33	0.02	4.37	0.32
Placeofresidence				
Urbanarea	1			
Rural area	0.13	0.04	0.42	<0.001
Treatament				
Medications	1			
Medication and diet	0.62	0.20	1.75	0.33
Others	0.47	0.08	3.44	0.28
Daily meals				
Two	1			
Three	0.50	0.05	2.45	0.37
Four	0.38	0.03	2.50	0.25
Six	0.1	0.05	0.69	<0.001

OR=odds ratio; CI 95%=Confidence interval at 95%.

Table 3. Diabetic patients' attitude towards, and knowledge about, diabetes mellitus in Bodoquena County, MatoGrosso do Sul state, 2016

Variable	Mean	SD	Minimum	Maximum	% SCORE
Attitude	53.57	10.28	0	80	7.0% ≥70 points
Knowledge	4.99	2.67	0	12	17.5 ≥ 8 points

SD=Standard deviation.

Based on the DKN-A questionnaire, only 17.5% of the participants scored higher than, or equal to, 8 in variables related to DM knowledge, whereas the ATT-19 questionnaire showed that 7% of the respondents scored higher than, or equal to, 70 in variable 'attitude towards DM'. There was no significant association between adequate food habits and interviewees' adequate DM knowledge and attitude scores. Results of the DKN-A test (knowledge about DM) were positively associated with family income, schooling, number of meals per day, and with patients' perception about the benefits of feeding to glycemic control.

DISCUSSION

Based on the main results of this study, most participants presented inadequate food habits, poor knowledge about DM and unfavorable attitudes towards the disease. These findings corroborate the ones recorded in a relevant study conducted in Brazil, in which most diabetic patients did not follow the dietary guidelines set by the Ministry of Health (Lima *et al*, 2015). It is known that socio-demographic factors directly affect patients' perception about the disease and their food habits, for example: the eating habit of diabetic women with high schooling level tend to be more adequate than the one of men and/or people with lower schooling level (Zanetti *et al*, 2015). Based on the results of the DKN-A questionnaire, 95.20% of the participants reported having knowledge about the importance of following a good diet in their treatment, although they reported that diet was their main difficulty in controlling the disease. This finding indicates that only knowledge about the importance of adequate nutrition is not sufficient to enable the behavioral change expected from DM patients. Approximately 1/3 of the participants reported that the ban on sweet products was the main factor hindering their adherence to the nutritional treatment.

This resistance to dietary restrictions is also characteristic of the disease, which generates an intense and "uncontrollable appetite" for sweet products and boosts such consumption even though patients are aware that this attitude can hinder their glycemic control and impair their nutritional treatment (Barsaglini *et al*, 2011). Most interviewees reported to have three meals per day, on average, which was similar to food habits identified in other studies (Machado *et al*, 2011; Carvalho *et al*, 2011). According to the Brazilian Ministry of Health, DM patients must have 5 to 6 meals per day to enable a healthy diet capable of controlling the disease. In addition, they must respect their eating schedules, insert healthy snacks between the main meals, besides avoiding excessive food intake and hypo or hyperglycemic peaks in order to enable glycemic control (Brazil, 2008). Another protective factor against the development of inadequate food habits lied on living in rural areas. The migration of individuals to urban areas, and the accelerated routine due to several obligations, can negatively affect food choices. The intake of fresh food has been increasingly replaced by that of ready-to-eat and processed food due to their ease of consumption, fact that contributes to high-calorie diets that bring poor nutritional benefits to the human body (Ferreira, 2010). Based on the ATT-19 questionnaire, 93% of the respondents presented scores lower than, or equal to, 70 and it indicated that most of them did not have an adequate attitude towards the disease. Similar data showed that most diabetic patients subjected to this questionnaire had poor knowledge about DM and presented inadequate self-care attitude towards the disease (Brazil, 2006). Based on the analysis applied to interviewees' knowledge about DM and its associated complications, it was possible seeing that this important pillar of the therapy was not incorporated as part of their treatment. Thus, it is possible seeing a gap in the healthcare provided by HIPERDIA when it comes to actions taken by health professionals in order to educate and instruct patients, since these actions are essential to enable co-responsibility in health treatments, to bond patients to the health service and to assure therapeutic efficacy. Dialogues and guidelines focused on empowering patients to manage their health must be part of the services provided by healthcare centers, mainly when it comes to PHC (Brazil, 2006). The DKN-A questionnaire used in this research focused on important questions about DM, with emphasis to items such as disease management, recommended glycemic values, food substitutions, disease complications, among others, as well as

on associating patients' knowledge about DM with the application of such knowledge to control the disease on a daily basis (Oliveira *et al*, 2011; Torres *et al*, 2009). Based on the herein collected data, most participants (82.5%) had scores that indicated poor knowledge and understanding about the disease, which was already demonstrated in previous studies (Oliveira *et al*, 2011; Yun *et al*, 2007; Rodrigues *et al*, 2012; Asmamaw*et al*, 2015).

This is a relevant result, since knowledge acquisition can lead DM patients to adopt behaviors focused on preventing diabetes-associated complications. The knowledge about DM, and its mechanisms, enable patients to understand the disease and to find the appropriate solution for such mechanisms in their daily livesFunnell, 2011). Knowledge about DM is an important variable that can promote positive changes in patients' attitude towards accepting to control the disease (Torres, 2010). However, raising patients' awareness about the disease alone is not enough to improve their therapeutic adherence rate. They must also be encouraged to adhere to the treatment, to become an active part of the therapeutic process, as well as to understand the disease and its associated complications and the need of adopting DM control-oriented practices (Torres *et al*, 2009).

Therefore, it is recommended to promote participatory processes focused on developing patients' ability to make decisions and on empowering them to deal with DM in order to improve their health (Costa *et al*, 2011). Low DM-knowledge levels are associated with lower education levels and with limited family income (Oliveira *et al*, 2011; Asmamaw *et al*, 2015; Al-Adsani *et al*, 2009; Almeida *et al*, 2014); these data corroborate the ones collected in this research. High intake of food rich in simple carbohydrates, as well as of processed red meat and refined cereals (Vilegas *et al*, 2007), is associated with the increased risk of developing diabetes (Almeida *et al*, 2014). Moreover, good glycemic and metabolic control is also associated with exercising on a regular basis, with taking the prescribed medication (Cota *et al*, 2008) and with adhering to associated behavioral therapies (Garcia-Silva *et al*, 2018). Although the herein investigated population participated in HIPERDIA (continued health care program for diabetic and hypertensive patients in PHC), they did not present adequate knowledge about, and attitudes towards, DM or food habits capable of enabling them to manage the disease. Based on evidences, it is essential bonding DM patients to the healthcare unit in order to assure disease diagnosis and the necessary care to avoid, or delay, the progression of chronic complications and to assure a successful treatment. Increased contact between patients and healthcare services can enable higher treatment adherence rates (Paiva *et al*, 2006).

Thus, it is necessary conducting further investigations focused on identifying gaps in health education processes developed by PHC teams. Such investigations take a critical dimension, since the lack of knowledge about the disease, both for DM patients and their families, may be associated with the inadequate training of, and integration between, health professionals, as well as with innocuous educational actions. Such gaps in the treatment and follow-up of DM patients evidence the need of changing the adopted traditional educational strategy by incorporating innovative approaches in health services in order to motivate DM patients (Costa *et al*, 2011), since educational actions have been effective in improving the care provided to them (Vieira *et al*, 2017). The follow-up of this specific population by interprofessional teams is essential to enable the correct management of the disease and to develop the domains necessary for such control. Such follow-up can be done through group strategies encompassing the HIPERDIA Program, in which participants can exchange their experiences and have their doubts clarified. Popular Health Education is a good strategy to be adopted against this issue. Thus, dietitians can be great collaborators in food plan-elaboration processes focused on meeting nutritional recommendations by the Brazilian Diabetes Society – these processes must take into consideration the particularities and specificities of each patient such as family income (Zanetti *et al*, 2015). Based on the results of the current research, it was not possible establishing cause and effect relationships; however, the study has the potential to deepen the debate about important aspects such as inadequate food habits, poor knowledge about DM and unfavorable attitude towards the disease among interviewees who are treated and followed up through the PHC program. Another possible limitation in our study is associated with the use of the Food Frequency Questionnaire (FFQ) to collect nutritional data; although it is a reliable and widely used questionnaire, it is limited because it requires participants to rely on their memory about food intake and its frequency.

Finally, even if the results of this study could not be objectively extrapolated to other populations, they have important implications for populations living in other counties and in developing countries, since our study took into consideration the challenges of providing healthcare to DM patients in PHC, as well as the relevance of investigating the association among patients' knowledge about, and attitudes towards, DM and their food habits. If one takes into consideration that PHC accounts for comprehensive and longitudinal care, the current study fulfills its role of problematizing and demonstrating the complexity of the care provided to the herein investigated population. Therefore, it is essential conducting studies in this field in order to reduce, or overcome, the herein identified limitations, as well as to broaden the debate and develop more effective treatment and follow-up strategies to be applied to DM patients. The nutritional profile of most participants in the current study was classified as inadequate food habit, since they reported eating food rich in saturated fats and simple carbohydrates, as well as industrialized and high calorie food. There was no association among the intake of food classified as adequate eating habit, participants' knowledge about, and attitudes towards, Diabetes Mellitus. DM patients presented low level of knowledge about the disease and its complications, as well as negative attitude towards the disease and its management. In addition, patients' level of knowledge about DM was positively related to their family income, schooling and number of meals per day, as well as to their perception about the benefits of nutrition to glycemic control. Poor knowledge about DM, negative attitude towards the disease, and lack of association among the intake of food classified as adequate food habit, patients' knowledge about DM and their attitude towards Diabetes Mellitus, reinforce the need of rethinking educational activities focused on this population and actions taken by PHC professionals treating these patients. It is worth suggesting the implementation of a Diabetes Education Program that counts on qualified interdisciplinary teams to take actions based on aspects such as bonding, care, health education and co-

responsibility in the care provided to the herein investigated population.

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