Original Article

Diabetes mellitus: associated factors among users of the family health strategy*

Diabetes mellitus: fatores associados entre usuários da estratégia saúde da família

Diabetes mellitus*: factores asociados entre usuarios de la estrategia salud de la familia*

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ABSTRACT

Objective: To identify factors associated with type 2 *diabetes* (DM2) in users of the Family Health Strategy (FHS) in the city of Itapipoca, Ceará (Brazil). **Methods:** A transversal study, conducted during the period from March/2009 to October/2010, in 11 basic health units, in which sociodemographic and clinical data were collected from a sample of 419 users of these units. **Results:** Among the study participants, 250 (59.7%) were overweight, 352 (84.0%) had central obesity, 349 (83.3%) were sedentary, and 225 (53.7%) did not eat fruits and/or vegetables daily. There was a statistically significant association between central obesity and gender variables (p <0.001), age (p = 0.001) and marital status (p <0.001), and between nutrition research and education (p = 0.033) and socioeconomic status (p = 0.007). **Conclusion:** Because modifiable risk factors for DM2 were identified with a higher prevalence, we suggest the development of educational interventions for changes in the lifestyles of individuals and systematic monitoring of these changes, with the objective of reducing or delaying the onset of the disease.
Keywords: Risk factors; Diabetes mellitus, type 2; Public health nursing; Family health

RESUMO

Objetivo: Identificar os fatores associados ao Diabetes *Mellitus* tipo 2 (DM2) em usuários da Estratégia Saúde da Família (ESF) da cidade de Itapipoca-Ceará. **Métodos:** Estudo transversal, realizado no período de março/2009 a outubro/2010, em 11 unidades básicas de saúde, nas quais foram coletados dados sociodemográficos e clínicos de amostra de 419 usuários dessas unidades. **Resultados:** Entre os participantes do estudo, 250 (59,7%) estavam com excesso de peso, 352 (84,0%) com obesidade central, 349 (83,3%) eram sedentários e 225 (53,7%) não comiam frutas e/ou verduras diariamente. Houve associação estatisticamente significante entre as variáveis obesidade central e sexo (p<0,001), idade (p=0,001) e estado civil (p<0,001); e entre investigação nutricional e escolaridade (p=0,033) e classe econômica (p=0,007). **Conclusão:** Diante dos fatores de risco modificáveis para DM2 identificados com maior prevalência sugere-se o desenvolvimento de intervenções educativas para mudanças no estilo de vida dos indivíduos e o acompanhamento sistemático dessas mudanças, objetivando reduzir ou retardar o aparecimento da doença.
Descritores: Fatores de risco; Diabetes *Mellitus* Tipo 2; Enfermagem em saúde pública; Saúde da família

RESUMEN

Objetivo: Identificar los factores asociados a la Diabetes *Mellitus* tipo 2 (DM2) en usuarios de la Estrategia Salud de la Familia (ESF) de la ciudad de Itapipoca-Ceará. **Métodos:** Estudio transversal, realizado en el período de marzo/2009 a octubre/2010, en 11 unidades básicas de salud, en las cuales fueron recolectados los datos sociodemográficos y clínicos de la muestra de 419 usuarios de esas unidades. **Resultados:** Entre los participantes del estudio, 250 (59,7%) estaban con exceso de peso, 352 (84,0%) con obesidad central, 349 (83,3%) eran sedentarios y 225 (53,7%) no comían frutas y/o verduras diariamente. Hubo asociación estadísticamente significativa entre las variables obesidad central y sexo (p<0,001), edad (p=0,001) y estado civil (p<0,001); y entre investigación nutricional y escolaridad (p=0,033) y clase económica (p=0,007). **Conclusión:** Frente a los factores de riesgo modificables para DM2 identificados con mayor prevalencia se sugiere el desarrollo de intervenciones educativas para cambios en el estilo de vida de los individuos y el acompañamiento sistemático de esos cambios, objetivando reducir o retardar la aparición de la enfermedad.
Descriptores: Factores de riesgo; Diabetes mellitus tipo 2; Enfermería en salud pública ; Salud de la familia

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INTRODUCTION

The chronic noncommunicable diseases (CNDs) are the priority agenda of most countries because of its impact on mortality, morbidity and costs for health care. In Brazil, it accounts for the biggest expenditures on medical care in the Unified Health System, according to data presented by the Ministry of Health. In 2005, from the six billion spent on the payment of authorizations for hospital admissions (excluding labours), chronic diseases accounted for 58% of total spending [1].

The main determinants of the epidemic growth of CNDs in Brazil are demographic, related to the population growth and aging, and increased urbanization, besides the changes in the nutritional dietary patterns and physical activity of the Brazilian population [1,2].

Among the CND, diabetes mellitus (DM) stands out, a syndrome of multiple etiologies, it is a consequence for the lack of insulin and/or the inability of insulin to function properly. It is characterized by chronic hyperglycemia with disturbances of the metabolism of carbohydrates, lipids and proteins. There are two main types of diabetes: type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) [3].

The T2DM is caused by a combination of genetic and lifestyle factors. The genes which predispose an individual to have diabetes are considered essential for the development of the disease, but the activation of a genetic predisposition requires the presence of environmental and behavioral factors, particularly those associated with lifestyle [4]. In this context, non-modifiable and modifiable risk factors are involved at the outbreak of T2DM.

Among the modifiable risk factors, there are the following overweight and/or total obesity, central obesity, sedentarism, diminished glucose tolerance, metabolic syndrome (hypertension, decreased HDL and increased triglycerides), nutritional factors and inflammation [4].

Researches focused on identifying risk factors for T2DM were developed by nurses involving students, university students and health workers [5-9], highlighting the need to extend the study to other populations, which will provide subsidy for planning interventions which contribute to reduce or delay the appearance of the disease.

Thus, the purpose of this study was to identify T2DM associated factors in users of the Family Health Strategy (FHS).

METHODS

Cross-sectional study, carried out from March/2009 to October/2010 by nurses of the research group: "Integrated actions to prevent and control type 2 diabetes mellitus ", Federal University of Ceará, the study scenario was composed of 11 health basic units in the city of Itapipoca in Ceará.

For the sampling design and the choice of subjects, it was according to registration data from the FHS of the city, composed of 23,201 registered users, and consisted with the inclusion criteria (individuals of both genders, aged between 20 and 59 years , waiting for consultation) and exclusion criteria (individuals who lived in the rural area of the city, those who had a confirmed diagnosis of diabetes mellitus, and those with a chronic condition that could directly interfere with anthropometric measurements). The sample was calculated from the indicated formula for the calculation of cross-sectional studies of infinite population.

$$n = \frac{Z\alpha^2 . P.Q}{E^2}$$

It was considered a level of significance of 95% and a prevalence of risk factors for T2DM of 50%, considering this value provides a maximum size of the sample and a sample error of 5%. The sample had a total of 419 people.

For data collection, done during the months of January to March of 2010, it was used a form in which sociodemographic and clinical data was registered.

Sociodemographic characteristics:

- Gender: male and female;
- Age: the adopted ages were: 20-29 years old, 30-44 years old and 45-59 years old;
- Marital status: married/consensual union, single, widowed or divorced;
- Employment situation: active, housewifes/ househusband, retired;
- Education: did not study/functional illiterate, incomplete primary education, complete primary education, incomplete secondary education, complete secondary education, incomplete higher education and complete higher education;
- Household income: in minimum wages;
- Economy class: the "Criteria for Economic Classification of Brazil" was used [10]. The assessment considers the degree of education of the main household and the presence of certain belongings (color television, radio, bathroom, car, housemaids, vacuum cleaner, washing machine, VCR and / or DVD, refrigerator and freezer), by scores corresponding to the following classes: A1, A2, B1, B2, C, D and E.

Measurements:

- The body mass index (BMI) was obtained from the ratio between weight in kilograms and height in squared meters (kg/m^2), being classified

according to World Health Organization [11] in: underweight <18.5 ; normal – 18.5 to 24.9, overweight – 25 to 29.9, obesity class I – 30 to 34.9, obesity class II (severe) – 35 to 39.9, obesity class III (morbid) ≥ 40 . Weight was measured in a single measurement in scale brand Lightex ® with the patient barefoot, wearing light clothes and not carrying any objects which could interfere with the measurement result as handbags, mobile phones, among others. The height was also determined through a single measurement using an inelastic tape fixed on the wall, being the zero point at ground level. The patients were standing erect with their barefeet together, keeping their heels and their occipital region in contact with the tape.

- Waist circumference (WC) was measured in centimeters, with an inelastic tape at the midpoint between the iliac crest and the outer side of the last rib [12]. The cutoff point adopted for the classification of central obesity was recommended by the International Diabetes Federation [13]: WC ≥ 80 cm for women ≥ 94 cm for men.

To assess physical activity and consumption of fruits and vegetables, the following recommendations of the Ministry of Health (in Brazil) [14] were considered: individuals must practice at least thirty minutes of physical activity every day and eat fruits and vegetables on a daily basis.

The data were double inserted and stored in a database built in Excel. The statistical mean measurement and standard deviation were calculated, the odds ratios (OR), their respective 95% confidence intervals with (95% CI) and p values. For the association analysis between variables, it was decided for the nonparametric tests Chi-square ($\chi 2$). The data were processed in the statistical program Statistical Package for Science Social version 18.0 and presented in tables.

The research project was approved by the Ethics Committee in Research at the Federal University of *Ceará* (Protocol 346/09) and data were collected after obtaining the signatures of the Consent Term by the study participants.

RESULTS

According to the sociodemographic characteristics, the majority of users were: females (88.1%), they were aged between 30 and 44 years (42.5%), with an average of 37 years and standard deviation of 10.8; they were married or had a consensual union (60.4%); they did not work outside their homes, they did only activities at home (57.8%); they did not finish elementary school (39.4%); they received between half and a minimum wage (47.3%), with the average household income around the minimum wage (R$ 516.00, SD = R$ 441.00) and they also belonged to social classes D/E (58.2%).

Table 1. T2DM associated factors and sociodemographic variables of Family Health Strategy users. Itapipoca – CE, 2010

	Dependent Variables											
Variable	**Excess weight**			**Central Obesity**			**Sedentarism**			**Inadequate consumption of fruits / vegetables**		
(categories)	**No**	**%**	**p**	**No**	**%**	**p**	**No**	**%**	**p**	**No**	**%**	**p**
Gender												
Male	32	64,0	0,801	23	46,0	<0,001	38	76,0	0,141	29	58,0	0,516
Female	218	59,1		329	89,2		311	84,3		196	53,1	
Ages												
20-29	75	55,6	0,219	98	72,6	<0,001	111	82,2	0,597	81	60,0	0,200
30-44	106	59,6		157	88,2		152	85,4		91	41,1	
45-59	69	65,1		97	91,6		86	81,1		53	50,0	
Marital status												
Single/divorced/widow	88	53,0	0,025	129	77,7	0,004	135	81,3	0,382	97	58,4	0,115
Married/Consensual union	162	64,1		223	88,1		214	84,6		128	50,6	
Education												
Higher education	19	43,2		34	77,2		32	72,7		19	43,2	
Complete secondary	75	56,0	0,070	108	80,6	0,156	113	84,3	0,241	63	47,0	0,033
Incomplete secondary	44	57,9		65	85,6		63	82,9		41	53,9	
Until incomplete primary	112	67,9		145	87,9		141	85,5		102	61,8	
Economic Classification												
Until B2	8	36,3	0,214	15	68,2	0,062	18	81,8	0,086	8	36,4	0,007
C	95	62,1		135	88,2		120	78,4		68	44,4	
D/E	147	60,2		202	82,8		211	86,5		149	61,1	

Table 2. Crude odds ratio for associated factors for the developmento of T2DM and sociodemographic variables of Family Health Strategy users. Itapipoca – CE, 2010

Variables	Dependent Variables							
	Excess weight		Central Obesity		Sedentarism		Inadequate consumption of fruits / vegetables	
(categories)	OR	IC 95%	OR	IC 95%	OR	IC 95%	OR	IC 95%
Gender								
Male	1,23	0,66-2,27	1,00		1,00		1,00	
Female	1,00		9,65	5,06-18,41	1,69	0,83-3,43	0,82	0,45-1,49
Ages								
20-29	1,00		1,00		1,00		1,00	
30-44	1,17	0,74-1,85	2,82	1,56-5,10	1,26	0,68-2,31	0,69	0,44-1,09
45-59	1,49	0,88-2,52	4,06	1,86-8,88	0,93	0,48-1,79	0,66	0,39-1,11
Marital status								
Single/divorced/widow	1,00		1,00		1,00		1,00	
Married/Consensual union	1,57	1,05-2,35	2,13	1,25-3,61	1,26	0,75-2,11	0,72	0,49-1,08
Education								
Higher education	1,00		1,00		1,00		1,00	
Complete secondary	1,67	0,84-3,32	1,22	0,53-2,78	2,01	0,89-4,53	1,16	0,58-2,31
Incomplete secondary	1,80	0,85-3,83	1,73	0,67-4,50	1,81	0,74-4,43	1,54	0,73-3,25
Until incomplete primary	2,78	1,40-5,48	2,13	0,91-4,96	2,20	0,99-4,86	2,13	1,08-4,18
Economic Classification								
Until B2	1,00		1,00		1,00		1,00	
C	2,86	1,13-7,25	3,50	1,25-9,73	0,80	0,25-2,55	1,40	0,55-3,53
D/E	2,65	1,07-6,56	2,24	0,86-5,84	1,42	0,45-4,46	2,74	1,10-6,79

As for the factors associated with T2DM, 250 users (59.7%) had excess weight , and 171 (41.1%) were classified as overweight and 79 (18.6%) as obese (mean BMI: 26.4; SD: 4.4); when comparing the WC, 352 (84.0%) were classified with central obesity (mean WC: 92.9 cm, SD = 10.8), the vast majority (83.3%) were sedentary and 225 (53.7%) reported that they do not eat fruits and/or vegetables on a daily basis.

Associations between excess weight, central obesity, sedentary lifestyle and inadequate intake of fruits/vegetables with sociodemographic variables are shown in Table 1 and their odds ratios in Table 2. They demonstrated that higher odds of having excess weight involved men users aged between 45 and 59 years, married or in consensual union, who had completed elementary school and who belonged to economic class C.

Concerning central obesity, higher odds prevailed in females, married or in stable relationships and who belonged to the economic class C. Furthermore, central obesity presented as directly proportional to the age and inversely proportional to the education.

Regarding their sedentary lifestyle, those who had more chances were women, users aged between 30 and 44 years, married or in a stable relationship, also those who had completed primary education and belonged to socioeconomic classes D/E. Unlike the excessive weight and central obesity, ages from 45 to 59 years old were identified as a protective factor for sedentarism.

Still on the nutritional research, higher odds of inadequate consumption of fruits and/or vegetables were found among men who were single/divorced/widowed, presenting it inversely proportional to their age, educational level and socioeconomic status. Being of the female gender and married/consensual union presented itself as a protective factor.

DISCUSSION

Last decades, due to the increasing prevalence of obesity worldwide, this disease has been one of the major public health problems, being a risk factor for the appearance of several other chronic diseases, among them, diabetes.

Alarming data on the nutritional status of adults in Brazil were found in the Research of Familiar Budget (RFB) 2008-2009, conducted by IBGE [15] in partnership with the Ministry of Health, confirming that the weight of the Brazilians have increased in recent years. During this period, the excess weight in adult men increased from 18.5% to 50.1%, exceeding women, which had an increase from 28.7% to 48%. From these, approximately one third (12.5%) of men and one third (16.9%) of women were obese.

In most studies conducted in Brazil, the distribution according to gender have demonstrated that women

compete with the highest prevalence of excess weight and that there is a gradient, according to age and education, indicating more frequency as age increases and between individuals with low education level [16-18].

Unlikely the mentioned studies and confirming the data found in the RFB 2008-2009 [16] and in the present study, other researchers have found higher prevalence of excess weight in males [19-21].

Regarding the prevalence of central obesity found, 84.0%, it was superior to those of other national surveys [19-20] and international [20,21]. In these, as well as in the present study, women showed a higher prevalence of central obesity compared to men and a significant linear tendency as their age increase.

Concerning a sedentary lifestyle, the frequency identified in this study, 83.3%, matched to the national mean (83.6%) found in VIGITEL [22]. The data indicated that in the entire adult population of 27 Brazilian cities, the frequency of sufficient physical activity during leisure time was 16.4% and it was also higher in males (20.6%) than in females (12, 8%).

Currently, recommendations for healthy life habits such as regular physical activities and healthy eating are increasingly common and in the National Health Promotion [23], it is a priority due to the fact it is believed that regular physical activity and the daily intake of fiber, fruits and vegetables may significantly reduce the incidence of T2DM in patients at high risk of developing the disease [24].

In this study, daily consumption of fruits and/or vegetables found, 46.3%, despite less than ideal, surpassed the national mean showed in VIGITEL-2008 [23], in which the frequency of regular consumption of fruits and vegetables was only 31.5%. However, a higher frequency has been identified in a similar study in the city of Ribeirão Preto SP [25], in which the intake of fruits and vegetables was found to be very high in both genders (over 70%).

Low consumption of fruits and vegetables by adults was also found in an international study [26]. In most studies on dietary habits, women ate more fruits and vegetables than men [23,27,28]. Variables such as age [22,27,28], income [26] and education [22,26,27] were positively associated with consumption of fruits and vegetables.

The above findings constitute a diagnostic assessment of factors associated with T2DM, which is one of the main competencies of health promotion [29]. It is essential to ensure a plan with appropriate strategies, coherent approaches and achievable goals, through health education, which involves awareness of the individual and the community about the importance of adopting a healthy lifestyle.

CONCLUSION

In relation to modifiable risk factors for T2DM this study identified a high prevalence of central obesity, sedentary lifestyle, excess weight and inadequate nutrition.

From this perspective, it is part of managers` and health professionals` duties to improve access and quality of health services, especially for the fortification and qualification of the Family Health Strategy, with emphasis on promoting healthy lifestyles, such as regular practice of physical activities, healthy eating habits and weight control.

It should be noted that as a professional promoter of health, the nurse should be able to identify risk factors for T2DM, taking into account the context in which the person is located. Along with their leadership and communication skills, nurses can promote empowerment and participation of such people in the planning of interventions on the risk factors highlighted, tracing, along with people who are interested, a feasible plan of action, with the goal of improving their health.

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