

Prevalence of Suspected Diabetes in Adults From a Municipality in the Northeastern Interior

Prevalência de Suspeição de Diabetes em Adultos de um Município do Interior do Nordeste

Prevalencia de Sospecha de Diabetes en Adultos de un Municipio del Interior Del Nordeste

RESUMO

Objetivo: Estimar a prevalência e investigar fatores associados a suspeição de Diabetes em adultos, no município de Mucugê, Bahia. **Método:** Estudo de corte transversal, amostral, em 337 adultos, cadastrados na Estratégia de Saúde da Família do município de Mucugê, Bahia. Coletou-se dados sobre aspectos sociodemográficos, hábitos de vida e condições de saúde. Foram aferidas medidas antropométricas e a glicemia capilar. Considerou-se suspeito de diabetes o sujeito com glicemia casual ≥ 180 mg/dl. Utilizou-se a Razão de Prevalência como medida de associação e o intervalo de confiança de 95%, como medida de inferência estatística. **Resultado:** A prevalência de suspeição de Diabetes foi de 8% e os fatores associados foram: sexo feminino, idade ≥ 40 anos, ter filhos, escolaridade inferior ao Ensino Médio completo, obesidade, circunferência abdominal elevada, ser fumante, consumir bebida alcoólica e sedentarismo. **Conclusão:** A prevalência de suspeitos de Diabetes foi semelhante à nacional e foi observada associação com alguns fatores modificáveis.

DESCRIPTORES: Diabetes Mellitus; Prevalência; Atenção primária à saúde; Estratégia Saúde da Família, Saúde do adulto

ABSTRACT

Objective: To estimate the prevalence and investigate factors associated with suspected diabetes in adults in the municipality of Mucugê, Bahia. **Method:** This was a cross-sectional, sample study of 337 adults registered with the Family Health Strategy in the municipality of Mucugê, Bahia. Data was collected on sociodemographic aspects, lifestyle habits and health conditions. Anthropometric measurements and capillary glycemia were measured. Subjects with casual glycemia ≥ 180 mg/dl were considered to have suspected diabetes. The Prevalence Ratio was used as a measure of association and the 95% confidence interval as a measure of statistical inference. **Results:** The prevalence of suspected diabetes was 8% and the associated factors were: female gender, age ≥ 40 years, having children, less than high school education, obesity, high waist circumference, smoking, alcohol consumption and sedentary lifestyle. **Conclusion:** The prevalence of suspected diabetes was similar to the national prevalence and was associated with some modifiable factors.

DESCRIPTORS: Diabetes Mellitus; Prevalence; Primary Health Care; Family Health Strategy, Adult Health Care

RESUMEN

Objetivo: Estimar la prevalencia e investigar factores asociados a la sospecha de diabetes en adultos del municipio de Mucugê, Bahía. **Método:** Estudio transversal por muestreo de 337 adultos registrados en la Estrategia de Salud de la Familia del municipio de Mucugê, Bahía. Se recogieron datos sobre aspectos sociodemográficos, hábitos de vida y condiciones de salud. Se midieron medidas antropométricas y glucemia capilar. Los sujetos con glicemia casual ≥ 180 mg/dl fueron considerados sospechosos de diabetes. Se utilizó el cociente de prevalencia como medida de asociación y el intervalo de confianza del 95% como medida de inferencia estadística. **Resultados:** La prevalencia de sospecha de diabetes fue del 8% y los factores asociados fueron: sexo femenino, edad ≥ 40 años, tener hijos, estudios inferiores al bachillerato, obesidad, perímetro de cintura elevado, tabaquismo, consumo de alcohol y sedentarismo. **Conclusión:** La prevalencia de sospecha de diabetes fue similar a la nacional y se asoció a algunos factores modificables.

DESCRIPTORES: Diabetes Mellitus; Prevalencia; Atención Primaria; Estrategia de Salud de la Familia, Atención a Adultos

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INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic disorders characterized by the presence of hyperglycemia in the absence of treatment. Its heterogeneous etiopathology includes defects in insulin secretion, in the action of this hormone or both, resulting in disorders in the metabolism of carbohydrates, fats and proteins.⁽¹⁾ In Brazil, the estimated prevalence of Diabetes, adjusted for the age group between 20 and 79 years, was 8.8%, in 2021, according to data from the International Diabetes Federation (IDF).⁽²⁾

In Brazil, the estimated prevalence of Diabetes, adjusted for the age group between 20 and 79 years, was 8.8%, in 2021, according to data from the International Diabetes Federation (IDF).⁽³⁾ However, DM2 and DM1 stand out, since they are the most prevalent types in our environment, corresponding to 90% to 95% and 10% to 5% of diabetes cases respectively.⁽⁴⁾

Since it has a multifactorial etiology, genetic susceptibility and viral infections are among the risk factors for the occurrence of DM1. On the

other hand, for DM2, obesity stands out, especially central obesity, which is defined by the measurement of abdominal circumference, considered high when equal to or greater than 80 cm in women and 90 cm in men, according to IDF criteria. In addition, other risk factors include a sedentary lifestyle, family history of DM2, ethnicity, age over 40 years, previous GDM, smoking, dyslipidemia and high blood pressure.^(4,5)

The diagnosis of Diabetes Mellitus is based on the laboratory detection of hyperglycemia, either through fasting blood glucose, oral glucose tolerance test or glycated hemoglobin. The subject must have two concordant results for diagnosis, with the exception of casual blood glucose measurement ≥ 200 mg/dl, in the presence of polyphagia, polyuria, polydipsia and weight loss.⁽⁶⁾

Studies show that people with DM have an increased risk of cardiovascular disease, obesity, cataracts, infectious diseases, erectile dysfunction and non-alcoholic fatty liver disease.⁽¹⁾ Therefore, the importance of health actions aimed at the population with DM or its risk factors can be seen, within the scope of Primary

Health Care (PHC), as it is the priority entry point for users into the Unified Health System (SUS).⁽⁷⁾

The objective of this study is to estimate the prevalence and investigate the associated factors of suspected Diabetes Mellitus, in a random sample of 337 adult individuals, registered in the Family Health Strategy of the municipality of Mucugê, Bahia, in order to support Public Health actions that aim to prevent this condition and, consequently, its biopsychosocial consequences.

METHOD

This is a cross-sectional, sample-based epidemiological study in the municipality of Mucugê, located in the mesoregion of Centro Sul Baiano and in the microregion of Seabra, 448 km from the capital Salvador and 338 km from Feira de Santana. Mucugê has approximately 12,137 inhabitants (8), distributed throughout the urban (39.7%) and rural (60.3%) territories. In the health area, Mucugê has six (06) Family Health Units (USF), distributed throughout the municipality.⁽⁹⁾

The sample consisted of adults

(age ≥ 18 years) residing and registered in the Family Health Strategy (ESF) of the municipality of Mucugê. The estimated prevalence of 10% was adopted for sample calculation, with a confidence interval of 95% and a sampling error of 4%. Therefore, the sample should have at least 216 adults. A design effect (DEFF) of 0.5 was scored to correct the sample size, since the population comes from several ESF units. Thus, the sample size was limited to 325 adults.

A random, stratified and systematic sampling technique was used. Initially, 24 microareas were identified, with 14 families per microarea and one adult individual per family being drawn, and finally, one more family was drawn in 10 of the 24 existing microareas. Any selected individual who could not be found after two visits, or in the event of death, was replaced by another member of the same family. Bedridden individuals, pregnant women and individuals with mental disabilities were excluded from the study. In the end, 337 adults were interviewed. There were nine losses.

Data collection was carried out through home visits in November and December 2021 and March 2022. Before starting the interview process, the Informed Consent Form (ICF) was read. The Community Health Agents (CHAs) from the six USFs previously sent a communication to the research subjects, explaining the objectives and procedures of the study. A pilot study was then carried out at a Family Health Unit in Feira de Santana, Bahia.

The data were collected by six medical students, Scientific Initiation scholarship holders, from the State University of Feira de Santana (UEFS), who underwent prior training to measure anthropometric measurements, blood glucose levels, and apply the data collection instrument. A manual for data collection was pre-

pared and given to the students, who were supervised by professors from the Health Department/UEFS and accompanied by at least one CHA from the municipality.

Weight was measured using a compact portable mechanical scale (G-Tech). Height was measured using a portable stadiometer (Personal Caprice Sanny – ES2060). To calculate the body mass index (BMI), a new variable was generated from the result of dividing each weight measured by the square of the participant's height. Waist circumference was measured using an inelastic tape measure, positioned at the midpoint of the distance between the lower edge of the rib cage and the iliac bone, in the horizontal plane. Capillary blood glucose levels were measured using a glucometer (ACCU-CHEK PERFORMA – ROCHE).

Two databases were created to compare the information and identify possible typing errors. After correction, the data were exported and analyzed using SPSS for Windows, 16.0, from the Situation and Epidemiological and Statistical Analysis Room of the UEFS Health Department (SSAEE/DSAU/UEFS). The relative and absolute frequencies of the qualitative variables and the mean and standard deviation of the quantitative variables were calculated.

For the association analysis, the measured capillary blood glucose was adopted as the dependent variable. The subject with casual capillary blood glucose ≥ 180 mg/dl was considered to have suspected diabetes. The independent variables of the study were: sex (female or male), age (≥ 40 years or < 40 years), offspring (has children or does not have children), education ($<$ complete high school or \geq complete high school), weight control (does not control or controls), physical activity (does not practice or practices), smoking (smokes or does not smoke), alco-

hol consumption (drinks or does not drink), body mass index (BMI ≥ 30 kg/m² or BMI < 30 kg/m²), abdominal circumference (AC) in males (AC ≥ 90 cm or AC < 90 cm) and in females (AC ≥ 80 cm or AC < 80 cm), following the IDF definition of central obesity. (5) The Prevalence Ratio (PR) and its respective 95% confidence interval (95% CI) were used to measure the association and statistical inference of the results.

This study is an excerpt from the project “Health surveillance for the detection of minor mental disorders, diabetes mellitus and arterial hypertension in Mucugê, Bahia”, funded by the Bahia State Research Support Foundation (FAPESB), Grant Term No. SUS0018/2021 and carried out by researchers from the Epidemiological and Statistical Analysis and Situation Room (SSAEE/DSAU/UEFS). This project was assessed and approved by the UEFS Research Ethics Committee through the Certificate of Presentation for Ethical Assessment (CAAE) No. 15618119.7.0000.0053 and opinion No. 3,758,267.

RESULT

A total of 337 adult individuals participated in the study, of which 216 were female (64.1%) and 121 were male (35.9%). Among the interviewees, 28 (8.3%) had casual blood glucose ≥ 180 mg/dL (suspected DM). The median age of the subjects was 46 years. Regarding gender, the prevalence of suspected DM was 9.3% in females and 6.6% in males. By dichotomizing the variables, we obtained the results shown below (Tables 1 and 2).

Table 1 - Absolute and relative frequencies of the variables studied in adults registered in the Family Health Strategy of Mucugê-BA, 2021/2022.

Variable		Absolute Frequency*	Relative Frequency
Sex	Female	216	64,1%
	Male	121	35,9%
	Total	337	100%
Age	≥40 y/o	214	63,5%
	<40 y/o	123	36,5%
	Total	337	100%
Offspring	Has children	274	81,3%
	Has no children	63	18,7%
	Total	337	100%
Education	< Complete HS	213	63,2%
	≥ Complete HS	124	36,8%
	Total	337	100%
Weight control	Doesn't control it	147	43,6%
	Control it	190	56,4%
	Total	337	100%
Physical activity	Doesn't practice it	179	53,1%
	Practice it	158	46,9%
	Total	337	100%
Smoking	Smoke	28	8,3%
	Doesn't smoke	309	91,7%
	Total	337	100%
Alcohol consumption	Drinks	101	30%
	Doesn't drink	236	70%
	Total	337	100%
BMI	≥30 kg/m ²	99	29,4%
	<30 kg/m ²	238	70,6%
	Total	337	100%
Female AC	≥80 cm	184	85,2%
	<80 cm	32	14,8%
	Total	216	100%
Male AC	≥90 cm	80	66,1%
	<90 cm	41	33,9%
	Total	121	100%
Casual blood glucose	≥180 mg/dl	28	8,3%
	<180 mg/dl	309	91,7%
	Total	337	100%

Source: Study database.

HS: High school; BMI: Body mass index; AC: Abdominal circumference.

*Valid responses, excluding ignored ones.

Table 2 - Prevalence, Prevalence Ratio and 95% Confidence Interval (95% CI) of possible factors associated with suspected Diabetes (casual blood glucose $\geq 180\text{mg/dl}$), in adults, registered in the Family Health Strategy, Mucugê-BA, 2021/2022.

Independentvariable	Casual blood glucose		Prevalence Ratio	CI - 95%
	$\geq 180\text{mg/dl}$	$< 180\text{mg/dl}$		
Female sex	20 (9,3%)	196 (90,7%)	1,40	0,64 a 3,08
Male sex	08 (6,6%)	113 (93,4%)		
Age ≥ 40 y/o	22 (10,3%)	192 (89,7%)	2,11	0,88 a 5,06
Age < 40 y/o	06 (4,9%)	117 (95,1%)		
Has children	27 (9,9%)	247 (90,1%)	6,21	0,86 a 44,83
Has no children	01 (1,6%)	62 (98,4%)		
$<$ Incomplete HS	24 (11,3%)	189 (88,7%)	3,49	1,24 a 9,83
\geq Complete HS	04 (3,2%)	120 (96,8%)		
Does not perform PA	18 (10,1%)	161 (89,9%)	1,59	0,76 a 3,34
Performs PA	10 (6,3%)	148 (93,7%)		
Doesn't control weight	10 (6,8%)	137 (93,2%)	0,72	0,34 a 1,51
Controls weight	18 (9,5%)	172 (90,5%)		
Drinks	23 (9,7%)	213 (90,3%)	1,97	0,77 a 5,00
Doesn't drink	5 (5%)	96 (95%)		
Smokes	03 (10,7%)	25 (89,3%)	1,32	0,43 a 4,11
Doesn't smoke	25 (8,1%)	284 (91,9%)		
BMI $\geq 30\text{kg/m}^2$	11 (11,1%)	88 (88,9%)	1,56	0,76 a 3,20
BMI $< 30\text{kg/m}^2$	17 (7,1%)	221 (92,9%)		
Female AC $\geq 80\text{cm}$	18 (9,8%)	166 (90,2%)	1,57	0,38 a 6,42
Female AC $< 80\text{cm}$	02 (6,3)	30 (93,8)		
Male AC $\geq 90\text{cm}$	07 (8,8%)	73 (91,3%)	3,59	0,46 a 28,18
Male AC $< 90\text{cm}$	01 (2,4%)	40 (97,6%)		

Source: Study database.

HS: High school; BMI: Body mass index; AC: Abdominal circumference; PA: Physical activity

The level of education showed a strong association with the suspicion of DM in the studied sample, since individuals with incomplete high school (HS) had a 3.49 times greater probability (PR=3.49) of being suspected of the disease, this being the only statistically significant result of this study (95% CI 1.24 to 9.83). Furthermore, the following factors were related to the suspicion of DM - in decreasing order of strength of association: having children (PR=6.21); male abdominal circumference (AC) ≥ 90 cm (PR=3.59); age ≥ 40 years (PR=2.11); drinking (PR=1.97); not practicing physi-

cal activity (PR=1.59); female AC ≥ 80 cm (PR=1.57); BMI ≥ 30 kg/m² (PR=1.56); female gender (PR=1.40) and smoking (PR=1.32).

Not controlling weight (PR=0.72) was a protective factor for DM. Finally, among the 28 interviewees with casual capillary blood glucose ≥ 180 mg/dl, 20 (71%) reported having a previous diagnosis of diabetes and 19 (68%) reported using medication(s) to control the disease in question.

DISCUSSION

A prevalence of 8% of suspected DM was observed in the sample studied, being more prevalent in females (9%) than in males (7%). Being 40 years of age or older was

strongly associated with suspected DM (PR=2.11), although not statistically significant. The same epidemiological scenario was described in a cross-sectional study with data from the 2019 National Health Survey (PNS), which identified a prevalence of 7.7% of self-reported DM in the Brazilian adult population, being more prevalent in females (8.4%) and ten times higher in respondents over 40 years of age.⁽¹⁰⁾

In the previous PNS, from 2014 and 2015, different parameters were evaluated for the diagnosis of this disease, with the following variations in the prevalence of diabetes in adults being recorded: 6.6% by laboratory criteria (glycated hemoglobin $\geq 6.5\%$); 8.4% by laboratory criteria

or use of medication; 9.4% by laboratory criteria or self-reporting having a previous medical diagnosis of DM; and 7.5% by self-reported medical diagnosis of DM.⁽¹¹⁾ In this study, women over 30 years of age were also the group most frequently affected by diabetes, with prevalence increasing in line with increasing age.

In the sample studied, the level of education was the only variable associated with diabetes that presented statistical significance: 11% of the population with incomplete high school (HS) was considered to have suspected DM, with a Prevalence Ratio 3.49 times higher (PR=3.49 – 95%CI 1.24-9.83) than adults with education equal to or greater than HS. Similar data were recorded in another cross-sectional study, developed with 580 adults, served by an extension project in the city of Jundiá, in 2019, in which the population with up to 8 years of education was 3.16 times more likely to report a diagnosis of DM.⁽¹²⁾

In terms of sociodemographic factors, a strong association was recorded between having children and suspected diabetes, with a prevalence 6.21 times higher. However, there is a lack of more data in the literature to support this association. Regarding sedentary lifestyle, we observed a prevalence of 10% of hyperglycemia among interviewees who reported not practicing physical activity. These results are similar to what was evidenced in the 2019 PNS, in which 8.7% of individuals with physical inactivity reported having DM.⁽¹¹⁾

Smoking was associated with diabetes in this study, with a prevalence 1.32 times higher. Studies show that smoking is an important risk factor for DM. This was observed in a prospective cohort study published in 2006, which evaluated the development of glucose intolerance in adults exposed and not exposed to active and/or passive smoking for

15 years. At the end of this period, it was found that current smokers had a higher risk of developing hyperglycemia, compared to non-smokers without exposure to passive smoking.⁽¹³⁾

We found that obesity (BMI ≥ 30 kg/m²), especially central obesity – measured by measuring abdominal circumference (AC), is an important factor associated with suspected diabetes, with a prevalence 3.59 and 1.57 times higher in men and women, respectively, who had high AC measurements. According to data from the Food and Nutrition Surveillance System (SISVAN - Sistema de Vigilância Alimentar e Nutricional) of the Brazilian Ministry of Health, which tabulated anthropometric data from almost 14 million adults, 32.9% of individuals were obese.⁽¹⁴⁾

It was possible to observe among individuals who reported not controlling their weight, a lower prevalence of suspected diabetes (PR = 0.72), which suggests a possible reverse causality bias, as 71% of participants with high casual blood glucose levels reported having diabetes and of these, 68% were undergoing treatment for this condition.⁽¹⁵⁾

This study is a pioneer in estimating the prevalence and investigating associated factors of suspected Diabetes in the municipality of Mucugê, Bahia. However, it is noted that the cross-sectional design of this research constitutes one of the limitations for the development of analyses of the relationships between the predictor variables and the outcome. This occurs because the predictor/cause and outcome/effect variables are studied at the same historical moment, with no chronological difference between the variables studied and thus, it is not possible to establish a cause and effect relationship, as well as due to the possibility of reverse causality bias. Furthermore, no confounding and interaction analyses were performed. Finally, the study may have

presented selection bias, since the majority of participants were female, a finding different from the data reported by IBGE (2017).

CONCLUSION

This study observed a high prevalence of suspected diabetes in a random sample of adults in the municipality of Mucugê, and identified modifiable variables as associated factors, such as less than a high school education, obesity, especially visceral obesity, and a sedentary lifestyle, and non-modifiable variables, such as female gender, age 40 or older, and having children.

Therefore, it is recommended that simple actions be implemented, such as measuring blood glucose, weight, height, and abdominal circumference, and encouraging the adoption of healthy lifestyle habits by health professionals in the municipality. In addition, disseminating information about the risk factors for diabetes and its implications for health may contribute to the prevention and control of this condition in the municipality.

It is expected that the results of this study may contribute to the development of health actions that seek to prevent and control diabetes in the municipality of Mucugê.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

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