

## PREVALENCE OF HYPERTENSION AND DIABETES MELLITUS AMONG INDIGENOUS PEOPLES

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### ABSTRACT

**Objective:** to analyze the prevalence of systemic hypertension and diabetes mellitus among indigenous villagers associated with ethnicity and describe the frequency of care/diagnosis according to professional category.

**Method:** epidemiological and descriptive study, carried out with data on Systemic Hypertension and Diabetes Mellitus produced in the Distritos Sanitários Especiais Indígenas (Special Indigenous Health Districts of Pará), between 2013-2017, obtained from the Sistema de Informações da Atenção à Saúde Indígena (Indigenous Health Care Information System). For analysis, the morbidities were grouped, and Pearson's Chi-square was used,  $p \leq 0.05$ .

**Results:** 624 cases of Systemic Arterial Hypertension and 108 cases of Diabetes mellitus were studied, identifying a greater involvement of women. The Munduruku ethnic group showed a higher prevalence of systemic hypertension (35.0%;  $n=219$ ) and diabetes mellitus (23.1%;  $n=25$ ). It was observed expressive participation of the nursing team in the care of indigenous peoples.

**Conclusion:** The identified prevalence can be attributed to the accelerated nutritional transition and changes in lifestyle habits. Such findings are important for qualified and culturally meaningful nursing care.

**DESCRIPTORS:** Indigenous Population; Hypertension; Diabetes Mellitus; Chronic Disease; Nursing.

### PREVALENCIA DE HIPERTENSIÓN ARTERIAL SISTÉMICA Y DIABETES MELLITUS ENTRE INDÍGENAS

#### RESUMEN:

**Objetivo:** analizar la prevalencia de Hipertensión Arterial Sistémica y de la Diabetes mellitus en pobladores indígenas asociada a la etnia y describir la frecuencia de atención/diagnóstico según la categoría profesional. **Método:** estudio epidemiológico y descriptivo, realizado con datos de hipertensión arterial sistémica y diabetes mellitus producidos en los Distritos Especiales de Salud Indígena del Estado de Pará, entre 2013-2017, obtenidos del Sistema de Información de Atención a la Salud Indígena. **Para el análisis,** se agruparon las morbilidades y se utilizó la prueba de chi-cuadrado de Pearson,  $p \leq 0,05$ . **Resultados:** Se estudiaron 624 casos de Hipertensión Arterial Sistémica y 108 casos de Diabetes mellitus, identificando una mayor afectación de las mujeres. El grupo étnico Munduruku mostró una mayor prevalencia de hipertensión sistémica (35,0%;  $n=219$ ) y de diabetes mellitus (23,1%;  $n=25$ ). Se observó la participación expresiva del equipo de enfermería en el cuidado de los indígenas. **Conclusión:** La prevalencia identificada puede atribuirse a la transición nutricional acelerada y a los cambios en los hábitos de vida. Estos resultados son importantes para una atención de enfermería cualificada y culturalmente significativa.

**DESCRIPTORES:** Población Indígena; Hipertensión; Diabetes Mellitus; Enfermedad Crónica; Enfermería.

## INTRODUCTION

In Brazil, the indigenous population is estimated at about 800,000 people, living both in villages and in urban areas<sup>(1)</sup>. Throughout history, indigenous peoples have undergone several transformations in the social, economic and cultural areas, among others, with repercussions on health<sup>(2)</sup>. In this context, it is important to highlight the increasing number of cases of systemic hypertension (SAH) and diabetes mellitus (DM) that have been associated with cultural changes, eating habits, and lifestyle<sup>(3-4)</sup>.

Several studies<sup>(2-3,5-8)</sup> highlight the dietary transition experienced by indigenous peoples, resulting in an accelerated increase in cases of SAH and DM, causing complications, disabilities, comorbidities, and even death, being considered serious public health problems.

Between 2015 and 2017, Brazil registered approximately 9 million cases of SAH and DM, affecting 24.7% of the population. In this same period, the Indigenous Health Care Subsystem (SasiSUS) notified, in these peoples, 42,583 cases of Chronic Noncommunicable Diseases (NCDs), including cardiovascular diseases, acute respiratory diseases, DM and neoplasms. There were also 2,371 deaths from cardiovascular diseases and DM<sup>(9)</sup>.

In the indigenous context, the change in eating habits stands out as a major factor for the occurrence of SAH and DM, especially in ethnic groups that until recently had no records of cases. The consumption of processed foods, with little nutritional value and high lipid value is seen in everyday life in the villages, because of difficulties in agriculture, food scarcity and sedentary lifestyle<sup>(2,6,10)</sup>.

The indigenous dietary pattern is causally related to access to land, which in Amerindian cosmology is synonymous with health, therefore, difficulties in planting and subsistence farming limit the consumption of natural foods and lead to increased rates of SAH and DM<sup>(3,8)</sup>. In this sense, the 2030 agenda for sustainable development included in its second goal, access to land for indigenous peoples, in addition to the guarantee of inputs and technical assistance to add value to agricultural production<sup>(11)</sup>, contributing to the preservation of peculiar nutritional habits in the villages.

SAH and DM are events that can be controlled with healthy eating, weight control, reduction in consumption of alcoholic beverages and tobacco, practice of physical exercises, and, mainly, regular professional follow-up, performed through the HiperDia Program, in Primary Health Care (PHC)<sup>(5,12)</sup>.

In the villages, PHC is the responsibility of Multidisciplinary Indigenous Health Teams (EMSI), composed of doctors, nurses, nursing technicians, indigenous health agents (AIS), and sanitation agents (AISAN), which must program, identify, treat, and monitor cases of SAH and DM, through medical and nursing consultations, and health education activities<sup>(4-5)</sup>.

The guidelines for the performance of the Multidisciplinary Indigenous Health Teams (EMSI) are included in the National Policy for Health Care for Indigenous Peoples, in the pillar related to the monitoring of health actions, which includes the registration of morbidities that occur in the indigenous village populations and should be entered into the Indigenous Health Care Information System (SIASI). However, access to these data is restricted, resulting in few comprehensive studies on the prevalence of SAH and DM in this population<sup>(1,5)</sup>.

In this sense, the objectives were to analyze the prevalence of SAH and DM among the indigenous peoples living in the state of Pará associated with ethnicity, and to describe the frequency of care/diagnosis according to professional category.

## METHOD

Epidemiological and descriptive study carried out with data on SAH, and DM produced in the villages of the four Special Indigenous Health Districts (DSEI) located in the state of Pará (Altamira, Guamá Tocantins, Kaiapó do Pará and Rio Tapajós) in the period from 2013 to 2017. The source of the data was the SIASI, which brings together the production related to the health of indigenous people and was made available by SESAI in a bank format in September 2018. The option for the year 2013 is justified because it was the beginning of the process of improvement of the SIASI, which provided greater completeness and reliability to the data.

We studied 624 cases of SAH and 108 cases of DM, corresponding to the totality contained in the bank; no exclusion was made. These cases were distributed among 26 ethnic groups, which correspond to 66.66% of the total population inhabiting the territory of Pará, according to the Socio-environmental Institute. Among the ethnic groups studied, 15 presented cases of SAH and DM simultaneously, 10 presented only SAH, and one showed only DM.

Once in possession of the database, the completeness of the data was verified and then organized in Microsoft Excel 2017 spreadsheets, grouped by morbidity (SAH and DM) and by DSEI, according to the variables: number of cases per year, gender, age group (<20 years, 20 to 39 years, 40 to 59 years, and  $\geq 60$  years), ethnicity, and professional category that performed the care/diagnosis.

Then, the prevalence of SAH and DM was calculated by ISDN, stratified by year and ethnicity, using the data of each morbidity separately. The amount of care/diagnosis of SAH and DM was also counted according to professional category, and to verify the association between variables, Pearson's chi-square was used, and  $p \leq 0.05$  was considered.

The study was approved by the ethics committee of the Undergraduate Nursing Course of the Pará State University, opinion no. 2,803,226, which considered that the requirements of Resolution 466/12-CNS/MS and in the Operational Rule no. 001 of 2013 of the National Health Council (Brazil) were met.

## RESULTS

According to Table 1, DM presented higher occurrence among women (59.2%;  $n=64$ ) and in the 40 to 59 age brackets (49%;  $n=53$ ). Similarly, SAH showed a higher proportion among women (51.3%;  $n=320$ ), but in relation to age, it more significantly affected people aged 60 years or more (45.3%;  $n=283$ ). Among the DSEI, the Guamá Tocantins showed the highest number of DM cases (59.3%;  $n=64$ ) and in Tapajós River, the highest number was of SAH (45.7%;  $n=285$ ).

Table 1 - Distribution of cases of Diabetes mellitus and Systemic Arterial Hypertension in the Special Indigenous Health Districts of the State of Pará, according to sex and age group. Belém, PA, Brazil, 2020

DSEI	TYPES	no. of cases	Gender*		Age group**				
			Male	Female	<20 Years old	20 to 39 Years old	40 to 59 Years old	≥60 Years old	
Altamira	DM	n	8	3	5	0	2	3	3
		%	7,4	37,5	62,5	0	10,5	5,8	8,4
	SAH	n	76	44	32	3	21	28	24
		%	12,2	57,9	42,1	23	21,8	12	8,5
Guamá Tocantins	DM	n	64	24	40	0	12	26	26
		%	59,3	37,5	62,5	0	63,2	49	72,1
	SAH	n	184	92	92	3	38	77	66
		%	29,4	50	50	23	39,6	33,2	23,4
Kaiapó do Pará	DM	n	10	6	4	0	2	8	0
		%	9,3	60	40	0	10,5	15	0
	SAH	n	79	42	37	4	7	31	37
		%	12,7	53,1	46,9	31	7,3	13,4	13
Rio Tapajós	DM	n	26	11	15	0	3	16	7
		%	24	42,3	57,7	0	15,8	30,2	19,5
	SAH	n	285	126	159	3	30	96	156
		%	45,7	44,2	55,8	23	31,3	41,4	55,1
TOTAL	DM	n	108	44	64	0	19	53	36
		%	100	40,8	59,2	0	17,6	49	33,4
	SAH	n	624	304	320	13	96	232	283
		%	100	48,7	51,3	2	15,4	37,2	45,4

\* $\chi^2$ : 2,3491 p-value:0,125 \*\*  $\chi^2$ : 6,39823 p-value:0,040

Source: Authors (2020)

There was no association between gender and morbidities ( $\chi^2=2.34$ ;  $p=0.125$ ), unlike the analysis of age groups, where an increase in cases was identified that was directly proportional to the increase in age, especially in SAH ( $\chi^2=6.39$ ;  $p=0.040$ ).

Table 2 shows that, throughout the period, there was an oscillation of DM and SAH cases, with the number of SAH being higher than DM in all DSEIs. In the Rio Tapajós DSEIs, in 2015 and 2016, there was an increase from six (2.1%) to 147 (51.57%) cases of SAH, respectively, being the DSEI with the highest absolute number and with more than half of the total number of cases.

Table 2 - Distribution of cases of Diabetes mellitus and Systemic Arterial Hypertension per year and Special Indigenous Health District of the State of Pará. Belém, PA, Brazil, 2020

YEAR	DSEI	2013		2014		2015		2016		2017		TOTAL	
		DM	SAH	DM	SAH								
Altamira	n	0	1	4	40	0	0	3	18	1	17	8	76
	%	0	2,4	15,4	37,7	0	0	17,7	8,5	2,6	8,6	7,3	12,2
Guamá Tocantins	n	4	19	19	34	13	21	9	48	19	62	64	184
	%	57,1	45,2	73	32	68,4	33,3	52,9	22,4	48,7	31,1	59,2	29,3
Kaiapó do Pará	n	1	19	3	20	6	36	0	1	0	3	10	79
	%	14,2	45,2	11,6	18,9	31,6	57,2	0	0,5	0	1,5	9,5	12,8
Rio Tapajós	n	2	3	0	12	0	6	5	147	19	117	26	285
	%	28,5	7,2	0	11,4	0	9,5	29,4	68,6	48,7	58,8	24	45,7
TOTAL	n	7	42	26	106	19	63	17	214	39	199	108	624
	%	100	100	100	100	100	100	100	100	100	100	100	100

$\chi^2$ : 368986, p-value:4,83

Source: Authors (2020)

The Guamá Tocantins DSEI showed gradual annual growth, occupying the second place (n=184; 29.3%) in number of SAH cases and the first place in DM (n=64; 59.2%), followed by the Kaiapó do Pará SDR, with 79 cases of SAH (12.8%) and 10 cases of DM (9.5%) and the Altamira SDR, with 76 cases of SAH (12.2%) and 8 cases of DM (7.3%). It was found that there was no statistical association between the studied diseases and the DSEI ( $\chi^2=36.89$ ;  $p=4.83$ ), (Table 2).

According to Table 3, the highest prevalence of SAH was observed in the Munduruku (35%; n=219), Kaiapó (23.5%; n=147) and Tembé (17.4%; n=109) ethnicities. As for DM cases, the highest data were identified in the following ethnic groups: Munduruku (23.1%; n=25), Tembé (21.2%; n=23), Xikrin (17.5%; n=19) and Kaiapó (12.9%; n=14). These findings were not statistically significant ( $\chi^2$ : 73.09757;  $p=1.32$ ).

Table 3 - Prevalence of systemic hypertension and diabetes mellitus cases by ethnicity in Pará State. Belém, PA, Brazil, 2020 (continues)

Etnia	HAS		DM	
	n=624	%	n=108	%
Amanaye	3	0,48	-	-
Anambé	4	0,64	-	-
Apiaká	5	0,8	-	-
Arara	14	2,24	1	0,92
Araweté	3	0,5	-	-
Assurini	6	0,96	1	0,92
Atikun	4	0,84	-	-

Gavião	8	1,3	7	6,48
Guajajara	1	0,16	1	0,92
Guarani	1	0,16	1	0,92
Hixkaryana	1	0,16	-	-
Juruna	11	1,76	3	2,7
Katuena	2	0,32	-	-
Kaxuyana	5	0,8	1	0,92
Kaiapó	147	23,5	14	12,9
Kuruaia	9	1,44	-	-
Maitapu	3	0,48	1	0,92
Munduruku	219	35	25	23,1
Parakanã	3	0,48	-	-
Suruí	17	2,72	2	1,85
Tembé	109	17,4	23	21,2
Timbira	-	-	1	0,92
Tiryó	1	0,16	2	1,85
Waiwai	13	2,08	6	5,55
Xikrin	30	4,8	19	17,5
Xipaya	5	0,8	-	-

$\chi^2$ : 73,09757, p-value: 1,32

Source: Authors (2020)

The demand for SAH and DM is met in the villages by the Multidisciplinary Indigenous Health Teams (EMSI), with marked differences in the amount performed by each professional category throughout the period studied. In 2013, in all the DSEI, there was only one medical care for SAH and none for DM, with the care/diagnosis being the responsibility of nurses, nursing technicians, and AIS.

From 2014, an increase in the number of medical consultations for diagnosis of DM and SAH was identified, increasing the number of consultations that had already been performed by the nursing team, which led to an increase in the number of diagnosed cases. From this same year on, there was no record of DM diagnosis by the AIS and a discrete participation in SAH consultations.

In all the years studied, physicians led the establishment of DM diagnoses (n=67; 62.0%), but there was a significant participation of the nursing team, identified in the sum of the visits of nurses, nursing technicians and AIS (n=41; 38.0%). Regarding SAH, the highest number of consultations/diagnosis was made by nursing (n=325; 53%), followed by medical consultations (n=299, 48.0%) (Table 4).

Table 4 - Distribution of cases of Diabetes mellitus and Systemic Arterial Hypertension by year and professional category who performed the care/diagnosis. Belém, PA, Brazil, 2020

Professional Category		2013		2014		2015		2016		2017		TOTAL	
		DM	HAS	DM	HAS								
Indigenous Health Agent	n	1	12	0	0	0	2	0	1	0	1	1	16
	%	14,2	28,6	0	0	0	3,2	0	0,5	0	0,5	0,9	2,5
Nurse	n	5	13	3	24	2	27	5	55	10	81	25	200
	%	71,6	30,9	11,5	22,7	10,5	42,9	29,4	25,8	25,6	40,7	23,2	32
Nursing Technician	n	1	16	2	14	3	15	0	28	9	36	15	109
	%	14,2	38	7,7	13,2	15,8	23,8	0	13	23	18	13,9	17,5
Physician	n	0	1	21	68	14	19	12	130	20	81	67	299
		0	2,5	80,8	64,1	73,7	30,1	70,6	60,7	51,4	40,7	62	48
TOTAL	n	7	42	26	106	19	63	17	214	39	199	108	624
	%	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors (2020)

## DISCUSSION

The results of this study identified that the Munduruku, Kaiapó and Tembé ethnic groups have the highest prevalence of SAH and DM, with the inclusion of the Xikrin ethnic group in the DM group, with no statistical association between the diseases and ethnic groups. These are two rapidly growing morbidities among the indigenous populations living in the state of Pará, with a distinct epidemiological pattern in the four districts, with the Rio Tapajós River DESEI showing the highest number of SAH cases and the Guamá Tocantins ESID leading the cases of DM. In these districts, the Munduruku and Tembé ethnic groups predominate, respectively.

Regarding the age groups that have been affected, DM is more present in individuals aged 40 to 59 years and SAH in those aged 60 years and older. When analyzing the occurrence according to sex, the two morbidities affected women more strongly, attributable to the fact that they seek primary health care services more often, similar to the pattern of the Brazilian female population, creating an opportunity for diagnosis<sup>(9,13-16)</sup>. A study conducted in Australian indigenous communities, likewise, identified a higher prevalence of DM in women<sup>(17)</sup>. However, research results in the Krenak ethnic group, from Minas Gerais, pointed out a higher prevalence of SAH in the male gender<sup>(18)</sup>.

The higher prevalence at older ages is similar to the behavior of diseases in the general population, although the marked demographic transition among indigenous people is a warning, reflecting the increase in life expectancy. Living longer, with poor quality of life has been related to the increase in obesity and consequently the cases of SAH and DM, increasingly at earlier ages<sup>(2,5,10)</sup>.

Researchers dedicated to the indigenous cause have attributed the occurrence of SAH and DM to important changes in the daily life of the villages, which have brought about changes in the family economy and social life of these people, leading them to incorporate new eating habits and customs, compromising individual health and, consequently, quality of life<sup>(3,10-12)</sup>.

The change in the indigenous way of life is causally related to structural and cultural conditions, and has been associated with the rates of illness, especially due to the low consumption of natural foods and the incorporation in the diet of industrialized products, rich in carbohydrates and lipids, with low nutritional content, such as pasta, stuffed cookies, and soft drinks in increasingly younger age groups<sup>(12-16)</sup>.

The poor dietary pattern, enhanced by sedentary lifestyle, has caused the emergence of metabolic syndrome and increased levels of sodium and body fat, identified as risk factors for SAH and DM and their complications (14,18). These same studies also highlighted other important aspects for the disease: alcoholism, smoking and unfavorable socioeconomic factors, such as family monthly income equal to or just above the current minimum wage.

The high prevalence identified in the Munduruku, Kaiapó, Tembé, and Xikrin ethnicities may be attributed to the incorporation of habits of non-indigenous populations resulting from physical contact, essentially of those living near urban perimeters<sup>(19-20)</sup>. This is an increasingly frequent practice due to the need to receive money from government cash transfer programs, seek health care, and other services available in urban centers, exposing all those who make frequent displacements.

The routine in the villages requires health interventions that observe the indigenous people's way of life, based on their cultural profile. This is, therefore, a challenge for the EMSI, whose attribution is the development of primary care actions, among which is the search for cases of SAH and DM, being the doctor responsible for the diagnosis. However, in many occasions, the absence of this professional has favored the definition of the diagnosis and the introduction of drug therapy by the EMSI members present in the villages at the time of care.

It is possible that such diagnoses have been established based on the measurement of vital signs and evaluation of metabolic parameters on the occasion of mobile care, common in indigenous areas that do not have the EMSI in the territory. It is noteworthy with concern that diagnoses established without the due clinical rigor by professionals who do not have such attribution, especially the AIS, which, in the villages, are fundamental for the establishment of a bond between the residents and the EMSI, besides the activities established in the Family Health Strategy Program<sup>(21)</sup>.

Furthermore, it is evident the increase in medical care as of 2014, which can be attributed to the implementation of the More Doctors Program in Brazil, which took place the previous year and enabled the expansion of health care coverage for the indigenous population. It should be noted that this initiative ensured a constitutional right, with greater access to medical consultations, expansion of care in the villages, and respect for professional attributes<sup>(22-23)</sup>.

The diagnosis and monitoring of SAH and DM require multidisciplinary care, and each team member should develop activities corresponding to their responsibilities. Even though the public health management in Brazil has made the presence of medical professionals in the villages feasible, even so, nursing has remained expressively in the care/diagnosis of diseases<sup>(21,24)</sup>.

According to HiperDia guidelines, nursing duties include performing nursing consultation according to the unit's protocol and routine; registering patients in the program; checking vital signs; measuring body mass index and capillary glucose test; scheduling appointments with other members of the multi-professional team - physician, nutritionist and dentist. They should also provide guidance on physical activity, diet, and use of medications as prescribed, conduct health education, conduct home visits, and assist when necessary in the delivery of standard medications<sup>(25)</sup>.

Early detection, treatment, and control of SAH and DM should be aligned with preventive actions related to lifestyle and guaranteed access to quality multiprofessional care. Nevertheless, it is necessary to review and comply with the current health care protocols

for SAH and DM, instituted by the SUS as specific policies for the care of indigenous people in the dynamics of villages in the light of the National Policy for the Care of Indigenous Peoples<sup>(3,10-12,14)</sup>.

The limitations of this study refer to the use of secondary data, susceptible to incompleteness, either by underreporting of cases or by incomplete or incorrect filling out, which can alter the findings.

## CONCLUSION

The epidemiological panorama of SAH and DM among indigenous peoples is due to multiple factors, such as inter-ethnic contact, food transition, and difficulty in access to health care. This scenario points to the need for more effective measures to prevent cases, going through the completeness of the EMSI in the villages, aiming at alignment with the duties of each professional category and greater resoluteness in the health supply.

In this context of transition, indigenous peoples need support to understand the process of illness resulting from changes in diet and lifestyle, so that they can develop autonomy in making decisions about their health. A more sensitive look should be given to those who are closer to urban territorial spaces, due to the decisive influence on the change in lifestyle habits.

When dealing with a human group with cultural specificity, the association of popular knowledge with scientific knowledge is fundamental, with a dialogue between traditional indigenous medicine and biomedicine, without superimposing knowledge.

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