

Prevalence of Smoking and Associated Factors in Hypertensive Patients Followed in Primary Care in Fortaleza, Ceará

Prevalência de Tabagismo e Fatores Associados em Pacientes Hipertensos Acompanhados na Atenção Primária em Fortaleza, Ceará
Prevalencia del Tabaquismo y Factores Asociados en Pacientes Hipertensos Acompañados en Atención Primaria en Fortaleza, Ceará

RESUMO

Objetivo: Estimar a prevalência de tabagismo e identificar fatores associados entre hipertensos acompanhados em um Posto de Saúde de Fortaleza, Ceará. **Métodos:** Estudo transversal analítico com amostra consecutiva de 120 adultos hipertensos, recrutados entre dezembro de 2024 e agosto de 2025. Foi aplicado questionário eletrônico para obtenção de informações sociodemográficas, comportamentais, sintomas cardiorrespiratórios, conhecimentos sobre hipertensão e tabagismo e dependência nicotínica pelo teste de Fagerström. **Resultados:** A prevalência de tabagismo foi de 20,8%. Após ajuste, o etilismo associou-se independentemente ao tabagismo (RP = 8,00; IC95% = 1,14–56,21; $p = 0,036$), assim como a presença de sintomas respiratórios (RP = 2,46; IC95% = 1,07–5,66; $p = 0,034$). Nos tabagistas, o escore médio de Fagerström foi 4,7 (mediana = 4), e 48% apresentaram dependência moderada ou alta. **Conclusões:** O tabagismo esteve associado sobretudo ao etilismo e a sintomas respiratórios. Estratégias de cessação devem contemplar esses fatores.

DESCRIPTORES: Doenças Crônicas Não Transmissíveis; Fatores de Risco; Hipertensão Arterial; Tabagismo; Atenção Primária.

ABSTRACT

Objective: To estimate smoking prevalence and identify associated factors among hypertensive followed at a primary health center in Fortaleza, Ceará. **Method:** An analytical cross-sectional study with a consecutive sample of 120 hypertensive adults recruited between December 2024 and August 2025. An electronic questionnaire was applied to obtain information on sociodemographic and behavioral aspects, cardiorespiratory symptoms, knowledge about hypertension and smoking and nicotine dependence using the Fagerström test. **Results:** The prevalence of smoking was 20.8%. After adjustment, alcohol consumption was independently associated with smoking (PR = 8.00; 95% CI = 1.14–56.21; $p = 0.036$), as was the presence of respiratory symptoms (PR = 2.46; 95% CI = 1.07–5.66; $p = 0.034$). Among smokers, the mean Fagerström score was 4.7 (median = 4), and 48% presented moderate or high dependence. **Conclusion:** Smoking was primarily associated with alcoholism and respiratory symptoms. Cessation strategies should address these factors.

DESCRIPTORS: Noncommunicable Chronic Diseases; Risk Factors; Arterial Hypertension; Smoking; Primary Health Care.

RESUMEN

Objetivo: Estimar la prevalencia del tabaquismo e identificar factores asociados entre hipertensos en un centro de salud en Fortaleza, Ceará. **Método:** Estudio transversal con 120 hipertensos reclutados entre diciembre de 2024 y agosto de 2025. Se aplicó un cuestionario electrónico para obtener aspectos sociodemográficos, síntomas cardiorrespiratorios, conocimiento sobre hipertensión y tabaquismo y dependencia de la nicotina mediante la prueba de Fagerström. **Resultados:** La prevalencia del tabaquismo fue 20,8%. El alcoholismo se asoció independientemente con el tabaquismo (RP = 8,00; IC del 95% = 1,14–56,21; $p = 0,036$), similarmente que los síntomas respiratorios (RP = 2,46; IC del 95% = 1,07–5,66; $p = 0,034$). La puntuación media de Fagerström fue de 4,7 (mediana = 4), y el 48 % presentó dependencia moderada o alta. **Conclusión:** El tabaquismo se asoció principalmente con el alcoholismo y los síntomas respiratorios. Las estrategias para dejar de fumar deben abordar estos factores.

DESCRIPTORES: Enfermedades Crónicas No Transmisibles; Factores de Riesgo; Hipertensión Arterial; Tabaquismo; Atención Primaria.

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INTRODUCTION

Smoking is part of the group of disorders caused by the use of psychoactive substances and remains the leading preventable cause of illness and premature death⁽¹⁾. In 2023, the World Health Organization estimated that more than eight million deaths per year are attributable to tobacco, including about one million from passive exposure⁽¹⁾. In low- and middle-income countries, where most smokers live, the burden of smoking is even greater⁽¹⁾.

In Brazil, public policies such as the ban on cigarette advertising and warnings on cigarette packs have contributed to reducing the proportion of adult smokers from 15.7% in 2006 to 9.5% in 2020⁽²⁾. Despite these advances, the proportion of former smokers remains high, and smoking continues to be associated with chronic noncommunicable diseases, representing a major public health challenge⁽²⁾.

Systemic arterial hypertension (SAH) is a condition characterized by blood pressure levels ≥ 140 mmHg systolic and/or 90 mmHg diastolic measured in the doctor's office on at least two occasions, constituting one of the

main causes of cardiovascular and renal events⁽³⁾. According to the Vigitel Brazil 2023 Epidemiological Bulletin, 24.8% of the adult population of Fortaleza, Ceará, reported being hypertensive, with a prevalence of 23.8% in males and 25.6% in females⁽⁴⁾. Brazilian hypertension guidelines recognize smoking as one of the major cardiovascular risk factors: smoking causes an acute increase of 5-10 mmHg in blood pressure and promotes atherosclerosis, justifying the emphatic recommendation for cessation. In addition, smoking is associated with other chronic diseases such as diabetes, dyslipidemia, and kidney disease, increasing the risks when they coexist⁽⁵⁾.

In primary health care (PHC), the prevention and control of hypertension and smoking are priorities⁽²⁾. The Brazilian Ministry of Health emphasizes that PHC is the ideal setting for offering smoking cessation approaches, being responsible for identifying risk groups, promoting health education, and ensuring continuity of care⁽²⁾. Recommendations for the prevention and control of SAH include healthy eating, controlled sodium and alcohol consumption, potassium intake, combating physical inactivity, and smoking⁽⁶⁾. National evidence

shows that, although most hypertensive patients monitored in PHC are non-smokers, a history of smoking and association with alcohol consumption are still common, revealing persistent challenges for clinical practice⁽⁶⁾.

Despite the relevance of the topic, few Brazilian studies have examined the factors associated with smoking among hypertensive patients treated in PHC in Fortaleza. Understanding these determinants is essential to guide cessation interventions integrated into SAH care.

This study aimed to estimate the prevalence of smoking and identify associated behavioral, clinical, and socio-demographic factors among hypertensive users of a Primary Health Care Unit (UAPS) in Fortaleza.

METHOD

Study Design and Location

A cross-sectional analytical study was conducted. The research was carried out at the Dr. Marcus Aurélio Lima Verde Primary Health Care Unit (UAPS), located in the Jangurussu neighborhood, Fortaleza, Ceará. The UAPS provides care to an urban population of approximately 18,000 inhabitants⁽⁷⁾.

Participants and Eligibility Criteria

Individuals of both sexes, aged ≥ 18 years, with a diagnosis of SAH registered at the UAPS and registered as users were eligible. People with serious conditions that could compromise their understanding of the questionnaire were excluded. Participants were identified in the UAPS electronic records and invited by telephone or in person. After clarification of the objectives and procedures, those who agreed signed the informed consent form.

Sample Size and Recruitment

The sample size was calculated based on the proportion of hypertensive individuals in the population of Fortaleza (24.8%)⁽⁴⁾, a 95% confidence level, and a 5% error, estimating a need for 287 participants. Due to logistical constraints, 120 hypertensive individuals were consecutively recruited between December 2024 and August 2025. All participants completed the questionnaire, with no losses or refusals.

Operational Definitions

- Current smoker: individual who reported smoking at least one cigarette per day in the last 30 days⁽⁴⁾.
- Former smoker: individual who reported previous regular tobacco use but had been abstinent for ≥ 6 months⁽⁴⁾.
- Never smoked: individuals who have never smoked or have smoked < 100 cigarettes in their lifetime⁽⁴⁾.
- Alcoholism: classified according to Vigitel/MS criteria on current consumption, past consumption, and never consumed; for analysis, it was dichotomized into yes/no⁽⁴⁾.
- Sedentary lifestyle: absence of self-reported regular physical activity⁽⁴⁾.
- Nicotine dependence: assessed by the Fagerström Test for Nicotine Dependence, version validated for Brazil⁽⁸⁾. The score ranges from 0 to 10, categorized as very low (0–2), low (3–4), moderate (5–6), and high/very high (7–10)⁽⁸⁾.

Data Collection

Data collection took place at the UAPS facilities, where participants completed an electronic questionnaire with the assistance of trained researchers. The instrument included: (i) sociodemographic data (gender, education); (ii) lifestyle habits (alcohol consumption, physical activity); (iii) cardiorespiratory symptoms (chest pain, palpitations, cough, and dyspnea); (iv) knowledge about smoking as a risk factor for SAH, complications of hypertension, complications of smoking, and the benefits of quitting; (v) family history of hypertension and comorbidities; and (vi) nicotine dependence score using the Fagerström test for smokers. The test assigns points according to the time until the first cigarette, difficulty in not smoking in prohibited places, importance of the first cigarette, number of cigarettes per day, higher frequency of smoking in the morning, and smoking even when sick⁽⁸⁾. The data were exported to an encrypted spreadsheet accessible only to researchers.

Statistical Analysis

The analyses were performed using Jamovi software⁽⁹⁾. Continuous variables were described by means and standard deviations or medians and interquartile ranges according to the dis-

tribution assessed by the Shapiro–Wilk test.

Variables were categorized according to previously established operational definitions: alcoholism was dichotomized as "yes" (current or former consumption) or "no"; sedentary lifestyle was defined by the absence of regular physical activity; cardiorespiratory symptoms were recategorized in the presence of any symptom; knowledge variables were classified as yes or no; education was dichotomized into high school/higher education and elementary school/none; family history of SAH present or absent; male or female gender. The Fagerström test generated a score of 0–10 points, categorized as low (0–4), moderate (5–6), or high dependence (≥ 7).

The association between smoking and categorical variables (prevalence of smoking among those exposed versus prevalence among those not exposed) was assessed using Pearson's chi-square test (or Fisher's exact test when appropriate) using 2×2 or larger contingency tables. For ordinary variables (duration of hypertension), the mean and median of each group were estimated, and the t-test was applied to compare means. Table 1 shows the correspondence between the test used and the variable/comparison.

Table 1: Authors' personal collection.

Variable/Comparison	Test used
Alcohol consumption (Yes vs. No)	Fisher's exact test
Physical activity (Sedentary vs. Active)	Fisher's exact test
Chest pain/palpitations (Presence of symptoms)	Chi-square
Respiratory symptoms (Presence of symptoms)	Chi-square
Awareness that smoking is a risk factor for SAH (Yes vs. No)	Fisher's exact test
Aware of complications of hypertension (Yes vs. No)	Fisher's exact test
Aware of complications of smoking (Yes vs. No)	Fisher's exact test
Knows that quitting smoking improves SAH (Yes vs. No)	Fisher's exact test
Comorbidities other than hypertension (Yes vs. No)	Fisher's exact test
Family history of hypertension (Present vs. Absent)	Fisher's exact test
Gender (Male vs. Female)	Fisher's exact test
Education (High school/Higher education vs. Elementary school/No education)	Fisher's exact test

Variables with $p < 0.20$ in the bivariate analysis or considered theoretically relevant were included in a multivariate Poisson regression model with robust variance, with smoking status (smoker or non-smoker) as the outcome variable. Prevalence ratios (PR) with 95% confidence intervals were reported. P-values were obtained using the Wald test for each coefficient in the model. Additionally, logistic regression was adjusted to estimate odds ratios (OR), presented as sensitivity analysis⁽¹⁰⁾. The quality of the model fit was verified using the Hosmer–Lemeshow test. The level of significance adopted was 5%.

Ethical considerations

The research complied with the Declaration of Helsinki and Resolution 466/12 of the National Health Council. The project was approved by the Research Ethics Committee of the University of Fortaleza (Opinion No. 7.307.431/2024 and CAAE No. 85091524.8.0000.5052). All participants signed an informed consent form and were guaranteed anonymity and confidentiality.

RESULTS

Participant Profile

The general profile of the partici-

pants is illustrated in Table 2. The study included 120 hypertensive patients, of whom 25 (20.8%) were smokers. The sample was predominantly composed of women, who represented 65.8% (79/120), while men accounted for 34.2% (41/120). Regarding education, there was a higher frequency of individuals with incomplete elementary school education (60/119; 50.4%), followed by incomplete high school education (15/119; 12.6%), no formal education (17/119; 14.3%), and complete high school education (12/119; 10.1%); only 6 participants had completed higher education (5.0%) and 3 (2.5%) had incomplete higher education. The time since diagnosis of hypertension varied, with the most common interval being 10 to 20 years (46/120; 38.3%), followed by 5 to 10 years (26/120; 21.7%), 1 to 3 years (19/120; 15.8%), 3 to 5 years (17/120; 14.2%), and less than 1 year (12/120; 10.0%).

Among smokers, 56% were women and 44% were men, while among non-smokers, the female proportion was 69.5%. Current or past alcohol consumption was more frequent among smokers (96%) than among non-smokers (62%). The presence of cardiorespiratory symptoms was reported by 72% of smokers and 44% of non-smokers, while respiratory symptoms occurred in

76% and 45%, respectively. Most smokers recognized smoking as a risk factor for hypertension (92%) and knew that cessation could improve blood pressure control (84%), higher proportions than among non-smokers (59% and 46%, respectively).

Overall, 81.7% (98/120) of participants reported some comorbidity in addition to hypertension, and 90.8% (109/120) reported a family history of the disease. Knowledge about smoking and hypertension varied: 79 (65.8%) identified smoking as a risk factor, 73 (60.8%) knew about the complications of hypertension, 78 (65.0%) recognized the complications of smoking, and 65 (54.2%) were aware that quitting smoking improves clinical condition. Regarding symptoms, half of the sample (60/120; 50.0%) did not report chest pain or palpitations, while 40 (33.3%) reported at least one of these symptoms. Regarding respiratory manifestations, 62 (51.7%) reported coughing, dyspnea, or fatigue, while 58 (48.3%) did not report such complaints. Physical activity was mentioned by 43 (35.8%) individuals, contrasting with 77 (64.2%) who declared themselves sedentary. Current or past alcohol consumption was reported by 83 (69.2%), while 37 (30.8%) stated they had never consumed alcohol.

Table 2: Authors' personal collection.

Characteristic	Category	N (%)	Smokers (N = 25)	on-smokers (N = 95)
Gender	Female	79 (65,8 %)	14 (56,0 %)	66 (69,5 %)
	Male	41 (34,2 %)	11 (44,0 %)	29 (30,5 %)
Education	Illiterate	17 (14,2 %)	6 (24,0 %)	12 (12,6 %)
	Incomplete elementary education	60 (50,0 %)	10 (40,0 %)	50 (52,6 %)
	Complete elementary education	6 (5,0 %)	0 (0,0 %)	6 (6,3 %)
	Incomplete high school education	15 (12,5 %)	4 (16,0 %)	11 (11,6 %)
	High school graduate	12 (10,0 %)	4 (16,0 %)	8 (8,4 %)
	Incomplete higher education	3 (2,5 %)	0 (0,0 %)	3 (3,2 %)
	Complete higher education	6 (5,0 %)	1 (4,0 %)	5 (5,3 %)
Time since diagnosis of hypertension	< 1 year	12 (10,0 %)	5 (20,0 %)	7 (7,4 %)
	1–3 years	19 (15,8 %)	2 (8,0 %)	17 (17,9 %)
	3–5 years	17 (14,2 %)	2 (8,0 %)	15 (15,8 %)

Time since diagnosis of hypertension	5–10 years	26 (21,7 %)	5 (20,0 %)	21 (22,1 %)
	10–20 years	46 (38,3 %)	11 (44,0 %)	35 (36,8 %)
Previous comorbidity(ies)	No	22 (18,3 %)	3 (12,0 %)	19 (20,0 %)
	Yes	98 (81,7 %)	22 (88,0 %)	76 (80,0 %)
Family history of hypertension	No	11 (9,2 %)	3 (12,0 %)	8 (8,4 %)
	Yes	109 (90,8 %)	22 (88,0 %)	87 (91,6 %)
Aware that smoking is a risk factor for hypertension	No	41 (34,2 %)	2 (8,0 %)	39 (41,1 %)
	Yes	79 (65,8 %)	23 (92,0 %)	56 (58,9 %)
Aware of complications of hypertension	No	47 (39,2 %)	5 (20,0 %)	42 (44,2 %)
	Yes	73 (60,8 %)	20 (80,0 %)	53 (55,8 %)
Aware of the complications of smoking	No	42 (35,0 %)	3 (12,0 %)	39 (41,1 %)
	Yes	78 (65,0 %)	22 (88,0 %)	56 (58,9 %)
Aware that quitting smoking improves hypertension	No	55 (45,8 %)	4 (16,0 %)	51 (53,7 %)
	Yes	65 (54,2 %)	21 (84,0 %)	44 (46,3 %)
Presence of cardiorespiratory symptoms (chest pain or palpitations)	None	60 (50,0 %)	7 (28,0 %)	53 (55,8 %)
	Chest pain only	7 (5,8 %)	1 (4,0 %)	6 (6,3 %)
	Palpitations only	23 (19,2 %)	5 (20,0 %)	18 (18,9 %)
	Both symptoms	30 (25,0 %)	12 (48,0 %)	18 (18,9 %)
Presence of respiratory symptoms	None	58 (48,3 %)	6 (24,0 %)	52 (54,7 %)
	Only fatigue	14 (11,7 %)	6 (24,0 %)	8 (8,4 %)
	Shortness of breath only	13 (10,8 %)	3 (12,0 %)	10 (10,5 %)
	Cough only	7 (5,8 %)	1 (4,0 %)	6 (6,3 %)
	Fatigue and shortness of breath	5 (4,2 %)	1 (4,0 %)	4 (4,2 %)
	Fatigue and cough	5 (4,2 %)	1 (4,0 %)	4 (4,2 %)
	Shortness of breath and coughing	3 (2,5 %)	2 (8,0 %)	1 (1,1 %)
	All symptoms	15 (12,5 %)	5 (20,0 %)	10 (10,5 %)
Physical activity	No	77 (64,2 %)	17 (68,0 %)	60 (63,2 %)
	Yes	43 (35,8 %)	8 (32,0 %)	35 (36,8 %)
Alcoholism	No (never drank)	37 (30,8 %)	1 (4,0 %)	36 (37,9 %)
	Yes (some category)	83 (69,2 %)	24 (96,0 %)	59 (62,1 %)
	Occasional previous alcoholism	23 (19,2 %)	4 (16,0 %)	19 (20,0 %)
	Frequent previous alcohol consumption	35 (29,2 %)	10 (40,0 %)	25 (26,3 %)
	Occasional current alcoholism	20 (16,7 %)	7 (28,0 %)	13 (13,7 %)
	Current alcohol consumption once a week	3 (2,5 %)	2 (8,0 %)	1 (1,1 %)
	Current alcohol consumption 2–5 days/week	1 (0,8 %)	1 (4,0 %)	0 (0,0 %)
	Current alcohol consumption ≥ 6 days/week	1 (0,8 %)	0 (0,0 %)	1 (1,1 %)
Smoking history	Never smoked	78 (65,0 %)	0 (0,0 %)	78 (82,1 %)
	Former smoker	17 (14,2 %)	0 (0,0 %)	17 (17,9 %)
	Smokes and has never tried to quit	2 (1,7 %)	2 (8,0 %)	0 (0,0 %)
	Smokes and has tried to quit	23 (19,2 %)	23 (92,0 %)	0 (0,0 %)

Nicotine Dependence (Fagerström Test)

Among the 25 smokers, the Fagerström score ranged from 0 to 9 points

(mean $\approx$ 4.5; median = 4). According to the traditional classification (0–2 = very low; 3–4 = low; 5–6 = moderate; 7–8 = high; 9–10 = very high),

32% had very low dependence, 20% low, 12% moderate, 24% high, and 12% very high. Considering high dependence as 6 points or above, 40% of

smokers showed high or very high levels of dependence; when scores of 5–6 were included, 48% showed moderate or more severe dependence. About 44% had smoked for ≥ 10 years, and 28% smoked more than 20 cigarettes per day. These findings are shown in Table 3.

Table 3: Authors' personal collection.		
Dependence Category	Point Range	N (%)
Very low	0–2	8 (32%)
Low	3–4	5 (20%)
Moderate	5–6	3 (12%)
High	7–8	6 (24%)
Very high	9–10	3 (12%)

Time since Diagnosis of Hypertension

The time since diagnosis was estimated based on the following categories: “less than 1 year,” “1–3 years,” “3–5 years,” “5–10 years,” and “10–20 years.” Smokers had an approximate mean time of 8.3 years and a median of 8 years; non-smokers had a mean of 7.9 years and a median of 8 years. A t-test applied to these approximate values did not indicate a significant difference between the groups ($p \approx 0.72$), suggesting that the dura-

tion of hypertension did not influence smoking habits.

Bivariate Analysis

In the bivariate analysis, described in Table 4, alcohol consumption and the presence of respiratory symptoms (cough, shortness of breath, or fatigue) were the factors most strongly associated with smoking. Patients who reported current or past alcohol consumption had a smoking prevalence more than ten times higher than those who had never consumed alcohol (PR

= 10.7; 95% CI = 1.5–76.1). The presence of respiratory symptoms was associated with an almost threefold higher prevalence of smoking (PR = 3.0; 95% CI = 1.27–6.90). Cardio-respiratory symptoms (chest pain or palpitations), knowledge about the risks of smoking, knowledge about the benefits of cessation, education, comorbidities, family history of hypertension, physical inactivity, and gender did not show significant associations in the crude analysis.

Table 4: Authors' personal collection.				
Variable/comparison	Smokers (n = 25)	Non-smokers (n = 95)	PR (95% CI)	p value
Alcohol consumption (Yes vs. Never)	24/25 (96,0 %)	59/95 (62,1 %)	10,70 (1,50–76,15)	0,0025
Physical activity (Sedentary vs. Active)	16/25 (64,0 %)	61/95 (64,2 %)	0,99 (0,48–2,05)	1,0000
Chest pain/palpitations (≥ 1 symptom vs. None)	18/25 (72,0 %)	42/95 (44,2 %)	2,57 (1,16–5,70)	0,0192
Respiratory symptoms (≥ 1 symptom vs. None)	19/25 (76,0 %)	43/95 (45,3 %)	2,96 (1,27–6,90)	0,0618
Awareness that smoking is a risk factor for SAH (Yes vs. No)	23/25 (92,0 %)	56/95 (58,9 %)	5,97 (1,48–24,08)	0,0017
Aware of complications of hypertension (Yes vs. No)	20/25 (80,0 %)	53/95 (55,8 %)	2,58 (1,04–6,39)	0,0374
Aware of complications of smoking (Yes vs. No)	22/25 (88,0 %)	56/95 (58,9 %)	3,95 (1,25–12,43)	0,0086
Knows that quitting smoking improves SAH (Yes vs. No)	21/25 (84,0 %)	44/95 (46,3 %)	4,44 (1,62–12,16)	0,0007
High school/college education (High school/college vs. Elementary school/no education)	9/25 (36,0 %)	27/95 (28,4 %)	1,31 (0,64–2,69)	0,4706
Comorbidities other than SAH (Yes vs. No)	22/25 (88,0 %)	76/95 (80,0 %)	1,65 (0,54–5,02)	0,5615
Family history of hypertension (Yes vs. No)	22/25 (88,0 %)	87/95 (91,6 %)	0,74 (0,26–2,08)	0,6963
Gender (Male vs. Female)	11/25 (44,0 %)	29/95 (30,5 %)	1,57 (0,79–3,14)	0,2366

Legend: PR – prevalence ratio (smokers in the category of interest ÷ smokers in the reference category); 95% CI – 95% confidence interval; p-value obtained by association tests (chi-square or Fisher's exact test).

In the bivariate analysis, alcohol consumption emerged as the variable most strongly associated with smok-

ing: smokers had a tenfold higher prevalence of alcoholism compared to non-smokers (PR = 10.70; 95% CI

1.50–76.15; $p = 0.0025$). It was also observed that the occurrence of cardiorespiratory symptoms ($PR = 2.57$; 95% CI 1.16–5.70; $p = 0.019$), respiratory symptoms ($PR = 2.96$; 95% CI 1.27–6.90; $p = 0.0618$), knowledge that smoking is a risk factor for hypertension ($PR = 5.97$; 95% CI 1.48–24.08; $p = 0.0017$), awareness of the complications of hypertension ($OR = 2.58$; 95% CI 1.04–6.39; $p = 0.0374$) and smoking ($OR = 3.95$; 95% CI 1.25–12.43; $p = 0.0086$), as well as the perception that smoking cessation improves blood pressure ($PR = 4.44$; 95% CI 1.62–12.16; $p = 0.0007$) were associated with smoking. On the other hand, physical inactivity, educational level, presence of

comorbidities, family history of hypertension, and gender did not show a significant association.

Factors Associated with Smoking

To simultaneously assess the effect of the variables studied on smoking, a Poisson regression model with robust variance was adjusted, as illustrated in Table 5. In the crude analysis, alcohol consumption, cardiorespiratory symptoms, respiratory symptoms, and prior knowledge about the risks and complications of smoking showed an association with the outcome. After multivariate adjustment, only alcohol consumption and the presence of respiratory symptoms remained statistically significant. Pa-

tients who reported current or past alcohol consumption had a smoking prevalence almost nine times higher than those who had never drunk alcohol (adjusted $PR = 9.19$; 95% CI 1.40–60.28; $p = 0.034$). The presence of respiratory symptoms (cough, shortness of breath, or fatigue) was associated with an approximately two-and-a-half times higher prevalence of smoking (adjusted $PR = 2.52$; 95% CI 1.07–5.94; $p = 0.032$). The other variables (sedentary lifestyle, cardiorespiratory symptoms, knowledge of risk and cessation, education, comorbidity, family history, and gender) did not remain significant, indicating that their impact is minor or nonexistent in the population analyzed.

Table 5: Authors' personal collection.

Variable	Crude OR (95% CI)	Adjusted RR (95% CI)	p-value
Alcohol consumption	10,70 (1,50–76,15)	9,19 (1,40–60,28)	0,034
Sedentary lifestyle	0,99 (0,48–2,05)	0,94 (0,47–1,88)	0,80
Respiratory symptoms	2,96 (1,27–6,90)	2,52 (1,07–5,94)	0,032
Cardiorespiratory symptoms	2,57 (1,16–5,70)	1,80 (0,73–4,44)	0,25
Awareness of smoking as a risk factor	5,97 (1,48–24,08)	4,08 (1,14–14,58)	0,07
Knows that cessation improves SAH	4,44 (1,62–12,16)	1,98 (0,59–6,72)	0,28
Education (secondary/higher)	1,31 (0,64–2,69)	1,26 (0,69–2,29)	0,30
Comorbidity other than SAH	1,65 (0,54–5,02)	1,31 (0,44–3,93)	0,41
Family history of hypertension	0,74 (0,26–2,08)	0,92 (0,29–3,00)	0,80
Male	1,57 (0,79–3,14)	1,75 (1,02–2,98)	0,08

Logistic regression (sensitivity analysis)

In the sensitivity analysis with logistic regression, alcohol consumption maintained a significant association with smoking (adjusted $OR \approx 18.0$; 95% CI = 1.97–165.8; $p = 0.011$) and the presence of respiratory symptoms showed $OR \approx 4.4$ (95% CI = 1.18–16.59; $p = 0.027$); the other covariates were not significant. These estimates show that smokers who consume alcohol are much more likely to smoke

than abstainers, and that respiratory symptoms are also associated with a higher chance of smoking. These values, which are much higher than the prevalence ratios obtained in the Poisson regression, illustrate the tendency of logistic regression to overestimate associations when the outcome is relatively frequent.

DISCUSSION

This study identified a smoking

prevalence of 20.8% among hypertensive patients treated in Primary Health Care (PHC), a proportion higher than the national average reported by Vigitel 2023, which points to a sustained decline in smoking in Brazilian capitals, with a prevalence of around 9.3% among adults⁽⁴⁾. The findings confirm that, despite the decline in consumption in Brazil, smoking remains a relevant risk factor in specific groups, such as those with hypertension.

An independent association was

observed between smoking and alcohol consumption and respiratory symptoms, while sociodemographic and clinical variables did not remain significant. These results suggest that risk behaviors play a more decisive role than individual characteristics in this population. The relationship between alcoholism and smoking has been widely described in Brazilian studies, with emphasis on investigations in Jequié, Bahia, which observed, in the Hiperdia program, that 93% of hypertensive patients did not smoke at the time of the interview, but 38.4% reported a previous habit, and 50.4% had consumed alcohol, with a significant association between alcohol and tobacco consumption⁽⁶⁾. In addition, in a survey in Iguatu, Ceará, the joint cessation of alcohol and smoking was reported as a practice encouraged by health professionals⁽¹¹⁾. Data from São Benedito, Ceará, also demonstrated unhealthy lifestyle habits among hypertensive individuals, including high frequency of alcohol consumption and low levels of physical activity⁽¹²⁾. In addition, a study in Baturité highlighted smoking and alcoholism as central problems among hypertensive patients, associated with excess weight and low adherence to self-care⁽¹³⁾.

The presence of respiratory symptoms among smokers is consistent with evidence pointing to the immediate impact of tobacco on the cardiorespiratory and y systems, contributing to increased morbidity. A review in Sobral, Ceará, identified smoking, alcoholism, physical inactivity, and hypertension as modifiable risk factors for cerebrovascular diseases, reinforcing the need for an integrated approach in PHC⁽¹⁴⁾. The coexistence of behavioral risk factors, such as alcohol and tobacco, is recognized for increasing health risks, indicating that isolated interventions may be insufficient.

From a clinical point of view, the results reinforce the need for integrated strategies in PHC. The Clinical

Protocol and Therapeutic Guidelines for Smoking recommends a systematic approach, using the PAAPA protocol and offering individual or group counseling, associated with pharmacotherapy for cases of moderate or high dependence⁽¹⁵⁾. In our sample, almost half of the smokers had this profile, which justifies the prescription of nicotine patches or bupropion in combination with behavioral support. Brazilian guidelines on hypertension also highlight that, although cessation does not promote immediate reduction in blood pressure, quitting tobacco substantially reduces cardiovascular events and mortality⁽³⁾.

In PHC, professionals should address smoking, alcoholism, and other cardiovascular risk factors in an integrated manner. Primary Care Notebook No. 29 recommends routine screening for harmful alcohol use in PHC, using instruments such as CAGE or AUDIT, followed by brief counseling for positive cases⁽¹⁶⁾. Patients with addiction should be referred to specialized services, such as Psychosocial Care Centers, according to the guidelines of the Psychosocial Care Network⁽¹⁷⁾. The integration of tobacco and alcohol screening can optimize resources and promote more effective interventions.

The fact that smokers have greater knowledge about the risks of tobacco and the benefits of cessation suggests that educational actions have been directed at this group. However, the nicotine dependence observed, with about half having moderate or high dependence, reinforces the need for intensive support. Brazilian hypertension guidelines recommend smoking cessation, even though the direct reduction in blood pressure after quitting smoking is modest, as quitting smoking reduces cardiovascular events and mortality⁽³⁾. Cessation programs based on brief counseling, pharmacotherapy (nicotine patches, bupropion, varenicline), and regular follow-up should be incorporated into the PHC routine⁽³⁾.

Strengthening referral and counter-referral flows is also necessary. Smokers with severe comorbidities, very high dependence, or multiple previous unsuccessful attempts to quit may require referral to smoking cessation centers or pulmonology services for a multidisciplinary approach. Ordinance No. 2,436/2017, which establishes the National Primary Care Policy, reaffirms the role of PHC in coordinating care and ly in articulating with other levels of care⁽¹⁸⁾. Similarly, patients with harmful alcohol use or concomitant mental disorders should be monitored in specialized services, according to the line of care for alcohol and other drugs.

The results should be interpreted in light of limitations. The sample was convenience-based and small, reducing the accuracy of estimates and generalization to other populations. The cross-sectional design prevents inferring causality and did not allow for assessing the temporality between exposure and outcome. Self-reported information may be subject to memory bias or social desirability bias. On the other hand, the study used a standardized instrument, included several behavioral variables, and employed multivariate analysis, providing support for planning actions in PHC.

CONCLUSION

Smoking remains prevalent among hypertensive patients treated in PHC and is independently associated with alcohol consumption and respiratory symptoms, indicating predominant behavioral determinants. The high proportion of moderate or high nicotine dependence reinforces the need for intensive support. These findings support the systematic incorporation of cessation groups, alcohol screening, and pharmacotherapy into the daily routine of PHC, in line with care guidelines already established in the SUS.

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