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# Factors associated with smoking cessation

## Fatores associados à cessação do tabagismo

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### ABSTRACT

**OBJECTIVE:** To analyze the prevalence and factors associated with smoking abstinence among patients who were treated in a reference unit for smoking cessation.

**METHODS:** This cross-sectional study examined the medical records of 532 patients treated in a reference unit for smoking cessation in Belém, PA, Northern Brazil, between January 2010 and June 2012. Sociodemographic variables and those related to smoking history and treatment were analyzed. Statistical significance was set at  $p < 0.05$ .

**RESULTS:** The mean age of the participants was 50 years; 57.0% of the patients were women. The mean tobacco load was 30 packs/year, and the mean smoking duration was approximately 32 years. Most patients remained in treatment for four months. The rate of smoking abstinence was 75.0%. Regression analysis indicated that maintenance therapy, absence of relapse triggers, and lower chemical dependence were significantly associated with smoking cessation.

**CONCLUSIONS:** The smoking abstinence rate observed was 75.0%. The cessation process was associated with several aspects, including the degree of chemical dependence, symptoms of withdrawal, and period of patient follow-up in a multidisciplinary treatment program. Studies of this nature contribute to the collection of consistent epidemiological data and are essential for the implementation of effective smoking prevention and cessation strategies.

**DESCRIPTORS:** Substance Withdrawal Syndrome, epidemiology. Smoking Cessation. Tobacco Use Cessation. Smoking, therapy. Cross-Sectional Studies.

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## RESUMO

**OBJETIVO:** Analisar a prevalência e fatores associados à abstinência tabágica entre pacientes atendidos em unidade de referência para cessação do tabagismo.

**MÉTODOS:** Estudo transversal que analisou 532 prontuários de pacientes atendidos em unidade de referência para cessação do tabagismo em Belém, PA, entre janeiro de 2010 e junho de 2012. Foram analisadas variáveis sociodemográficas e aquelas relacionadas à história tabágica e ao tratamento realizado. Considerou-se para significância estatística  $p < 0,05$ .

**RESULTADOS:** A média de idade dos participantes foi 50 anos e cerca de 57,0% dos pacientes eram do sexo feminino. A carga tabágica média foi 30 maços/ano e o tempo médio de tabagismo foi aproximadamente 32 anos. A maioria dos pacientes permaneceram em tratamento por quatro meses. A taxa de abstinência tabágica foi 75,0%. Na análise de regressão, terapia de manutenção, ausência de gatilhos de recaída e dependência química mais baixa foram significativamente associados à cessação.

**CONCLUSÕES:** A taxa de abstinência tabágica observada foi 75,0%. O processo de cessação associou-se a diversos aspectos, como grau de dependência química, sintomas de abstinência e tempo de acompanhamento do paciente em um programa de tratamento multiprofissional. Estudos desta natureza, portanto, auxiliam na reunião de informações epidemiológicas consistentes, fundamentais à elaboração de ações de prevenção e combate ao tabagismo mais efetivas.

**DESCRIPTORIOS:** Síndrome de Abstinência a Substâncias, epidemiologia. Abandono do Hábito de Fumar. Abandono do Uso de Tabaco. Hábito de Fumar, terapia. Estudos Transversais.

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## INTRODUCTION

Smoking is an important public health problem. Tobacco dependence is a complex process that involves the pharmacological action of nicotine (physical dependence); conditioning and acquired behavioral processes (behavioral dependence); and factors related to personality, emotional expressions, and social conditions (psychological dependence).<sup>a</sup>

Smoking cessation is an efficient and cost-effective intervention because it promotes a significant reduction in morbidity and mortality rates.<sup>b</sup> Therapeutic strategies that can be used for smoking cessation include pharmacological treatments (particularly nicotine replacement and bupropion), combined with behavioral and individualized approaches, also known as cognitive-behavioral therapy.<sup>2,17</sup>

Considering that most studies on tobacco control in Brazil contain specific population profiles,<sup>4,20</sup> knowing the profile of smokers in the context of the main

difficulties associated with smoking cessation allows for more effective treatments.

The present study aimed to analyze the prevalence of the factors associated with smoking abstinence among patients who were treated at a reference unit for smoking cessation.

## METHODS

The study was conducted at the *Centro de Referência Especializado em Abordagem e Tratamento do Fumante* (CREATF – Reference Centre Specialized in the Approach and Treatment of Smokers), in Belém, PA, Northern Brazil, which is linked to the Pará State Health Secretariat. The CREATF serves patients by spontaneous demand or referral by the municipal health units. The CREATF treated approximately 3,500 patients during its 10 years of operation.

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<sup>a</sup> Rosemberg J, Rosemberg AMA, Moraes MA. Nicotina: droga universal. São Paulo: Secretaria de Saúde do Estado de São Paulo, Centro de Vigilância Epidemiológica; 2003.

<sup>b</sup> World Health Organization. Report on the Global Tobacco Epidemic, 2008: the MPOWER package. Geneva; 2008 [cited 2012 Dec]. Available from: [http://www.who.int/tobacco/mpower/mpower\\_report\\_full\\_2008.pdf](http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf)

This cross-sectional study examined the medical records of patients enrolled in the smoker attention program at the CREATF between January 2010 and June 2012. During this period, 593 individuals sought the help of the CREATF for smoking cessation. Smoking histories with incomplete or incoherent data were excluded from the analysis, as well as those not retrieved after three attempts. A total of 61 records were excluded. Therefore, the study sample comprised 532 records of patients who attended at least two sessions of cognitive-behavioral therapy.

Sociodemographic data, smoking history, treatments performed, and outcome obtained within the aforementioned program were collected. The aspects related to smoking history included number of cigarettes/day, levels of chemical dependence levels, attempts of smoking cessation, and presence of triggers (any physical, chemical, psychological, or behavioral factors that can induce the consumption of cigarettes, leading to a lapse or relapse). The variables related to treatment and its outcome were reported withdrawal symptoms, treatments performed (behavioral and/or medical approach), physical activity practice, and treatment outcome (the time when the patient ceased to be monitored at the CREATF).<sup>20</sup>

The following sociodemographic variables were included in the statistical analysis: sex, age, educational level, and occupational status. To simplify the statistical analysis, some variables were stratified. Education was stratified as “up to eight years of education” (this group included illiterate and semi-literate individuals) and “more than eight years of education”; occupational status was stratified as “individuals without a source of income” (unemployed), “individuals with a source of income” (formal or informal employment), and “retirees”.

The number of cigarettes/day was stratified as “up to 20 cigarettes/day” and “more than 20 cigarettes/day”. Chemical dependence was characterized according to the Fagerstrom Scale and stratified into “very low to medium” and “high to very high”. The variable “cessation attempts” was divided into patients who attempted smoking cessation and those who never attempted. The triggers associated with smoking habit were classified as behavioral, psychological, chemical, or their associations thereof; triggers leading to relapse were stratified according to the absence of triggers, the presence of a single trigger, and association of triggers. Regarding the abstinence syndrome, the patients were divided into those with up to two reported symptoms and those with more than two complaints. Regarding the treatments conducted, the patients were divided into those who underwent cognitive-behavioral therapy only (and did not require drug support) and those who, in addition to cognitive-behavioral therapy, required other therapeutic strategies (nicotine replacement or laser therapy). Treatment outcome was defined as the time of the last contact with the CREATF (as registered in

the medical history) for cognitive-behavioral therapy or maintenance therapy.

Each post-treatment patient was classified as teetotaler or smoker, according to the most recent record in their medical history; the last analysis variable was “smoking status at the end of the treatment”, which indicated the rate of success and failure of treatment.

Data were tabulated and organized in spreadsheets. Statistical analysis was performed using EpiInfo software, version 3.5.2. The frequencies of the variables and their respective confidence intervals were included, and raw and adjusted analyses were included for determination of the variables associated with the final status of the patients who underwent the treatment. The statistical significance level was set at  $p < 0.05$ .

This study was approved by the Research Ethics Committee of the *Fundação Pública Estadual Hospital de Clínicas Gaspar Vianna* (Protocol 001795), in accordance with the guidelines for human research established by Resolution 196/96 of the National Health Council. The patients were identified by their respective medical history numbers in order to preserve their identity.

## RESULTS

The mean age of individuals were treated at the CREATF was 49.73 years. Most individuals in the study group were women (56.6%). The total study group and the prevalence of teetotalers and smokers, according to sociodemographic variables, smoking history, and treatments performed are listed in Table 1.

The tobacco load was, on average, 30 packs/year; the mean smoking duration was 32.4 years. The success rate of the intervention was 75.0% in the period evaluated. On average, teetotalers were monitored for up to four months after smoking cessation, and the control and maintenance periods reached up to 33 months when their contact with the CREATF ended.

No sociodemographic variable was significantly associated with the status at the end of treatment ( $p > 0.05$ ; Table 2). The analysis of smoking history and the treatments performed indicated that all variables were statistically significant, except number of cessation attempts and triggers (Table 3). The variables stratified by status at the end of treatment (teetotaler and smoker) with  $p < 0.2$  were selected for raw analysis (Table 4). Physical activity, treatment outcome, nicotine addiction, relapse triggers, number of cigarettes/day, and the treatments performed were statistically significant ( $p < 0.05$ ) variables and therefore, were subjected to adjusted analysis. The duration of participation in the program, presence of relapse triggers, and high or very high status of addiction appeared to influence the cessation process (Table 5).

**Table 1.** Profile of the study group and prevalence of teetotalers and smokers, according to sociodemographic variables, smoking history, and treatments. Belém, PA, Northern Brazil, 2012.

Variable	Total population		Teetotalers		Smokers	
	N (532)	%	N (399)	%	N (133)	%
Sex						
Feminine	301	56.6	224	74.4	77	25.6
Masculine	231	43.4	175	75.8	56	24.2
Education (years of study)						
≤ 8	194	36.5	149	76.8	45	23.2
> 8	338	63.5	250	74.0	88	26.0
Occupational status						
Formal or informal employment	385	72.4	285	74.0	100	26.0
Aposentado	63	11.8	50	79.4	13	20.6
Desempregado	84	15.8	64	76.2	20	23.8
Cigarettes/day						
≤ 20	382	71.8	298	78.0	84	22.0
> 20	150	28.2	101	67.3	49	32.7
Chemical dependence (Fagerstrom)						
Very low to medium	243	45.7	193	79.4	50	20.6
High to very high	289	54.3	206	71.3	83	28.7
Cessation attempts						
Yes	449	84.4	339	75.5	110	24.5
No	83	15.6	60	72.3	23	27.7
Trigger						
Chemical	5	0.9	4	80.0	1	20.0
Psychological	71	13.3	57	80.3	14	19.7
Behavioral	454	85.3	336	74.0	118	26.0
Associations	2	0.4	2	100.0	0	0.0
Treatment used						
CBT	111	20.9	68	61.3	43	38.7
CBT + others	421	79.1	331	78.6	90	21.4
Withdrawal symptoms						
≤ 2	334	62.8	228	68.3	106	31.7
> 2	198	37.2	171	86.4	27	13.6
Treatment outcome						
CBT	234	44.0	116	49.6	118	50.4
MT	298	56.0	283	95.0	15	5.0
Relapse trigger						
Absent	485	91.2	378	77.9	107	22.1
One trigger	38	7.1	16	42.1	22	57.9
Trigger associations	9	1.7	5	55.6	4	44.4
Physical activity						
Yes	110	20.7	307	72.7	115	27.3
No	422	79.3	92	83.6	18	16.4

CBT: cognitive-behavioral therapy; MT: maintenance therapy

**Table 2.** Frequency and analysis of sociodemographic variables, according to patient status after treatment for smoking cessation. Belém, PA, Northern Brazil, 2012.

Variable	Teetotalers		Smokers		p
	%	95%CI	%	95%CI	
Prevalence	75.0	71.1;78.6	25.0	21.4;28.9	
Sex					0.40
Feminine	56.2	51.1;61.1	57.9	49.0;66.4	
Masculine	43.9	38.9;48.9	42.1	33.6;51.0	
Education (years of study)					0.24
≤ 8	36.2	31.5;41.2	32.3	24.4;41.1	
> 8	63.8	58.8;68.5	67.7	58.9;75.6	
Occupational status					0.33
Formal or informal employment	70.4	65.6;74.8	72.2	63.7;79.6	
Retiree	12.5	9.5;16.3	9.8	5.3;16.1	
Unemployed	16.0	12.7;20.1	15.0	9.4;22.3	

**Table 3.** Frequency and analysis of variables associated with smoking history and treatment used, according to patient status after treatment for smoking cessation. Belém, PA, Northern Brazil, 2012.

Variable	Teetotalers		Smokers		p
	%	95%CI	%	95%CI	
Cigarettes/day					< 0.01
≤ 20	74.7	70.1;78.8	63.2	54.4;71.4	
> 20	25.3	21.2;29.9	36.8	28.6;45.6	
Chemical dependence (Fagerstrom)					< 0.05
Very low to medium	46.9	41.9;52.0	36.6	28.4;45.5	
High to very high	53.1	48.0;58.1	63.4	54.5;71.6	
Cessation attempts					0.44
Yes	84.9	81.0;88.3	82.6	75.0;88.6	
No	15.1	11.8;19.1	17.4	11.4;25.0	
Trigger					0.95
Chemical	1.0	0.3;2.7	0.8	0.0;4.1	
Psychological	14.3	11.1;18.2	10.5	5.9;17.0	
Behavioral	84.2	80.3;87.6	88.7	82.1;93.5	
Associations	0.3	0.0;1.6	0.0	0.0;2.7	
Treatment used					< 0.01
CBT	17.0	13.6;21.2	31.6	23.8;40.2	
CBT + others	83.0	78.9;86.5	67.7	59.0;75.5	
Withdrawal symptoms					< 0.01
≤ 2	44.7	39.8;49.8	45.1	36.5;54.0	
> 2	43.0	38.1;48.0	20.3	13.8;28.1	
Treatment outcome					< 0.01
CBT	29.1	24.7;33.8	88.7	82.1;93.5	
MT	70.9	66.2;75.3	11.3	6.5;12.9	
Relapse trigger					< 0.01
Absent	80.2	72.3;86.6	94.7	91.8;96.6	
One trigger	16.8	10.8;24.3	4.1	2.4;6.6	
Trigger associations	3.1	0.8;7.6	1.3	0.5;3.1	
Physical activity					< 0.05
Yes	23.1	19.1;27.6	13.5	8.2;20.5	
No	76.9	72.4;80.9	86.5	79.5;91.8	

CBT: Cognitive-behavioral therapy; MT: Maintenance therapy

**Table 4.** Raw analysis of the studied variables associated with smoking abstinence at the end of treatment. Belém, PA, Northern Brazil, 2012.

Variable	OR	95%CI	p
Physical activity	0.93	0.87;0.98	< 0.05
Treatment outcome	19.19	10.75;34.24	< 0.01
Nicotine addiction (Fagerstrom)	0.65	0.43;0.98	< 0.05
Relapse triggers	0.34	0.20;0.57	< 0.01
Number of cigarettes	0.58	0.38;0.88	< 0.05
Symptoms	0.96	0.84;1.09	0.54
Treatment used	2.35	1.51;3.65	< 0.01

**Table 5.** Adjusted analysis of the studied variables associated with patient status at the end of treatment (teetotaler or smoker). Belém, PA, Northern Brazil, 2012.

Variable	OR	95%CI	p
Treatment outcome			< 0.01
CBT	1.00	13.18;58.54	
MT	27.77		
Relapse triggers			< 0.01
Absent	1.00	0.02;0.18	
One	0.52		
Chemical dependence (Fagerstrom)			< 0.05
Very low to medium	1.00	0.29;0.96	
High to very high	0.52		

CBT: Cognitive-behavioral therapy; MT: Maintenance therapy

## DISCUSSION

The abstinence rate at the CREATF in Belém was 75.0%, which is considered high when compared with the rate from other national studies<sup>14,20</sup> and with the profile of patients who were treated in other health care units. The main factor associated with the success or failure of treatment was the participation in maintenance therapies, which appeared to favor abstinence, whereas the presence of relapse triggers and high or very high chemical dependence were complicating factors in this process.

Mazoni et al<sup>11</sup> (2008) observed that pharmacotherapy doubles the probability of abstinence.<sup>3,8</sup> However, these authors found that the association between drug therapy and cognitive-behavioral therapy is not statistically significant for the maintenance of abstinence.

Patients who underwent maintenance behavioral therapy presented a 27-fold higher probability of maintaining abstinence when compared with those who underwent only cognitive-behavioral therapy. Illiceto et al<sup>9</sup> (2013) reinforced the importance of patient follow-up even after smoking cessation, considering that the risk of relapse is the highest in the initial phase.

Maintenance therapy aims to keep patients motivated to maintain abstinence because the chances of relapse

are strongly associated with the lack of motivation and low attendance in therapy sessions.<sup>18</sup>

In the present study, the average follow-up period after smoking cessation was four months. However, the Guidelines for Tobacco Cessation of the Brazilian Society of Pneumology and Tisiology<sup>17</sup> (2008) suggest that the patient's smoking cessation process should be monitored for at least six months.<sup>17</sup> Therefore, it is important to resort to strategies that support maintenance therapy for a period longer than that reported herein.

Yong et al<sup>22</sup> (2010) emphasized the importance of monitoring patients for more than six months after smoking cessation through outpatient consultation and telephone contacts in order to monitor the difficulties faced by the patients and to praise their progress.

The results demonstrated that the presence of a trigger, understood as a factor that motivates smoking, acts as a deterrent to smoking cessation because it predisposes to relapse. According to Cardoso et al<sup>6</sup> (2010), the occurrence of relapse is correlated with sociodemographic variables and the level of addiction; the present study evaluated whether the presence or absence of triggers in the face of relapse was associated with patient status at the end of treatment.

Ferguson & Shiffman<sup>7</sup> (2010) reinforced the idea that the presence of triggers hinders the success rates of anti-smoking treatment. These authors highlighted that behavioral strategies toward triggers should be encouraged in all patients, regardless of their drug therapy status.

Furthermore, the high degree of addiction hinders the success rates of treatment, and moderate and severe dependence enhances withdrawal symptoms during smoking cessation, favoring long-term relapse.<sup>5,22</sup>

Father & Prasad<sup>13</sup> (2012) evaluated two groups of smokers with similar sociodemographic characteristics and found that patients with low addiction benefited from cognitive-behavioral therapy, whereas those with a high degree of nicotine dependence required nicotine replacement therapy to achieve abstinence.

The success rate of the treatment offered by the CREATF was 75.0%, which can be considered high when compared with similar services in Brazil, with average rates of smoking cessation between 40.0% and 50.0%.<sup>14,20,21</sup> This information is relevant, considering the significant long-term smoking habit presented by the patients in this study. The history of smoking and duration of heavy smoking may have contributed to the patients' awareness of their high degree of dependence, leading them to effectively engage in treatment.

According to Bortoluzzi et al<sup>4</sup> (2011), being under 40 years and having low income and lower education status are factors closely associated with maintenance of smoking and higher rates of failure.<sup>10,19</sup> Nonetheless, the present study found no significant association between sociodemographic variables and status at the end of treatment.

Other studies observed the existence of heterogeneity in the sociodemographic variables associated with smoking cessation in different populations. Peixoto et al<sup>14</sup> (2007), in a comparative analysis between the metropolitan region of Belo Horizonte and the town of Bambuí, both in MG, Southeastern Brazil, found very similar abstinence rates (40.0% and 38.8%, respectively). However,

the factors associated with smoking cessation differed among these population groups.

Azevedo et al<sup>1</sup> (2009) and Morissette et al<sup>12</sup> (2007) found that the rate of failure and relapse is strongly associated with the presence of psychiatric symptoms, such as depression and anxiety. The present results showed no statistically significant association between the presence of these symptoms and failure of treatment. However, patients with psychiatric disorders were not analyzed individually.

With regard to the investigation of physical activity in similar programs, Prochaska et al<sup>16</sup> (2008) argued that physical exercise reduces withdrawal symptoms, promoting smoking cessation. However, the results demonstrated that the records for this variable were incomplete. Therefore, it is suggested that this variable should be included in the standard evaluation form in order to optimize therapy.

The limitations of the present study are related to the collection of secondary data, underreporting of bias, and the self-reporting of abstinence, which may have over- or under-estimated the results. Furthermore, the cross-sectional nature of the study limited the establishment of causal relationships.<sup>15</sup> However, such limitations are inherent to this type of study and therefore cannot be avoided. To minimize information bias, only records with complete data were included in the analysis.

The identification of the main factors associated with successful treatment will allow a reassessment of the health strategies aimed at smokers. Patients with a higher degree of dependence and those who relapse during treatment require increased therapeutic support. In addition, maintenance therapies should be more dynamic to ensure full adherence to treatment.

Additional studies comparing and addressing population changes that influence the success of treatment and further research to support smoking prevention and cessation initiatives are needed.

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