

## Factors Associated with Smoking in Pregnancy

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The aim of this cross-sectional study was to identify factors related to smoking during pregnancy. The sample included 267 puerperae hospitalized in the maternity unit of a university hospital in Porto Alegre/RS. The data were collected through a self-applied instrument and statistically analyzed. The majority of the puerperae (51.3%) were between 18 and 25 years old, 55.4% were nonsmokers, 25.5% were smokers, 19.1% had recently ceased smoking (in abstinence). The nonsmokers had more consultations than the smokers and the abstinent smokers ( $p=0.025$ ). The number of women who had more than one child was higher among smokers than among nonsmokers and abstinent smokers ( $p=0.002$ ). Women were more likely to stop smoking before pregnancy when they had a partner who was a nonsmoker ( $p=0.007$ ). Several factors influence smoking and smoking cessation and these are important in prenatal interventions aimed at pregnant women and their partners.

Descriptors: Smoking; Pregnancy; Prenatal Care; Tobacco Use Cessation.

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## Fatores associados ao tabagismo na gestação

É um estudo descritivo transversal que teve por objetivo identificar os fatores relacionados ao tabagismo na gestação. A amostra incluiu 267 puérperas, atendidas em uma unidade de internação obstétrica de um hospital universitário de Porto Alegre, RS. Os dados foram coletados por instrumentos autoaplicados e analisados estatisticamente. A maioria das puérperas (51,3%) tinha entre 18 e 25 anos, sendo 55,4% não fumantes, 25,5% fumantes em abstinência e 19,1% fumantes. As não fumantes consultaram mais do que as fumantes e fumantes em abstinência ( $p=0,025$ ). O número de mulheres com mais de um filho foi maior entre as fumantes ( $p=0,002$ ), e aquelas que se mostraram mais propensas a parar de fumar, antes da gestação, foram as que tinham um companheiro não fumante ( $p=0,007$ ). Os fatores que influenciam o tabagismo e a sua cessação são diversos, o que determina intervenções no pré-natal, direcionadas às necessidades das gestantes e seus companheiros.

Descritores: Tabagismo; Gravidez; Cuidado Pré-Natal; Abandono do Uso de Tabaco.

## Factores asociados al tabaquismo en la gestación

Se trata de un estudio descriptivo transversal que tuvo por objetivo identificar los factores relacionados al tabaquismo en la gestación. La muestra incluyó 267 puérperas atendidas en una unidad de internación obstétrica de un hospital universitario de Porto Alegre/RS. Los datos fueron recolectados por instrumentos auto-aplicados y analizados estadísticamente. La mayoría de las puérperas (51,3%) tenía entre 18 y 25 años, siendo 55,4% no-fumantes, 25,5% fumantes en abstinencia y 19,1% fumantes. Las no-fumantes consultaron más que las fumantes y fumantes en abstinencia ( $p=0,025$ ). El número de mujeres con más de un hijo fue mayor entre las fumantes ( $p=0,002$ ), y las que se mostraron más propensas a parar de fumar antes de la gestación fueron las que tenían un compañero no fumante ( $p=0,007$ ). Los factores que influyen el tabaquismo y su cesación son diversos, lo que determina intervenciones en el prenatal dirigidas a las necesidades de las gestantes y sus compañeros.

Descriptores: Tabaquismo; Embarazo; Atención Prenatal; Cese del Uso de Tabaco.

## Introduction

Smoking is considered by the World Health Organization (WHO) as the leading cause of preventable death in the world. It is estimated that approximately 1,300 million people, including 200 million women, are smokers and that the cigarette is responsible for approximately 5 million deaths per year. Around the year 2030, unless urgent measures are taken, annual deaths from tobacco will be more than 8 million<sup>(1-2)</sup>.

The proportion of male smokers has always been higher than that of women. However, it has seen a slight decline in prevalence, especially in developed countries. As for females, some developed countries already show a slight tendency of reduction in the proportion

of smokers, which has not been observed in developing countries, where the increase of commencement among women and the consequent increase in the prevalence among them is evident<sup>(3)</sup>. Studies on prevalence of smoking among schoolchildren of the Federal District have already shown a greater number of young female smokers (11%) compared to males (9.9%)<sup>(4)</sup>.

In Brazil, according to recent research by the Brazilian Institute of Geography and Statistics (IBGE), approximately 24.6 million Brazilians aged 15 or older smoke tobacco products, which corresponds to 17.2% of the population in this age group. Considering gender, 21.6% of Brazilian men and 13.1% of women are smokers<sup>(5)</sup>.

An estimated 200,000 deaths related to smoking occur annually<sup>(1)</sup> and, in the more economically developed cities, the prevalence of smoking among women is now close to that observed among men. This indicates an increasing trend of tobacco exposure in females, probably the result of strong advertising aimed specifically at this population group<sup>(3)</sup>.

Tobacco increases the risk of premature death and physical limitations for many morbidities such as coronary disease, arterial hypertension, stroke, emphysema and cancer<sup>(3)</sup>. Previously, it was believed that the effects of smoking were more intense in men, but current studies have shown that women are equally, or even more, susceptible to the harmful effects of smoking. Women smokers have an increased risk of infertility, cervical and colon cancer, early menopause and dysmenorrhea in relation to nonsmokers<sup>(6)</sup>.

Women who smoke during pregnancy have a higher risk of complications such as placenta previa, premature rupture of membranes, placental abruption, antepartum hemorrhage, premature delivery, miscarriage, ectopic pregnancy, intrauterine growth restriction, low birth weight, sudden death of the newborn, and impaired physical development of the child<sup>(4,3)</sup>.

Considering the harmful effects of tobacco to the binomial mother-baby, pregnancy is a special moment for smoking cessation, because of the concern of pregnant women in generating a healthy child and frequent contact with health professionals in prenatal consultations.

Thus, knowing the process of smoking and/or what is conducive to its cessation in pregnancy can help health professionals to implement interventions to improve the health of mother and baby. In this context, this study aims to identify factors associated with smoking during pregnancy.

## Material and Methods

This was a cross-sectional study<sup>(7)</sup>, held in the Inpatient Obstetric Unit of the Clinical Hospital of Porto Alegre (HCPA) of the Federal University of Rio Grande do Sul (UFRGS), Brazil. The sample was calculated based on the number of births in the institution and consisted of 267 women who had prenatal monitoring and were admitted to the referred unit after delivery (normal or cesarean), from February 29 to May 1, 2008.

Inclusion criteria were being older or equal to 18 years, being admitted to the inpatient unit Obstetric HCPA between 24 and 48 hours after the birth, having attended at least four prenatal consultations and possessing health

conditions to respond to the questionnaire. Women who presented puerperal complications were excluded.

Data collection occurred through three self-administered questionnaires, developed by the researchers specifically to meet the objectives of the research: one for nonsmokers, one for smokers and one for abstinent smokers. A smoker was considered to be a person who regularly smokes one or more cigarettes per day; a smoker in abstinence an individual who has smoked regularly and now does not smoke anymore, and a nonsmoker a person who has never smoked or has only experimented with smoking. The questionnaires contained questions that contemplated socioeconomic and demographic variables, characteristics of prenatal monitoring and of tobacco use by pregnant women and/or family, knowledge about smoking and the influence of smoking on the mother and baby.

Data were organized and analyzed using the statistical software Statistical Package for Social Science version 13. For the categorical variables, the Chi-square test was applied and for continuous variables, the Analysis of Variance test (ANOVA)<sup>(7)</sup>. Every association where the p-value difference was  $\leq 0.05$  was considered statistically significant. The percentages presented are based on valid responses, since some questions from the instruments were not completed.

The project was approved by the Research Ethics Committee of HCPA under number 07-659 and all participants signed a Free Prior Informed Consent form.

## Results

Study participants were 267 puerperae, of whom 148 (55.4%) were nonsmokers, 68 (25.5%) abstinent smokers and 51 (19.1%) smokers. The mean age was 26.5 years, with the greater concentration in the age group 18-25 years (51.3%).

Regarding education, 130 (48.7%) puerperae attended high school, 114 (42.7%) elementary school and 23 (8.6%) higher education. Among smokers, 52.9% had only completed elementary school. It was observed that 55.9% of abstinent smokers and 47.3% of nonsmokers had completed high school. The highest percentage of nonsmokers was among women who were enrolled in higher education (11.5%), but this association was not statistically significant ( $p = 0.195$ ).

Concerning prenatal visits, 140 (52.4%) women consulted between 7 and 10 times, 81 (30.3%) between 4 and 6 times and 46 (17.2%) more than 11 times. The nonsmokers had more prenatal visits (21.6%)

than smokers and abstinent smokers ( $p=0.025$ ). The percentage of abstinent smokers that made between 7 and 10 prenatal visits was greater (58.8%) than those who made between 4 and 6 consultations (27.9%). Prenatal care was conducted in health clinics (76%) at another hospital (12.2%) and at HCPA (11.8%).

Among the women, 115 (43.6%) already had a child, 76 (28.8%) two children, 43 (16.3%) three children and 30 (11.3%) four or more children. The average number of children was higher among smokers (2.75 children) than among nonsmokers (1.99 children) and abstinent smokers (1.88 children). A statistically significant difference was observed between the percentage of women smokers with more than one child (78.4%) when compared with abstinent smokers (50%) and nonsmokers (51.7%) ( $p=0.002$ ). There was no difference between women with only one child and those with two or more in relation to smoking cessation, as both presented a 50% cessation rate (Table 1).

Table 1 - Association between the number of children and different groups of pregnant smokers, abstinent smokers and nonsmokers. Porto Alegre, 2008

Number of children	Smokers		Abstinent smokers		Nonsmokers		Total	
	N	%	N	%	N	%	N	%
One child	11	21,6	34	50	70	48,3	115	43,6
More than one child	40	78,4	34	50	75	51,7	149	56,4
Total	51	100	68	100	145	100	264	100

Source: Direct research: authors own.

The commencement of smoking occurred more often between 10 and 18 years of age (91 - 77.8%) and between 19 and 25 years of age (23 - 19.7%).

Regarding the age of smoking commencement, 82.4% of smokers and 77.3% of abstinent smokers started smoking before 18, revealing that the age of smoking commencement did not influence the fact of continuing to smoke or having stopped smoking ( $p=0.657$ ).

Among pregnant smokers, 45.1% had stopped smoking at some point in the pregnancy, but returned while still pregnant. Between smokers and abstinent smokers, 51.4% had smoked in another pregnancy.

In early pregnancy, the consumption of cigarettes per day among the smokers was 1 to 5 (38.8%), 6 to 10 cigarettes (22.4%) and  $\geq 16$  cigarettes (24.5%). At the end of pregnancy, the number of cigarettes smoked per day was 1 to 5 (39.5%), 6 to 10 (47.4%) and  $\geq 16$  (7.9%). There was a decline in cigarette consumption in

late pregnancy in women who smoked between 11 and 15 and  $\geq 16$  cigarettes per day.

It was observed that pregnant women who had stopped smoking consumed 5.73 cigarettes/day in early pregnancy, while those who continued smoking cigarettes consumed 10.42 per day.

The majority of puerperae (229 - 86.1%) lived with a partner, who was a smoker in 29.6% of cases. Women more likely to stop smoking before pregnancy were those whose partner was not smoking (78.1%). Among those who stopped during pregnancy, 58.1% had partners who smoked ( $p=0.007$ ) (Table 2).

Table 2 - Association between the time at which the pregnant woman stopped and the partner smoking or not smoking. Porto Alegre, 2008

When smoking stopped	Partner smoking					
	Yes		No		Total	
	N	%	N	%	N	%
Before pregnancy	7	21,9	25	78,1	32	100
During pregnancy	18	58,1	13	41,9	31	100
Total	25	39,7	38	60,3	63	100

Source: Direct research: authors own.

The highest percentage of nonsmoker partners was also among nonsmoker women (76.4%), and the lowest percentage of male smokers is associated with nonsmoker women (23.6%). Regarding the smokers, the percentage of partners also smoking was 36.7%, and of abstinent smokers this percentage was 37.3% ( $p=0.061$ ).

The abstinent smokers and those who stopped smoking for some time during pregnancy reported that the main reasons for smoking cessation were will and determination to stop (25.6%), pregnancy (22.4%), request from close people (18.4%), and family, social and professional support (8%).

Only 176 (66%) of puerperae reported having received information about smoking during prenatal care. In 91.9% of cases, this information occurred at the beginning of pregnancy, 5.8% in late pregnancy and 2.3% in both periods. Information was provided by the physician (67.8% of cases), family (28.2%), nurses (24.7%), other health care professionals (13.8%) and others (8.6%); several puerperae reported having received information from more than one person. In relation to the different groups, 78.4% of smokers, 67.2% of abstinent smokers and 61.9% of nonsmokers reported having received some type of information in the prenatal period, which was not statistically significant ( $p=0.097$ ).

Of the 60 puerperae who smoked at the beginning of pregnancy, 49 (81.7%) responded that the information received in the prenatal period mobilized them to think about stopping smoking or influenced their decision.

Regarding the type of information received, 117 puerperae (74%) were informed that smoking damages the health of the baby and/or of the mother, 12 (7.6%) mentioned courses, lectures, documentaries, newsletters and advertisements on the subject, 11 (7%) were advised to reduce the consumption of cigarettes or to not smoke, four (2.6%) were warned that smoking is bad, three (1.9%) were only asked whether they smoked, another three (1.9%) were advised to stay away from smokers and eight (5%) mentioned other types of information.

Regarding the harm that smoking can cause to health, 260 puerperae (97.7%) believed that respiratory problems could occur, 253 (95.1%) lung cancer, 230 (86.5%) premature birth, 195 (73.3%) heart problems, 192 (72.2%) baby with low birth weight, 121 (45.5%), decreased fertility, 104 (39.1%) sudden death of the newborn, 99 (37.2%) stroke, 87 (32.7%) cervical cancer, 55 (20.7%) early menopause and pre-partum hemorrhage and 49 (18.4%) placenta previa. Among the other health problems of smoking (6%), abortion, fetal malformation, anemia, esophageal cancer, throat cancer and impotence were mentioned.

For the puerperae, the best ways to address, in the prenatal period, the issue of smoking were warnings about the problems of smoking in pregnancy (169 - 65.5%), assistance and offers of help to stop smoking (149 - 57.8%), to talk about the benefits of stopping (107 - 41.5%) and referral to specialist professionals (100 - 38.8%).

For the puerperae smokers and abstinent smokers, the factors that hinder smoking cessation are the emotional state (66 - 57.4%), addiction to cigarettes (56 - 48.7%), the influence of other people (18 - 15.7%), the pleasure that smoking brings (16 - 13.9%) and others (8 - 6.1%) such as lack of determination/desire, lack of awareness of the smoker and weight gain from smoking cessation.

## Discussion

The sample population consisted of mostly young and nonsmokers, with a mean age of 26.5 years, with the greater concentration in the age group 18-25. Another study also found similar results, with a mean age of the pregnant women of 25.6 years, with the greater concentration in the age group 20-24<sup>(8)</sup>. The percentage

of 19.1% of puerpera smokers is higher than that found in the adult female population of southern Brazil according to the IBGE study (15.9%)<sup>(5)</sup> and greater than that found in Porto Alegre by the Brazilian Vigitel survey in 2008 (17.5%)<sup>(9)</sup>. This finding is worrisome because one would expect a lower prevalence in pregnant women than in women in general, since the harm of smoking to both mother and baby are known.

In 77.8% of the puerperae, smoking started between 10 and 18 years of age, confirming a global trend of early commencement of smoking. Although there was no association between age of smoking commencement and cessation or continuity of smoking, other studies suggest that the later women start smoking, the more likely they are to stop during pregnancy<sup>(8,10)</sup>.

Concerning the association between education and smoking, only a tendency for women with less schooling to be smokers was observed. It is possible that this finding was not statistically significant due to sample size and the numerical differences between the groups, since other studies show an association between a low education level of pregnant women and smoking, along with less likelihood to smoke at the time of conception among women with higher education<sup>(8,11)</sup>.

The smokers had less prenatal consultations in relation to the other groups. Similar data were found in a study that showed an association between low frequency of consultations and the prevalence of smoking<sup>(12)</sup>. This result may be related to the greater concern with health in the group of nonsmokers and to the denial of the necessity of stopping smoking for smokers.

Most of the smokers had more than one child. Research shows that women with only one child stop smoking more frequently than women with two or more. This fact may be associated with lower health concerns among women who smoked in a previous pregnancy and gave birth to an apparently healthy baby<sup>(10-11)</sup>. Special attention is therefore necessary to women with two or more pregnancies, as these have a tendency to continue smoking during pregnancy.

A greater proportion of the women stopped smoking before pregnancy when the partner was not a smoker, which shows its negative influence on smoking cessation of the wife. Several studies show that to have a partner that is a smoker is a major predictor of smoking at the time of conception<sup>(8,11)</sup>. This highlights the importance of including the partner in the prenatal care orientation.

Among pregnant smokers, 45.1% had stopped smoking at some time in the gestation and more than half of the puerpera smokers and abstinent smokers (51.4%) had smoked in another pregnancy, higher percentages than those found in the literature<sup>(13-14)</sup>.

There was a decline in cigarette consumption in late pregnancy in puerperae who smoked more than 11 cigarettes per day, similar to other studies which showed that the majority of women that continue smoking in pregnancy reduce consumption to between a half and one third of cigarettes/day<sup>(10,15)</sup>.

The pregnant women who stopped smoking cigarettes consumed a mean of 5.73 cigarettes/day, while those who continued to smoke consumed a mean of 10.42 cigarettes/day. Smoking cessation occurred more easily among moderate or light smokers than among heavy smokers, which shows that when the nicotine dependence is greater the difficulty to cease smoking is increased.

Among the main reasons leading to the cessation of smoking are the desire/determination to stop smoking and the pregnancy itself. This is consistent with the literature, which describes motivation/determination as a key success factor for smoking cessation<sup>(16)</sup>, followed by reasons related to the baby's health or to the pregnancy<sup>(11,17)</sup>. It is understood that the starting point for smoking cessation is the determination of the person, the belief in their ability to resist the urge to smoke. Smoking cessation takes place as a result of a process, sometimes long and difficult, with successes and setbacks, for which individuals should be prepared.

Only 66% of puerperae received information about smoking during prenatal care, and the majority of these occurred early in gestation. This is corroborated by the literature<sup>(18)</sup>, which shows that only 68% of pregnant smokers were asked about smoking by their gynecologist, and that information on the impact of smoking on their baby was insufficient. Information about the hazardous effects of smoking are disseminated everywhere, and yet, people continue to smoke, from which it may be inferred that information alone does not lead to smoking cessation, however, it is an important contributing factor, especially when there is no occurrence of clinical manifestations and/or a notable event in life such as pregnancy.

It is recommended that information about smoking, as well as counseling and treatment for smoking cessation, are included in the health care of pregnant women throughout the prenatal period and strengthened in the puerperium, a time when the woman and the people around her are more sensitive about the care of the mother and baby.

The health hazards of smoking most often cited by the puerperae were respiratory problems, lung cancer, premature baby, heart problems and the baby having low birth weight. Similar results are presented in the literature that highlight that the majority know that

smoking causes health problems, but few are aware of specific risks to women's health, such as infertility, osteoporosis, early menopause, miscarriage, ectopic pregnancy and cervical cancer<sup>(14)</sup>.

For the puerperae, one way to approach pregnant smokers in prenatal care is to warn about the risks of smoking in pregnancy. It is believed that this approach can start with an individual consultation or with the formation of a group, with a view to providing information and encouraging self-control so that the pregnant woman can escape the vicious cycle of dependency and become an agent of change for their own behavior.

It is recommended that all pregnant and breastfeeding women have access to a cognitive-behavioral approach, which consists of the combination of interventions aimed at preparing the smoker to solve their problems and develop behavioral skills to resist the temptation to smoke. It is one of the effective methods for smoking cessation, being widely used for the treatment of dependents and recommended for pregnant women smokers, in which the use of medications is restricted<sup>(1)</sup>.

The emotional state was mentioned as the major factor of failure in smoking cessation, which shows the role of the cigarette as soothing and a companion in times of stress. Another factor cited was the influence of other smokers making it difficult to stop smoking, especially the partner. Thus, it is believed to facilitate smoking cessation it is important to include the family/partner in the consultations with the pregnant woman, so they can be shown how to assist in this process.

Psychological/hormonal factors are mentioned as factors that make smoking cessation among women difficult<sup>(19)</sup>, but the chemical and psychological dependency is also strongly linked to individual, social and environmental issues, which should be considered in approaching the pregnant woman. Thus, the multidisciplinary attendance may facilitate smoking cessation.

## Conclusions

The results show that there are various factors that influence smoking and its cessation among pregnant women. There was a positive association between smoking and carrying out a smaller number of prenatal consultations, smoking and having a partner that smoked and smoking and having more than one child. Smoking showed a higher tendency among women with less schooling and those who started smoking early.

This study had the limitation of not performing the measurement of biomarkers such as nicotine in the blood or saliva and cotinine in the urine to confirm the use of



tobacco. However, care was taken to ask each of the puerperae about their condition in relation to tobacco use before delivery of the data collection instrument. In future studies, it is thought to be important to use these markers.

Finally, it is understood that pregnancy should be seen as the ideal time to stop smoking because it increases the contact with health professionals, which can stimulate the termination, considering the harm to the mother and baby. It is believed that a strategy to help health professionals in effective interventions in the prenatal period is the development of programs specifically targeted at pregnant women, since this population is living a unique moment, which requires a differentiated approach that meets their needs. Another important factor in the process of smoking cessation is the inclusion of family in support groups, especially the partner, in an effort to make them aware of

the need to support cessation among pregnant smokers, as well as to protect nonsmokers from passive exposure to tobacco. Health professionals are in a strategic position since, during the prenatal consultations, they can identify the willingness to cease, advise, assist and refer to other professionals that will strengthen support for smoking cessation.

It is hoped that the study contributes to the visualization of the importance of the approach of pregnant women in prenatal care in terms of smoking and to health professionals using the knowledge about factors related to tobacco in treating their patients. Further to this investigation, it is considered important to identify from the prenatal specialists how they are working on the issue of smoking in their consultations, information that would improve the adequacy of methods for prevention and treatment of smoking in pregnancy.

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