

Factors associated with harmful use of tobacco during pregnancy

Fatores associados ao uso nocivo do tabaco durante a gestação

Roselma Lucchese¹
David Lemos Paranhos¹
Natália Santana Netto¹
Ivânia Vera¹
Graciele Cristina Silva²

Keywords

Pregnancy, complications; Pregnancy/drug effects; Pregnant women; Tobacco use/adverse effects; Primary health care

Descritores

Complicações na gravidez; Gravidez/efeito de drogas; Gestantes; Uso de tabaco/efeitos adversos; Atenção básica à Saúde

Submitted

March 14, 2016

Accepted

June 30, 2016

Corresponding author

Ivânia Vera
Dr. Lamartine Pinto de Avelar avenue,
1120, 75704-020, Catalão, GO, Brazil.
ivaniavera@gmail.com

DOI

<http://dx.doi.org/10.1590/1982-0194201600045>



Abstract

Objective: To calculate the prevalence and analyze factors associated with tobacco use once in a lifetime and check their harmful use among pregnant women.

Methods: Cross-sectional study conducted with 330 pregnant women assisted in specialized center for women primary health care (Central Brazil). The data of personal/family history and tracing of tobacco use were obtained through a sociodemographic questionnaire (Alcohol, Smoke and Substance Involvement Screening Test) and analyzed using logistic regression.

Results: The use of tobacco once in a lifetime was associated with income, family history of alcohol and personal mental disorder. The harmful use of tobacco during pregnancy was associated with a family history of smoking and alcohol consumption.

Conclusion: The prevalence of tobacco use as "once in a lifetime" in the sample was 37.1% (124) and "harmful use" of tobacco during pregnancy was 9.6% (32).

Resumo

Objetivo: Calcular a prevalência e analisar os fatores associados ao uso de tabaco uma vez na vida e verificar o seu uso nocivo entre gestantes.

Métodos: Estudo transversal em 330 gestantes atendidas em centro especializado no atendimento à saúde das mulheres na atenção básica (Brasil Central). Os dados dos antecedentes pessoais/familiares e o rastreamento de uso de tabaco foram obtidos por meio de questionário sociodemográfico (*Alcohol, Smoke and Substance Involvement Screening Test*) e analisados usando regressão logística.

Resultados: O uso de tabaco uma vez na vida mostrou estar associado à renda, antecedentes familiares de consumo de álcool e pessoais de transtorno mental. O uso nocivo de tabaco durante a gestação foi associado a antecedentes familiares de tabagismo e consumo de álcool.

Conclusão: A prevalência de uso de tabaco uma "vez na vida" na amostra estudada foi de 37,1% (124) e "uso nocivo" de tabaco na gestação foi de 9,6% (32).

¹Universidade Federal de Goiás, Catalão, GO, Brazil.

²Universidade Federal de Uberlândia, Uberlândia, MG, Brazil.

Conflict of interest: the authors declare no conflicts of interest.

Introduction

The damage and health problems due to tobacco use led the World Health Organization to establish, as a global goal for 2025, a reduction of 30% in the use of tobacco, which leads 6 million people a year to death. In addition to deaths, morbidities due to its use are also cited, including social, environmental and economic problems at national and individual level. While global projections for tobacco use in 2025 are high, reductions projected for Greece (41.5 to 36.8%) and Kiribati in Oceania (52.0 to 45.8%) are a highlight.⁽¹⁾

Contrary to reduction projections, there are countries with increased prediction in tobacco use in 2025, such as Indonesia (39.5 to 44.9%).⁽¹⁾ Although these data show that men have larger prevalence, women deserve attention, especially when taking into account the effect of its use.⁽²⁾

Considering women who use tobacco during pregnancy, in Brazil, it is estimated that 9.14% of pregnant women are also smokers, at considerable risk to her and the fetus health.⁽³⁾ Risks include ectopic pregnancy, placenta abruption, ruptured membranes and placenta previa.⁽⁴⁾ In addition, there are problems in the neurological development of the fetus, with changes in infant behavior,⁽⁵⁾ prematurity, low birth weight and episodes of abortion.⁽⁶⁾

The risks of tobacco use during pregnancy are associated with sociodemographic variables such as financial conditions and education. Insufficient education and family income level are relevant aspects in this subject⁽⁷⁾ and the family life relations should also be considered.⁽²⁾

On a personal level, the routinely use of other psychoactive substances, both licit and illicit, was significantly associated with tobacco use during pregnancy.⁽⁸⁾ The quality of mental health of pregnant women and recidive of mental illnesses were also described as smoking predictor during that period.⁽⁹⁾

Some women abandon tobacco use when they discover the pregnancy, but there are a significant number of women who continue to use it.⁽²⁾

Thus, tools to screen for tobacco use in prenatal consultations at the primary level of health care should be applied as a necessity, as many women do not abandon this habit during pregnancy. Reduction of health problems of women and fetuses through health promotion and disease prevention measures for tobacco should be a priority.

The aim of this study is to estimate the prevalence in the use of tobacco once in a lifetime and the harmful use of tobacco in pregnant women, as well as factors associated with prevalence.

Methods

This cross-sectional study was conducted in a medium-size city in central Brazil, where pregnant women were treated at a Specialized Center for Women Care (May 2014). The referred Specialized Center focuses on all the attention given to women seeking the Unified Health System (SUS) during pregnancy and childbirth, generating data on Primary Health Care.

The sample size was calculated by the early prevalence of drug use during pregnancy (18.0%),⁽³⁾ the design effect measure,⁽¹⁰⁾ statistical power of 80% ($\beta = 20\%$) with significance level of 95% ($\alpha = 0.05$) for a population of pregnant women (566) linked to service, resulting in 301 individuals. To the value estimated, 20% were added for possible losses, thus 361 individuals represented the population.

The inclusion criteria of patients were as follows: being registered in the independent information system of gestational age and attend the service center during the data collection period for the first contact. Pregnant women who were hospitalized were excluded, regardless of the reason. The pregnant women were recruited in the call center and interviewed in the same place. For added convenience, it was given the possibility of scheduled interview at the location indicated by them.

A pilot test was applied in six pregnant women, which were not part of the sample. They all signed the Informed Consent Form and when pregnant women were under 18 years old, a guardian was asked to sign the Form.

The data were collected between May 2014 -Out 2015. The instruments used were: sociodemographic, family and personal history in relation to alcohol and other drugs, information about pregnancy, sexual reproductive life, as well as tests and notes contained in the pregnant woman's record. To screen for exposure and risk for substance use, we used the Alcohol, Smoke and Substance Involvement Screening Test (ASSIST),⁽⁶⁾ the Fagerstrom,⁽¹⁰⁾ that estimates the degree of nicotine dependence, and the family APGAR for analysis of family relationships.⁽¹¹⁾

ASSIST instrument indicates the use of alcohol and other drugs, indicating degrees of risk after answering a questionnaire of eight questions. Scores indicate low risk of exposure to the substance (0-3), moderate risk or harmful or problematic use (4-26) and high risk of dependence (> 27). At the end, the eighth question screen for the use of injectable drugs.⁽⁶⁾ For the present study, we considered the aspects related to exposure and tobacco use.

The Fagerström test, also known as a test for nicotine dependence, is a questionnaire composed of six questions on physiological and behavioral symptoms, to analyze the degree of dependence on five levels (0-10 points), namely: very low (0- 2) low (3-4), moderate (5), high (6-7) and very high (8-10).⁽¹⁰⁾

To identify the familiar functionality, the family APGAR test was applied, which consists of five domains of scores from 0 to 10 points. From the interviewee's point of view, a family may present high family dysfunction (0-4), moderate family dysfunction (5-6) and good family functioning (> 7).⁽¹¹⁾

The outcome variable "use once in a lifetime" resulted from the "yes" answer in the first question of ASSIST instrument, assessing exposure to tobacco during life. The second outcome variable was "harmful use of tobacco," which understands that harmful use was the one that produced many losses to the individual, corresponding to a score of 4-26 points in ASSIST.⁽⁶⁾

The predictor variables were as follows: i. household income (mean R\$ 1,581.09)*; ii. Years of study

(≤10 years or > 10 years); iii. age groups according to the mean of the sample (<24 years and ≥24 years), iv. family history of smoking and alcohol (according to the perception of pregnant women concerning the people she recognizes as her family); v. psychiatric family history (if attended a mental health center care or conducted any specific treatment); vi. self-reported personal psychiatric history in specialized services; vii. Sexually transmitted disease (according to the notes of the test results in pregnant women); viii. alcohol use in the last 3 months (quantified by ASSIST instrument (question 2); and ix . score ≥ 7 (good family functioning) by family APGAR.

Data were analyzed using the Statistical Package for Social Sciences (v. 22.0). In the analysis of the reliability of the APGAR and Fagerstrom instruments, the Alpha of Cronbach was used. Prevalences were estimated with 95% confidence interval. Univariate analysis between the outcome and predictor variables was performed obtaining odds ratio. The variables with p<0.10 were subjected to binary logistic regression model. The differences between proportions were analyzed with the chi-square test or Fisher's exact test (values <5) and p values <0.05 were considered statistically significant. Variables that reached values under 5 were included in the exact test analysis. The final model of multiple analysis was guided by the quality of the result adjustment to the Hosmer-Lemeshow test.

The study was carried out in compliance with national and international standards of ethics in research involving humans (Brazil register/Platform CAAE - *Certificado de Apresentação para Apreciação Ética*: 25586013.2.0000.5083).

Results

A total of 334 (92.6% of the sample) pregnant women were interviewed, there was a loss of 27 individuals, which did not compromise the sample calculation as there was a 20% increase. The mean age of participants was 24.3 years (SD: 5.9) and gestational age was 22 weeks (SD: 11.3). The current pregnancy was their first pregnancy (126; 37.7%), second pregnancy (114;

*In Brazil, the currency used is called Real, R\$ 1,00 corresponds to US\$ 0.30 American dollars according to the Central Bank of Brazil on July 10th 2016.

34.1%), third pregnancy (50; 15%) and multigesta pregnancy (44, 13.2%). Part of the women interviewed had already gone through an abortion (138; 41.3%), previous cesarean section (114; 34.1%) and vaginal delivery (94; 28.1%). On complications during the pregnancy, the most reported were emesis/hyperemesis gravidarum (23; 6.9%), hypertension and pre-eclampsia (18; 5.4%), and preterm labor (15, 4.5%).

Regarding the use of illicit drugs in life, the highest prevalence were cannabis users (45; 13.5%) and cocaine and/or crack (22; 6.6%). The replies were positive to tobacco use over questions “once in a lifetime” (124; 37.1%) and “harmful use” (32; 9.6%). The prevalence use “once in a lifetime” and “harmful use” and associated factors are presented in tables 1 and 2.

After univariate analysis, the outcome “tobacco use once in a lifetime” remained associated with the

Table 2. Adjusted odds Ratio (OR) and factors associated with tobacco use in pregnant women

Variables	AOR* (IC95%)**	p-value
Smoked once in a lifetime		
Family income <R\$1.581,00	1.87 (1.08-3.26)	0.02
Family history of smoking	2.88 (0.69-12.00)	0.14
Family history of mental illness	1.30 (0.68-2.50)	0.41
Family history of alcohol use	2.27 (1.35-3.80)	< 0.01
History of mental disorder	2.27 (1.24-5.90)	0.01
Alcohol consumption	1.54 (0.78-3.02)	0.20
Sexually transmitted diseases	2.88 (0.69-12.00)	0.14
Good family functionality	1.22 (0.78-3.02)	0.49
Harmful use		
Family history of smoking	3.29 (1.08-10.00)	0.03
History of mental disorder	0.61 (0.26-1.41)	0.25
Family history of alcohol use	1.63 (0.73-3.63)	0.23
Alcohol consumption	2.62 (0.73-3.63)	0.02
Sexually transmitted diseases	2.32 (0.53-10.20)	0.26

*Adjusted for income, family history of smoking, family history of mental illness, family history of alcohol use, psychiatric medical history, it was alcohol use, sexually transmitted diseases and functional APGAR. The outcome of the “harmful use” of tobacco was *adjusted for family history of smoking, family history of mental illness, family history of alcohol use, if they were alcohol users and had sexually transmitted diseases; **95% confidence interval for the outcome “tobacco use once in a lifetime”

Table 1. Crude Odds Ratio Analysis (OR) and factors associated with tobacco use once in a lifetime (OL) and harmful use (HU) in pregnant women

Variables	Total	OL n(%)	OR* (95%CI)	p-value	HU n(%)	OR* (95%CI)	p-value
Age, years							
<24	165	65(39.4)	1.00		17(10.3)	1.00	
≥24	169	59(34.9)	0.88 (0.56-1.40)	0.39	15(8.8)	0.82 (0.39-1.93)	0.61
Years of study							
≤10	106**	44(41.5)	1.00		12(11.3)	1.00	
>10	217**	74(34.1)	0.72 (0.45-1.17)	0.19	20(9.2)	0.79 (0.37-1.69)	0.55
Family income, R\$							
>1.581,09	113	30(26.5)	1.00		11(9.7)	1.00	
<1.581,09	221	94(42.5)	2.04 (1.27-3.53)	0.00	21(9.5)	1.03 (0.47-2.22)	0.93
Family History of Smoking							
No	116**	24(20.7)	1.00		4(3.4)	1.00	
Yes	207**	94(45.4)	3.18 (1.82-5.66)	0.00	28(13.5)	4.38 (1.49-12.81)	0.04
Family History of mental illness							
No	258**	86(33.3)	1.00		22(8.5)	1.00	
Yes	65**	32(49.2)	1.93 (1.10-3.51)	0.01	10(15.3)	1.95 (0.87-4.35)	0.09
Family History of alcohol use							
No	179**	46(25.7)	1.00		12(6.7)	1.00	
Yes	144**	72(50.0)	2.89 (1.81-4.61)	0.00	20(13.8)	2.24 (1.05-4.76)	0.03
Personal psychiatric history							
No	293	100(34.1)	1.00		26(8.8)	1.00	
Yes	41	24(58.5)	2.72 (1.45-5.69)	0.00	6(14.6)	1.74 (0.67-4.54)	0.24
Alcohol consumption							
No	273**	93(34.1)	1.00		20(7.3)	1.00	
Yes	50**	25(50.0)	1.93 (1.05-3.55)	0.03	12(24.0)	3.38 (1.51-7.56)	0.00
Sexually transmitted diseases							
No	323	114(35.2)	1.00		29(8.9)	1.00	
Yes	11	8(72.7)	4.88 (1.42-21.00)	0.01	3(27.2)	4.34 (1.04-17.80)	0.02
Good family functionality							
Yes	261**	87(33.3)	1.00		24(9.1)	1.00	
No	72**	35(48.6)	1.89 (1.07-3.30)	0.01	8(11.1)	1.20 (0.51-2.81)	0.66

*Crude Odds Ratio; ** scores corresponding to valid questions; 95%CI - 95% Confidence Interval

variables family income, family history of tobacco use, family history of mental illness, family history of alcohol use, history of mental illness, if at the time of the interview they were consuming alcohol, had sexually transmitted diseases and pregnant women who reported a good family functioning. The result of the Hosmer-Lemeshow test was 0.61.

In the analysis of harmful use, the following factors were associated: family history of smoking, family history of mental illness, family history of alcohol use, women who used alcohol at the time of interview and had sexually transmitted diseases. The result of the Hosmer-Lemeshow test was 0.91.

Adding to the good reliability of the APGAR and Fagerstrom instruments, the reliability test of the Alpha Cronbach, respectively 0.84 and 0.95. In multivariate analysis, they were associated with the outcome “tobacco use once in a lifetime” variables family income, family history of alcohol use and history of mental illness. Additionally, in relation to history of mental illness, anxiety (25; 7.5%), depression (22; 6.6%) were reported among women (6; 1.8%) who had anxiety and depression.

In multivariate analysis, the outcome “harmful use” was associated with a family history of smoking and alcohol use. And the tobacco dependence among smokers is described in figure 1.

Out of the 124 women exposed to tobacco use once in a lifetime, 45 developed the habit

of smoking, but 13 of them have suspended this behavior due to their pregnancy and 32 maintained the use of tobacco. After application of the Fagerstrom test, 23 (71.9%) showed tobacco dependence on moderate level and 9 (28.1%) at a high level.

Discussion

This research has as limitations the study design which was cross-sectional, which prevents the estimation of the incidence and relations of cause and effect, and the recruitment, which was done for convenience and not by sampling. However, the study revealed a prevalence that justifies the need for intervention in the pregnancy process to reduce the damage caused by harmful use of tobacco to pregnant women and fetus. Additionally, the study pointed out ASSIST instrument as screening for the use of substances harmful to the fetus in prenatal care.

The National Alcohol and Drug Survey revealed that tobacco use among Brazilians is relevant (16.9%), being more prevalent in men (21.4%) than in women (12.8%), with a decline in the last 6 years.⁽¹²⁾

The difference between the prevalence in tobacco use seen in men could be explained by differences in social behavior of men and women, conservatism of the female image and regional cultures.⁽¹³⁾ However, such an interpretation does not explain our observation, as pregnant women investigated in our study showed a higher prevalence of tobacco use than the national data.

Different prevalence rates are found in the world. For example, in France, pregnant women routinely use tobacco (21.7%), as well as the Danish in the UK and Spain.⁽¹⁴⁾

Nicotine is among the psychoactive substances, and tobacco is the most commonly used product for women during pregnancy in Australia (46%).⁽⁹⁾ In the first decade of the 21st century, a fluctuation was observed in tobacco values in Canada, where interspersed reductions and expansions were found in the levels of consumption.⁽¹⁵⁾

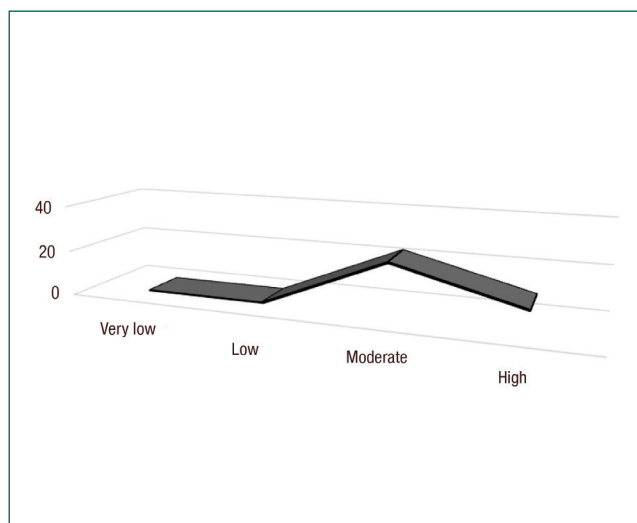


Figure 1. Dependence on nicotine levels among pregnant women who make harmful use of tobacco

In a previous study conducted in Australia, the continued use of tobacco by pregnant women has been associated with low income, concern with finances, limited social support, school education lower than 12 years and having a deficit in the mental health quality. Also, this population had exposure to domestic violence.⁽¹⁶⁾ The National Survey on Alcohol and Drugs used an income classification, Class A (most favored) to E (less favored), and pointed out that people with incomes in D and E are more susceptible to tobacco use than those in classes A and B.⁽¹¹⁾

Although this study did not reveal an association between tobacco use and low education, other studies show that this is a predisposing variable to tobacco use during pregnancy, and lower education is considered as a factor that drives the use of tobacco. Thus, the combination of low education, pregnancy and smoking boosts the risk of low birth weight and lower height according to gestational age.⁽⁷⁾

The association between smoking and other variables such as alcohol use during pregnancy, being unemployed and having low annual family income increases the likelihood of tobacco use among pregnant women.⁽¹⁵⁾ Pregnant women who live with smokers in their families are more exposed to the use of tobacco, and the association with smoking is a risk factor for the early use of tobacco.⁽²⁾

Similarly, pregnant women who had a diagnosis of mental disorder and have received some specialized treatment tend to use tobacco, and have more difficulties to stop their use than those without mental disorders. Presence of depressive symptoms and no help in mental disease or smoking cessation makes the cessation of its use more complex, with predictable consequences to the fetus.⁽⁸⁾

It is also noteworthy that in Latin America one third of pregnant women manifests depressive symptoms during prenatal care in the first weeks of pregnancy. Protective factors for depressive symptoms during pregnancy are associated with a higher socioeconomic status and

higher education.⁽¹⁷⁾ Therefore, actions to assist pregnant women with mental disorders to quit smoking since the beginning of pregnancy should be considered for the promotion of mother and fetus health, as well as the interaction of health care teams of women and those dedicated to tobacco control, since the strategies usually applied to the general population in the cessation of smoking should be modified for pregnant women with mental disorders.⁽⁸⁾

Successful and strongly indicated experiences are brief interventions, led by cognitive therapy framework.⁽⁶⁾ A survey raised the difficulties of a pregnant woman with mental disorder, construction and training for specific coping.⁽⁸⁾

A previous study of pregnant women was conducted in the USA and revealed that alcohol provides an increase in both use of tobacco and in its dependency on the gestational period.⁽¹⁸⁾ During pregnancy, the prevalence of the alcohol was lower (15%) than that of tobacco (46%) increasing with the multiuse (44%) of drugs such as alcohol, tobacco and cannabis. When pregnant women were asked about the abandonment of these substances, the responses showed different prevalence as the cessation of tobacco use (20%), alcohol (60%) and cannabis (40%).⁽⁹⁾

The family environment also deserves attention, since this context increases the use of psychoactive substances,⁽¹⁹⁾ especially in conflictive family space, as compared to an environment where relationships are harmonious and salutary.⁽²⁰⁾

The decline in the use of psychoactive substances during pregnancy is detected in pregnant women through the reduction of the prevalence and manifestation of the desire to reduce their use. In this process, the ability of health professionals to address the problem, including adopting strategies such as singular attention, use of adhesives, spray and gum, are essential to preserve the health of the mother and fetus.⁽²¹⁾ Such procedures are compatible with reduction practices in damage that guide psychosocial care programs in Brazil.

Conclusion

The prevalence of tobacco usage “once in a lifetime” in the sample was 37.1% (124) and “harmful use” of tobacco during pregnancy was 9.6%. The variables associated with the outcome “tobacco use once in a lifetime” were family income, family history of alcohol use and Mental illness history. The outcome “harmful use” of tobacco was associated with a family history of smoking and alcohol use. Among pregnant women, 23 (71.9%) showed tobacco dependence of moderate level and 9 (28.1%) at high level.

Collaborations

Lucchese R, Paranhos DL, Santana Netto N, Vera I and Silva GC declare that contributed to the study design, analysis, data interpretation, article writing, relevant critical review of the intellectual content and final approval of the version to be published.

References

- World Health Organization (WHO). WHO global report on trends in prevalence of tobacco smoking 2015 [Internet]. Geneva: WHO; 2015 [cited 2015 Dec 28]. Available from: http://apps.who.int/iris/bitstream/10665/156262/1/9789241564922_eng.pdf.
- Lai MC, Chou FS, Yang YJ, Wang CC, Lee MC. Tobacco use and environmental smoke exposure among Taiwanese pregnant smokers and recent quitters: risk perception, attitude, and avoidance behavior. *Int J Environ Res Public Health*. 2013; 10(9):4104-16.
- Kassada DS, Marcon SS, Pafliarini MA, Rossi RM. Prevalência do uso de drogas de abuso por gestantes. *Acta Paul Enferm*. 2013; 26(5):467-71.
- Masho SW, Bishop DL, White S, Svikis D. Least explored factors associated with prenatal smoking. *Matern Child Health J*. 2013; 17(7):1167-74.
- Polańska K, Jurewicz J, Hanke W. Smoking and alcohol drinking during pregnancy as the risk factors for poor child neurodevelopment - A review of epidemiological studies. *Int J Occup Med Environ Health*. 2015; 28(3):419-43.
- Sue Henry-Edwards, Rachel Humeniuk, Robert Ali, Vladimir Poznyak and Maristela Monteiro. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Guidelines for Use in Primary Care (Draft Version 1.1 for Field Testing). Geneva: WHO; 2003.
- van den Berg G, van Eijsden M, Vrijkotte TG, Gemke RJ. Educational inequalities in perinatal outcomes: the mediating effect of smoking and environmental tobacco exposure. *PLoS One*. 2012; 7(5):e37002.
- Howard L, Bekele D, Rowe M, Demilew J, Bewley S, Marteau T. Smoking cessation in pregnant women with mental disorders: a cohort and nested qualitative study. *BJOG*. 2013; 120(3):362-70.
- Passey ME, Sanson-Fisher RW, D'Este CA, Stirling JM. Tobacco, alcohol and cannabis use during pregnancy: Clustering of risks. *Drug Alcohol Depend*. 2014; 134:44-50.
- Pérez-Ríos M, Santiago-Pérez MI, Alonso B, Malvar A, Hervada X, de Leon J. Fagerstrom test for nicotine dependence vs heavy smoking index in a general population survey. *BMC Public Health*. 2009; 9:493.
- Smilkstein G. The family APGAR: a proposal for a family function test and its use by physicians. *J Fam Practice*. 1978; 6(6):12316-19.
- Laranjeira R, organizador. II Levantamento Nacional de Álcool e Drogas (LENAD) -2012. São Paulo: Instituto Nacional de Políticas Públicas do Álcool e Outras Drogas (INPAD); 2014.
- Bakar C, Gündoğar D, Ozisik Karaman HI, Maral I. Prevalence and related risk factors of tobacco, alcohol and illicit substance use among university students. *Eur J Psychiatry*. 2013; 27(2):97-110.
- Melchior M, Chollet A, Glangeaud-Freudenthal N, Saurel-Cubizolles MJ, Dufourg MN, van der Waerden J, et al. Tobacco and alcohol use in pregnancy in France: the role of migrant status: the nationally representative ELFE study. *Addict Behav*. 2015; 51:65-71.
- Lange S, Probst C, Quere M, Rehm J, Popova S. Alcohol use, smoking and their co-occurrence during pregnancy among Canadian women, 2003 to 2011/12. *Addict Behav*. 2015;50:102-9.
- Powers JR, McDermott LJ, Loxton DJ, Chojenta CL. A prospective study of prevalence and predictors of concurrent alcohol and tobacco use during pregnancy. *Matern Child Health J*. 2013; 17(1):76-84.
- Fortner RT, Pekow P, Dole N, Markenson G, Chasan-Taber L. Risk factors for prenatal depressive symptoms among Hispanic women. *Matern Child Health J*. 2011; 15(8):1287-95.
- Witt WP, Mandell KC, Wisk LE, Cheng ER, Chatterjee D, Wakeel F, et al. Predictors of alcohol and tobacco use prior to and during pregnancy in the US: the role of maternal stressors. *Arch Womens Ment Health*. 2015; 18(3):523-37.
- Cheetham A, Allen NB, Schwartz O, Simmons JG, Whittle S, Byrne ML, et al. Affective behavior and temperament predict the onset of smoking in adolescence. *Psychol Addict Behav*. 2015; 29(2):347-54.
- Denton WH, Adinoff BH, Lewis D, Walker R, Winhusen T. Family discord is associated with increased substance use for pregnant substance users. *Subst Use Misuse*. 2014; 49(3):326-32.
- Kapaya M, Tong V, Ding H, Spring S, States U, States U. Nicotine replacement therapy and other interventions for pregnant smokers: Pregnancy Risk Assessment Monitoring System, 2009–2010. *Prev Med*. 2015; 78:92-100.