Prevalence and Characterization of Tobacco Use Among Adolescents from Montes Claros, Minas Gerais, 2019-2020

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Prevalência e Caracterização do Consumo de Tabaco entre Adolescentes de Montes Claros, Minas Gerais, 2019-2020

Prevalencia y Caracterización del Consumo de Tabaco en Adolescentes de Montes Claros, Minas Gerais, 2019-2020

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ABSTRACT

Introduction: Tobacco-related diseases are responsible for five million deaths each year. By 2020, the estimate is that the number of annual deaths would increase to ten million, of which 70% would occur in developing countries. **Objective:** Estimate the prevalence of smoking and characterize tobacco use among adolescents aged 12 and 15 in the city of Montes Claros, Minas Gerais in 2019-2020. **Method:** Cross-sectional quantitative epidemiological study, part of the project "Epidemiological survey on oral health conditions among students in Montes Claros, Minas Gerais, Brazil", conducted in 2019-2020.The sample consisted of 354 12-year-old and 355 15-year-old adolescents from a population of 4,458 12-year-old and 4,524 15-year-old adolescents, respectively. The data were analyzed through descriptive analysis with measures of central tendency, variance and frequency. **Results:** There was prevalence of tobacco use in adolescents at some point in their lives of 8.6%, being 4.6% for cigarettes made with pressed tobacco leaves. **Conclusion:** The prevalence of the use among adolescents is worrying due to the harmful effects to health. Knowing the profile of these users may support health policies aimed to reduce its use.

Key words: tobacco use disorder; tobacco use; prevalence; cross-sectional studies; adolescent.

RESUMO

Introdução: As doenças tabaco-relacionadas são responsáveis por cinco milhões de óbitos a cada ano. Em 2020, estimou-se que o número de óbitos anuais aumentaria para dez milhões, dos quais 70% ocorreriam nos países em desenvolvimento. **Objetivo**: Estimar a prevalência do tabagismo e caracterizar o consumo de tabaco entre adolescentes de 12 e de 15 anos na cidade de Montes Claros, Minas Gerais, em 2019-2020. **Método:** Estudo epidemiológico quantitativo transversal, parte do projeto "Levantamento epidemiológico sobre condições de saúde bucal entre escolares de Montes Claros, Minas Gerais, Brasil", realizado em 2019-2020. A amostra estimada foi de 354 escolares de 12 anos e 355 de 15 anos, calculada entre 4.458 escolares de 12 anos e 4.524 de 15 anos, respectivamente. Os dados foram analisados descritivamente por meio de medidas de tendência central, variância e frequência. **Resultados:** Houve prevalência do uso de tabaco entre adolescentes alguma vez na vida de 8,6 %, sendo 4,6% relativos ao consumo do cigarro Paiol. **Conclusão:** A prevalência do consumo encontrada entre os adolescentes é preocupante por causa dos efeitos deletérios à saúde. Conhecer o perfil dos desses usuários pode contribuir para as políticas de saúde coletiva com o objetivo de reduzir o seu uso.

Palavras-chave: tabagismo; uso de tabaco; prevalência; estudos transversais; adolescente.

RESUMEN

Introducción: Las enfermedades relacionadas con el tabaco son responsables de cinco millones de muertes cada año. Para 2020, la estimación es que el número de muertes anuales aumentaría a diez millones, de los cuales el 70% ocurriría en países en desarrollo. **Objetivo:** Estimar la prevalencia del tabaquismo y caracterizar el consumo de tabaco en adolescentes de 12 y 15 años de la ciudad de Montes Claros, Minas Gerais, en 2019-2020. **Método:** Estudio epidemiológico cuantitativo transversal, parte del proyecto "Encuesta epidemiológica sobre condiciones de salud bucal en escolares de Montes Claros, Minas Gerais, Brasil", realizado en 2019-2020. La muestra estimada estuvo conformada por 354 de 12 años y 355 de 15 años, calculada a partir de 4.458 de 12 años y 4.524 de 15 años, respectivamente. Los datos fueron analizados mediante análisis descriptivo que estimaron medidas de tendencia central, variabilidad y frecuencia. **Resultados:** Esta investigación observó una prevalencia del consumo de tabaco entre los adolescentes en algún momento de su vida del 8,6%, con predominio del 4,6% en el consumo de cigarrillos. **Conclusión:** La prevalencia de consumo encontrada es preocupante, debido a los efectos nocivos para la salud. Conocer el perfil de los consumidores adolescentes de productos del tabaco puede contribuir a las políticas de salud colectiva para reducir este uso.

Palabras clave: tabaquismo; uso de tabaco; prevalência; estudios transversales; adolescente.

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INTRODUCTION

Tobacco is a plant whose scientific denomination is *Nicotiana tabacum*, and one of its toxic components is nicotine[1]. The resulting products can be smoked (pipe, cigar, cigarette), chewed (tobacco leaves) or inhaled (snuff)[1-3]. Tobacco use is a chronic disease caused by the chemical dependence of the substance nicotine[4]. Smokers use any tobacco product daily or ocasionally[5,6]. Secondhand smoke or passive smoking is involuntary by non-smokers who inhale tobacco by-products[4].

Nicotine is the main psychoactive substance responsible for tobacco addiction. It is absorbed by lungs (70%-90%), buccal mucosa (4% to 45%) and by the skin. The amount of nicotine inhaled by smokers depends on how it is used, number of puffs and pH of tobacco[7].

Tobacco use can start in the adolescence[8,9]. This phase brings great biopsychosocial changes, and consists in a search for new experiences in different contexts of the adolescents' development[10]. According to a study conducted in 2008 by the Pan American Health Organization – PAHO in partnership with the World Health Organization – WHO, five million persons died of tobacco-related diseases; it has been estimated that in 2020 the number of annual deaths could rise to ten million of which 70% would occur in developing countries[11].

Exposure to nicotine in adolescents can affect the central nervous system, cause cognitive and functioning impairments and compromise their development, a concern if used for longer periods[12]. Cognitive skills disorders, likely caused by tobacco like mental flexibility, thoughts, motor control, decision making, planning, attention and inhibitory control, the so called "executive functions" in the adolescence can lead to inappropriate behavior in complex environments and increasing social vulnerability[13,14].

In Brazil, the data of "*Pesquisa Nacional de Saúde do Escolar*" (PeNSE) showed that trying a cigarette increased approximately 53% in the age range of 13 and 17 years old[15]. Adolescents smokers have several individual characteristics related to psychosocial issues, self-esteem and self-efficacy[8,9]. In this transition period, external influences, culture, values, responsibilities and relationships are causal factors of change of the process of construction of the identity, making the adolescent susceptible to social risks[16,17]. The prevalence of trying cigarette by 13 to 15 years adolescents according to PeNSE in 2015 was 18.4%; a little more than 6% of the students claimed they used tobacco by-products[15]. The exposure to nicotine among adolescents can affect the central nervous system, cause cognitive and functioning impairment and compromise its development, a concerning situation when long-term use of tobacco is in the horizon[12]. Tobacco-dependence is classified as mental and behavioral disease by the International Classification of Diseases and Related Health Problems (ICD-10)[18].

The evaluation of the prevalence and characterization of tobacco use among adolescents at a certain location and time frame can corroborate the development of favorable health policies to reduce tobacco use and, consequently, the incidence of diseases and harms associated with it. The aim of the study was to characterize the use of tobacco among 12-and-15-years-old adolescents in the city of Montes Claros, Minas Gerais, in 2019-2020.

METHOD

This epidemiological study is part of the project "Epidemiological Survey of Oral Health Conditions of Students of Montes Claros, Minas Gerais, Brazil" (Project SBMoc), with cross-sectional and quantitative design. The sample consisted of 12-and-15-years-old students from public schools of the urban area of Montes Claros (MG), an average-size town with estimated population of 413,498 inhabitants according to the "*Instituto Brasileiro de Geografia e Estatística* (IBGE)"[19]. The Project SBMoc[20] adopted WHO – World Health Organization methodological proposal to conduct studies about oral health already published in five editions of manuals addressing the standardization of methodologies to be followed worldwide. The fifth edition published in 2013[21] recommended the evaluation of two index-ages, 12 and 15 years, for representing the adolescence, between 11 years and 6 months and 12 years and 6 months (index-age of 12 years); 14 years and 6 months and 15 years and 6 months (index-age of 15 years). In addition, diagnostic criteria to be followed while evaluating oral diseases and problems among them oral cancer, suggesting the necessity of assessing the exposure to risk factors.

Initially, a probabilistic sample by conglomerates encompassing the universe of 12-and-15-years-old students enrolled in public, private, municipal, state schools of urban and rural areas in 2019, stratified by age as proposed by WHO published in 2013[22] was designed. Through simple randomization of conglomerates, 38 public schools were randomized among the 138 which had students with the recommended index-ages. The sample was based in the parameters: the universe (5,539 12-years old students and 5,228 15-years old students), prevalence of 50% of health-related events or conditions, confidence level of 95% (Z= 1.96) and sample error of 5%, non-response rate of 10%[22].

It would be necessary to evaluate 360 and 358 students respectively. However, in the city of Wuhan, China, in

December 2019, the virus Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-CoV-2) has been identified, causing severe pneumonia[23], the novel human coronavirus[24], responsible for the coronavirus pandemic (COVID-19). Because of the pandemic, the collection of data in the public and private schools of the urban and rural areas and of the private schools of the urban area were suspended and the sample calculation needed to be revised including only urban municipal and state public schools. The universe changed to 12 years old (n=4,458) and 15 years (n=4,524) and the sample estimated dropped to n=354 and 355, respectively. The students with the index-ages recommended were invited to participate. The exclusion criteria were cognitive impairments impeding the interview.

The study utilized the software "*Sistema de Gerenciamento de Pesquisas (SGP)*" of Project SBMoc 2019-2020 developed by a contractor specialized in collecting the data. However, the investigators continued discussing with the contractor to optimize the software. The field research was conducted through interviews with evaluation instruments for demographic and socioeconomic questions and tobacco use habits. Next, the following variables were defined and evaluated: the use of any tobacco by-product directly or secondhand and characterization of tobacco use by adolescents in the last three months. Odontology students of the participating institutions conducted the interviews.

The analyzes followed statistical hypothesis. In the descriptive analysis, the measures of central tendency (mean and standard deviation of the quantitative variables) and frequency (absolute and percentage of nominal or ordinal categorical variables) were estimated. The prevalence and characterization of the tobacco use (yes/no) was estimated for the adolescents pursuant to statistical principles and hypotheses[25,26].

The data collected in the interviews were stored in a database of the SGP software server, entered in Excel spreadsheets and late transferred to the software Statistical Package for the Social Sciences (SPSS), version 24.0 for Windows. Eventually, the data were analyzed and tabulated. The Institutional Review Board of "*Universidade Estadual de Montes Claros (Unimontes)*" report 2.483.638, CAAE: 82447617.7.0000.5146 approved the study.

RESULTS

654 adolescents mostly females, of White, Yellow and Brown race were enrolled in the study (Table 1).

8.6% of the adolescents claimed they had used a tobacco by-product once in their lifetime. The most consumed was *Paiol*, a straw cigarette corresponding to 4.6% of the total consumption of other tobacco by-products (Table 2).

Table 1. Distribution of 12-and-15-years old adolescents according to sociodemographic characteristics. Montes Claros (MG), 2019-2020 (n=654)

Variables	n	%
Age		
12 years	213	32.6
15 years	441	67.4
Sex*		
Female	346	53.6
Male	299	46.4
Race/ethnicity/self-claimed skin color*		
Yellow	98	19.1
White	81	15.8
Brown	326	63.5
Black	5	1.0
Indigenous	3	0.6

(*) Number of respondents lower than participants.

The use of tobacco in the last three months by adolescents who reported the use in the lifetime was characterized as shown in Table 3.

DISCUSSION

The number of 12-years old participants was below the estimated (4.7% of the n estimated) but the number of 15-years old was higher (9.7 % above the n estimated). This occurred because of COVID-19 related logistics. The randomization of conglomerates was performed in a single step, there was no need to correct by the effect of the design since all the adolescents who met the inclusion criteria had the same odds of joining the study sample.

Among adolescents of Montes Claros in 2019-2020, it was found lower prevalence of tobacco use once in the lifetime than with adolescents engaged in the project PeNSE conducted in 2015 where trying tobacco in 13-to-17-years-old male adolescents in public schools was 19.4%. Of those who tried tobacco, 30.5% of the adolescents smoked within 30 days before the investigation, 24.7% used other tobacco by-products and 50.9% shared the same environment of persons smoking cigarettes[4].

Ultimately, among the adolescents investigated, 8.6% claimed they used any tobacco by-product once in the lifetime. This result contrasts with the current Brazilian Law number 9,294 of July 15, 1996[27], which determined the restricted use and advertising of tobacco products

Table 2. Distribution of adolescents of 12-and-15-years-old according to tobacco use. Montes Claros (MG), 2019-2020 (n=654))

Variable	n	%
Have you ever used any tobacco by-product?		
No	598	91.4
Yes	56	8.6
Industrial cigarette		
No	614	97.2
Yes	18	2.8
***Paiol* straw cigarette**		
No	605	95.0
Yes	32	5.0
Pipe		
No	632	99.5
Yes	3	0.5
Cigar		
No	634	99.7
Yes	2	0.3
Snuff		
No	630	99.2
Yes	5	0.8
Chewed tobacco		
No	635	99.8
Yes	1	0.2
Another type		
No	629	99.1
Yes	6	0.9
Secondhand smoke		
Industrial cigarette		
No	598	93.7
Yes	40	6.3
***Paiol* straw cigarette**		
No	613	96.7
Yes	21	3.3
Pipe		
No	634	99.8
Yes	1	0.2
Another type		
No	631	99.2
Yes	5	0.8

to minors than 18 years, children and adolescents. In addition, it bans the use of cigarettes, *cigarillos*, cigars, pipes or any other product producing smoke whether tobacco by-product or not in closed environment, private or public in the whole country.

A study conducted in Guanambi, Bahia, Brazil about tobacco use with 370 students, concluded that 17.6% claimed they smoked cigarettes in the age-range of 10 to 14 years (13%), from 15 to 19 years (87%), most of them females (64.6%) and Blacks (75.4%)[28]. In another study carried out in the Northeast regions, the use of tobacco was investigated, revealing that among adolescents evaluated in the age-range of 14-15 years, the prevalence was 21.6%, being 59.7% females and 5.2% smoked cigarettes[29].

In a countryside city of Minas Gerais, Itaúna, 28.6% have already tried cigarette in their lifetime, the first contact occurred between 11 and 21 years old, mostly students in the age range of 14 and 16 years old (68.25%)[30]. Another study conducted in a city of Minas Gerais with 15-years adolescents concluded that 32.31% had already tried and the prevalence persisted in 22.84%. Males were the majority of the sample (55.15%)[31].

In the city of Januária, a countryside town of Minas Gerais, a study showed that 4.1% were male smokers and only 1.8% were in the age-range from 15 to 16 years[32]. The discrepancies encountered can be attributed to several characteristics of the adolescents evaluated with different ages. In this study, the adolescents attending rural private or public schools were not included in the evaluation carried out in Montes Claros.

Nicotine is widely known for its great potential of causing dependence: the proportion of random smokers evolving to dependence is bigger than alcohol, morphine and cocaine users. Nearly 70% of the adolescents who try smoking become dependent[8].

Adolescents are more susceptible to developing the symptoms of tobacco dependence, even if the use is low[33]. Few adolescents smokers try to quit smoking and even those who attempt on their own or seek help are not very successful[10]. In Januária, a municipality of Minas Gerais, the use of tobacco was lower than in Montes Claros[32]. However, in other studies, the use by adolescents was higher than in Montes Claros[15,28,30].

Tobacco use continues to be one of the main causes of avoidable deaths in the world because it is a risk factor for respiratory and other diseases in adolescents which impact health in the short-term. Nicotine is addictive and has long-term consequences as cardiac diseases, strokes, psychological disorders and cancers[34].

The profile of adolescents of another study conducted in the Northeast region in the State of Paraíba concluded there was prevalence of 9.8% of smokers in the sample

Table 3. Characterization of tobacco use in adolescents of 12-and-15-years-old in the last three months. Montes Claros, MG, 2019-2020 (n=654)

Variables	n	%
During the last three months, how frequently did you directly use the tobacco by-products mentioned?		
Ever	140	86.4
1 or twice	14	8.6
Monthly	5	3.1
Weekly	3	1.9
During the last three months, how frequently did you have a sudden urge or crave to directly use the tobacco by-products mentioned?		
Ever	62	86.1
1 or twice	5	6.9
Monthly	3	4.2
Weekly	2	2.8
During the last 3 months, how frequently your direct use of tobacco by-products caused health, social, legal or financial problems?		
Ever	68	98.6
Weekly	1	1.4
During the last 3 months, how frequently because of your direct use of tobacco, did you quit doing things that were typically expected from you?		
Ever	67	97.1
Once or twice	2	2.9
Are there friends, relatives or any other person who were concerned with your direct use of tobacco?		
No, never	55	87.3
Yes, in the last three months	7	11.1
Yes, but not in the last three months	1	1.6
Have you ever tried to control, reduce or quit smoking directly or did you fail?		
No, never	55	84.6
Yes, in the last three months	7	10.8
Yes, but not in the last three months	3	4.6

evaluated and 2.9% were regular smokers. The percentage of experimentation was 31.1%. 17% of the adolescents started to smoke with less than 12 years, 32% from 12 to 14 years, 46%, between 15 and 17 years. Of the interviewees who experimented tobacco by-products, industrial cigarette was the most frequent (90%) and 59% of the sample were women[35], similar to the results of the study in Montes Claros.

The prevalence of experimenting cigarettes in the South region was 24.9%, but in the last 30 days prior to the date of the study, it reached 7%. The consumption of other tobacco by-products in 13-17-years-old students was more intense in the last 30 days prior to the study in the Midwest and South regions, in the States of Mato Grosso do Sul and Paraná, with prevalence of 10%, 9.6%, 13.9% and 13.8% respectively, according to PeNSE[15].

In the Midwest region, there was more prevalence of male students (24.69%), indigenous (29.17%) and Blacks (25.19%) of 15 years or older (33.64%)[15,36]. Considerable disparities exist in tobacco use in Brazil depending on the regions or time of analysis – during the lifetime, in the last 30 days, in the last 30 months. These considerations should be pondered while analyzing tobacco use.

According to the "*Estudo de Riscos Cardiovasculares em Adolescentes* (*ERICA*)" cigarette use at least once in a lifetime was 54.2% in the age-range of 15-to-17-years and

21.6% in the age range of 12-14-years-old. During the study, there was more prevalence of current 15 years-old adolescents smokers (15.6%) and in the present study, 0.4% correspond to 15-years-old adolescents smokers of straw cigarette *Paiol*[7].

There are evidences that smoking cessation improves the well-being, including quality-of-life and health status, in addition to reducing mortality and extending life expectancy for all ages. Also, it is a financial burden for smokers, health systems and the society. Therefore, social policies and interventions for smoking cessation are cost-effective initiatives[9].

The limitation of the study was the suspension of the evaluation of students in rural areas and private schools due to the COVID-19 pandemic, losing representativeness of 25% for 12-years-old and 18.74% for 15-years-old. The results are referred to urban public schools adolescents, however, they can be utilized in the elaboration of municipal public policies to restructure the society (family, school and society) and health services[9].

CONCLUSION

The prevalence of tobacco use in adolescents was low, however, it is concerning because of health-related adverse effects. The characterization of the use can help to obtain favorable outcomes in reducing tobacco use and secondhand smoke associated risks, a critical issue in public health. More tobacco-related health promotion actions are necessary in schools, particularly for users. Antismoking campaigns, control of tobacco sales and use by minors can help to reduce this prevalence in adolescents.

CONTRIBUTIONS

Maria Alice Aguiar Soares, Ana Maria Rodrigues Santos, Ana Maria de Jesus Teixeira Alves, Paula Karoline Soares Farias and Andréa Maria Eleutério de Barros Lima Martins contributed to the study conception and/or design, data collection, analysis and interpretation, wording and critical review. Giulia Emannuele Albuquerque Costa and Viviane Soares Fonseca contributed to the study conception and/or design, data collection, analysis and interpretation. They approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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