

(RESEARCH ARTICLE)



## Influence of tobacco consumption on the appearance of cervicovaginal lesions

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### Abstract

The gynecological interrogations, clinical impressions and results obtained from 1587 patients who attended the Department of Cellular Biology of the Faculty of Medicine of the Benemérita Universidad Autónoma de Puebla, México, for cervicovaginal exfoliative cytology sampling (Papanicolaou) were analyzed. Within the framework of the early cancer detection program from March 2010 to March 2021. From the 1587 patients studied, 302 reported smoking during the gynecological examination. Of the total number of patients with a smoking habit 178 (58.94%) showed cervicovaginal lesions on microscopic observation and/or physical examination. Smoking is considered a predisposing factor in the appearance of cervicovaginal lesions, and there is a need to carry out more detailed studies on the secondary effects of tobacco in patients with an active sexual life and a smoking habit in Mexico.

**Keywords:** Smoking; Cervicovaginal lesions; Exfoliative cytology; México

### 1. Introduction

Cigarette consumption according to the World Health Organization (WHO) is one of the main risk factors for premature death in men and women. In México, there are more than 16 million smokers, of which a third are women. The American Cancer Society reports that smoking is a risk factor for different types of cancer, especially cervical cancer, thus highlighting that tobacco combustion products are distributed throughout the body causing alterations in central cellular pathways, damage, and mutations [1-4].

After being inhaled, nicotine crosses the alveolar surface of the lungs, stimulating  $\beta$ -adrenoceptors and generating elevated levels of cyclooxygenase-2 (COX-2), prostaglandin-E2 and vascular endothelial growth factor (VEGF), favoring the nicotine exchange in the smoker's tissues; these findings provide an association of nicotine with the genesis of lesions, cellular modifications and even cancer [5,6].

Initially, the repair mechanisms manage to recover the damaged genetic information, however, chronic exposure to harmful substances from tobacco causes mutations in genes that control cell division, proliferation, and growth [7]. Biochemical studies show that both the nitrosamine ketone derived from nicotine, as well as the polycyclic aromatic hydrocarbon, can be stored in any part of the body, generating free radicals that explain part of the pathogenesis of diseases related to smoking, being the consumption of cigarettes one of the most important risk factors for the development of cellular and epithelial lesions [8,9]. The purpose of this research was to analyze the influence of smoking on the appearance of cervicovaginal pathology

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## 2. Material and methods

Observational and retrospective study in which the gynecological interrogations, clinical impressions and results obtained from 1587 patients who attended the Department of Cell Biology of the Faculty of Medicine of the Benemérita Universidad Autónoma de Puebla, to take cervicovaginal exfoliative cytology (Papanicolaou), in the framework of the early cancer detection program, from March 2010 to March 2021. The samples obtained were fixed with cytospray, stained with the modified Papanicolaou staining train and subsequently mounted with synthetic resin for microscopic interpretation. Patients with an active sexual life who reported a smoking habit at the gynecological examination plus evidence of cervicovaginal lesions at the microscopic observation and/or physical examination were included in the study. Non-smokers were excluded from the study. Likewise, the smoking index of the patients included in the study was calculated using the following formula: (number of cigarettes per day) x (number of years smoking) / 20 = packs per year.

## 3. Results

From the 1587 patients studied, 302 reported a smoking habit during the gynecological examination, while 1285 patients did not. Regarding the total number of patients with a smoking habit 178 patients (58.94%) showed cervicovaginal lesions on microscopic observation and/or physical examination, so their smoking rate was calculated (Table 1).

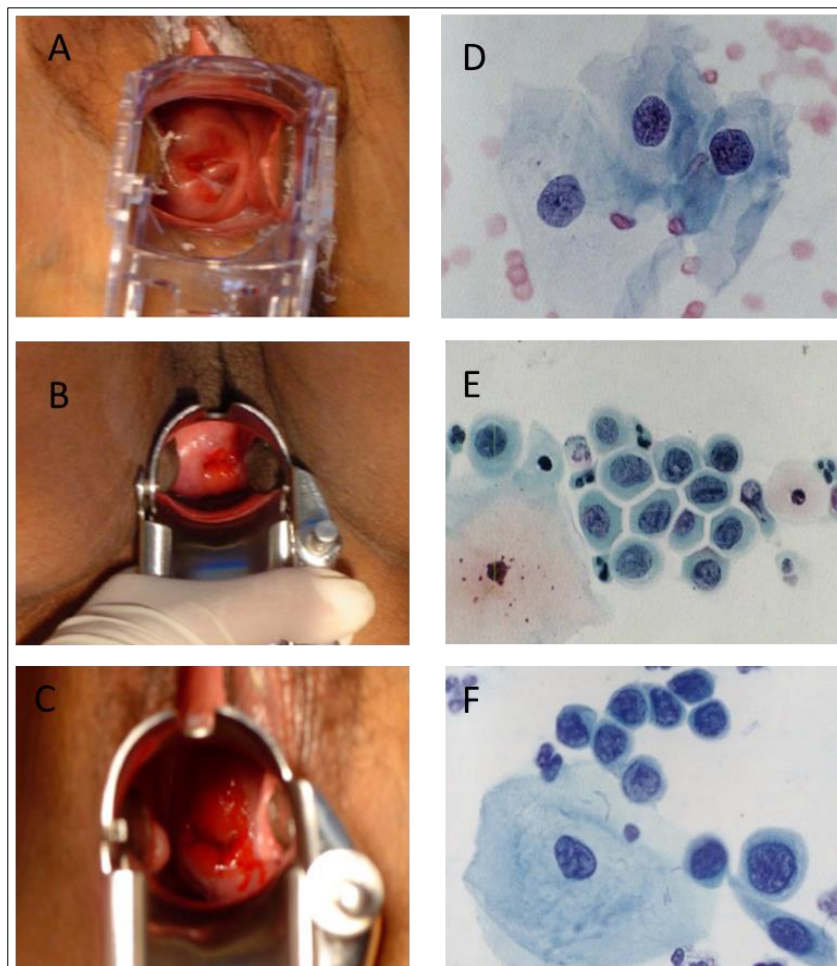
**Table 1** Number and percentage of smoking patients with their respective smoking rate

| Patients number | Smoking Index (SI)         |
|-----------------|----------------------------|
| 36 (20.22%)     | Zero level of smoking      |
| 40 (22.47%)     | Moderate degree of smoking |
| 50 (28.08%)     | Heavy level of smoking     |
| 52 (29.21 %)    | High level of smoking      |
| N = 178         |                            |

The cervicovaginal lesions reported in the 178 patients who smoked were the following: erosions, cervical ulcers, cervicovaginal polyps, and cellular atypia. Of the patients with cellular atypia, 22 patients were diagnosed according to the results of microscopic observation, with low-grade squamous intraepithelial lesion, while 10 patients were diagnosed with high-grade squamous intraepithelial lesion (Table 2 and Figure 1).

**Table 2** Frequent macroscopic and microscopic cervicovaginal lesions in smoker patients

| Cervicovaginal lesion type | Patients number |
|----------------------------|-----------------|
| Cervical erosions          | 95 (53.37%)     |
| Cervical ulcers            | 25 (14.04%)     |
| Cervicovaginal polyps      | 26 (14.60%)     |
| Cellular atypia            | 32 (17.97%)     |
|                            | N = 178         |



**Figure 1** Cervicovaginal polyp in a patient who smokes (A), cervical erosions in patients who smoke (B and C), low-grade squamous intraepithelial lesion in a patient who smoke (D), high-grade squamous intraepithelial lesions in patients with smoking habit (E and F)

One hundred twenty-five patients (9.72%) of the total number of patients who did not report a smoking habit during the gynecological examination showed cervicovaginal lesions on microscopic observation and/or physical examination, while 1160 patients did not show any lesions.

#### 4. Discussion

Smoking represents a public health problem for women worldwide, and several factors are known, such as: chronic inflammatory processes, trauma, atrophy and human papillomavirus that predispose to the appearance of cervicovaginal lesions, however, the results of the present study show an important statistical impact, where the smoking habit and the various degrees of smoking are a predisposing factor in the appearance of cervicovaginal lesions, compared to patients who do not have a smoking habit; such is the case of cervicovaginal polyps, where the number of cigarettes contributes to their appearance [10-18]. Certainly, it has been argued that cervical erosions and ulcers, in addition to being caused by atrophy, trauma or infections, are also the result of the action of tobacco combustion products, which cause inflammatory reactions, histological changes and total loss or partial cervical epithelium [19]. Likewise, the effects of tobacco produce persistent epigenetic changes that increase the risk of cervical cancer, regardless of the duration and intensity of smoking, therefore, smoking is an important accelerator of the process in places susceptible to the potent carcinogens of the cervix. Tobacco and areas with metaplasia, where the human papilloma virus of the oncogenic type can cause intraepithelial lesions and even squamous cell carcinoma [20-22]. Finally, it is important to highlight that there is evidence that tobacco combustion products are distributed throughout the body, especially in the cervical epithelium of smoker patients, which suggests the existence of an important pathophysiological basis for the prevalence, progression, and risk of presenting important cellular and epithelial changes in the uterine cervix.

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## 5. Conclusion

After analyzing the results obtained in this study, it is concluded that smoking is considered a predisposing factor in the appearance of cervicovaginal lesions compared to patients without smoking; Due to this, there is a need to carry out more in-depth studies on the side effects of tobacco in patients with an active sexual life, surveillance guidelines for the early detection of cervical anomalies, as well as efforts to reverse trends in smoking in México.

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## Compliance with ethical standards

### *Acknowledgments*

All authors listed have made a substantial and intellectual contribution to the work and approved it for publication.

### *Disclosure of conflict of interest*

The authors declare no conflict of interest.

### *Statement of informed consent*

The informed consent included the following aspects: name of the research project in which it will participate, objectives of the study, that is, what is intended to be obtained with the research and procedures and maneuvers that will be performed on the people in that study. And it was approved by ethics committee of the Benemérita Universidad Autónoma de Puebla.

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