

**\*Corresponding author**

\*Dionis Ruiz Reyes, Medical Sciences University of Villa Clara, School of Medicine, Villa Clara, Cuba.

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Smoking; Risk factor; Smoking habit.

**Smoking Habit as a Risk Factor for People's Health**

Dionis Ruiz Reyes\*, Maikro Osvaldo Chávez Moya, Adriel Herrero Díaz, Ileana Beatriz Quiroga López

Medical Sciences University of Villa Clara, School of Medicine, Villa Clara, Cuba.

**Abstract**

**Introduction:** Smoking is considered a dangerous risk factor for illness, complications, and mortality from diseases affecting the cardiovascular, gastrointestinal, respiratory, genitourinary, and nervous systems. It not only puts the smoking population at risk, but also those exposed to secondhand smoke.

**Method:** A descriptive bibliographic review was conducted between July and August 2021 at the Villa Clara University of Medical Sciences. Various prestigious national and international search engines and bibliographic resources were used, including the VHL, Infomed, ClinicalKey, and books, respecting the principles of medical ethics.

**Objective:** The objective was to describe the risk factors associated with smoking for individual health.

**Development:** Tobacco use is a risk factor that predisposes to various diseases. These include respiratory diseases (chronic bronchitis, chronic obstructive pulmonary disease, asthma), cardiovascular diseases (ischemic heart disease, atherosclerosis, high blood pressure, and myocardial infarction), and various types of cancer (lung cancer, gastric cancer, lip cancer, laryngeal cancer, esophageal cancer). It is also particularly harmful during pregnancy. It not only affects smokers but also passive smokers. **Conclusions:** It was concluded that smoking represents the main risk factor for various chronic non-communicable diseases such as respiratory and cardiovascular diseases and various types of cancer. In adult women, it affects the pregnancy and the location of the baby. It also significantly increases the risk of SARS-CoV-2 infection.

**Introduction**

Tobacco, a plant native to South America, has been known since ancient times. It was used by Cuban aborigines for entheogenic purposes, that is, they mixed it with other distorting substances to "get closer to the deities" during religious ceremonies, through hallucinogenic journeys. [1]

Smoking arose clearly associated with development and industrialization. It is the cause of three million deaths per year, and the rate is increasing. [1]

Smoking is a chronic systemic disease, belonging to the group of addictions and classified by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The International Classification of Diseases (ICD-10) of the World Health Organization (WHO) includes it in section F17 under the heading of mental and behavioral disorders due to tobacco use, as well as in the Third Cuban Glossary of Psychiatry (2001). [2]

A diagnosis of smoking is made for any person who, as a result of repeated use of any tobacco product, has developed a dependence syndrome, which can produce physical and psychological alterations. [2].

It is one of the main risk factors for several chronic non-communicable diseases. [3].

A risk factor can be defined as an attribute or characteristic that confers

an individual with a variable degree of susceptibility to contracting a disease or health problem. [4].

There are circumstances in which smoking can be considered a special risk situation. These are: people who have had or have respiratory, cardiovascular, or allergic problems, or diseases that can be aggravated by tobacco use; women during pregnancy or breastfeeding; adults who smoke in the presence of minors; not only are they exposed to smoke, but they also serve as negative role models, which is attributed to increasing the ranks of future smokers; smoking in small, poorly ventilated rooms; and early initiation of smoking (adolescence). [5]

Since the middle of the last century, when the first epidemiological studies linking various diseases to smoking appeared, the medical community has witnessed a momentous event: smoking has gone from being a glamorous habit to being considered a social plague of incalculable proportions. It represents the most widely documented cause of disease studied in the history of biomedical research. Added to this are its addictive nature and the ease with which it can be acquired and consumed. [6]

According to the World Health Organization (WHO), there are more than 1.3 billion smokers worldwide, representing approximately one-third of the population over 15 years of age. In Latin America and the Caribbean, smoking causes 150,000 deaths each year and is steadily increasing. It estimates that mortality specifically attributed to tobacco is 12% worldwide and 16% in the Americas (17% in men and 15% in women). Of the deaths associated with non-communicable diseases, tobacco is responsible for 15% of deaths from cardiovascular diseases, 26% of deaths from cancer and 51% of deaths from chronic respiratory diseases. To date, it is estimated that there are 150 thousand deaths annually in Latin America and the Caribbean attributed to the use of this product [6].

Cuba's current situation regarding the prevalence of smoking and cigarette consumption is not favorable; it ranks among the countries with the highest tobacco consumption in the world. Despite the measures adopted to combat it, the incidence of smoking among adolescents and young people is increasing. [8] It has the highest rates compared to the rest of the Caribbean countries. [9] It ranks fifth in Latin America and the Caribbean in terms of smoking prevalence, with a higher proportion of men than women. Twenty-four percent of the population aged 15 and over is an active smoker, that is, one in four people, and more than 50% is exposed to tobacco smoke at home, at work, or in public places. It is the only legal consumer product that kills between one-third and one-half of its users and is linked to more than 25 diseases. Fifteen percent of mortality in

the country is caused by smoking, equivalent to 13,300 people. Meanwhile, nearly 1,500 people die each year from exposure to secondhand smoke. [7]

In Cuba, chronic non-communicable diseases cause more than 70% of deaths, along with accidents. Currently, heart disease, malignant tumors, and cerebrovascular diseases are, in that order, the three leading causes of death, all with an upward trend over the last 20 years and related to systematic tobacco use. [1]

Diseases such as coronary heart disease and strokes have occupied top places as causes of mortality in Cuba and in Villa Clara, a province that occupies fifth place by province (238.5) in terms of cardiovascular diseases, tenth (218.2) in terms of malignant tumors and eighth (85.9) in terms of the rate of cerebrovascular diseases. In research carried out in the period 2001-2014 it was observed that one in four Villa Clara residents dies of cancer, and one in four dies of lung cancer. These pathologies are closely related to smoking levels, and although statistical reports reporting data on this issue are scarce in the region, daily experience shows that they are high [6].

In the municipality of Camajuaní, according to the latest Statistical Health Yearbook, the main causes of death were: heart disease (252.4%), malignant tumors (220.5%), vascular disease (94.2%), and chronic lower respiratory tract diseases (58.9%) [11].

Considering that smoking is closely linked to respiratory and cardiovascular diseases, various types of cancer, and is especially harmful during pregnancy, this literature review aims to describe the risk factors of smoking for people's health. Our main motivation is to expand our knowledge of these risk factors that lead to death in our population. We propose the following scientific question: What are the risk factors of smoking that can harm people's health? To answer this question, 43 bibliographies were consulted.

## Development

Tobacco use is a risk factor that predisposes to various diseases, known as chronic non-communicable diseases. These include respiratory diseases (chronic bronchitis, chronic obstructive pulmonary disease, asthma), cardiovascular diseases (ischemic heart disease, peripheral vascular disease, atherosclerosis, high blood pressure, myocardial infarction, abdominal aortic aneurysm), and various types of cancer (lung cancer, gastric cancer, lip cancer, oral cavity cancer, laryngeal cancer, esophageal cancer). It is also particularly harmful during pregnancy. It not only harms smokers but also those who breathe the same air (passive smokers). Among the effects produced are disorders and alterations that can be very harmful to health, such as hoarseness, persistent cough, irritation, sore throat,

bad breath, loss of appetite, headaches, fatigue, bronchitis or bronchial irritation, as well as increased blood pressure and palpitations. It can also cause emphysema, or a loss of the lungs' ability to exchange gases, and major changes that can lead to lung cancer.

### **Effects of Tobacco on the Body by Different Organs and Systems**

**Cardiovascular System:** The World Health Organization confirms that cardiovascular diseases are the leading cause of death worldwide. Factors associated with these, such as high blood pressure (13%), smoking (9%), diabetes mellitus (6%), sedentary lifestyle (6%), and overweight and obesity (5%), are related to cardiovascular deaths. As indicated, cardiovascular diseases are the leading cause of death worldwide. Estimates for 2012 indicate that 17.5 million people died, representing 31% of all recorded deaths; of these deaths, 7.4 million were due to coronary heart disease. The Pan American Health Organization assumes that cardiovascular diseases are the leading cause of disability and premature death worldwide and substantially contribute to the increase in health care costs. The fundamental lesion is arteriosclerosis, which occurs over the years and is usually advanced when symptoms appear, generally in adulthood [12], [13].

The effects on cardiovascular health appear immediately after starting to smoke and are also the first to be reversed after quitting. According to Castillo Rodríguez et al., 14 for every 10 cigarettes smoked per day, the risk of death from heart disease increases by 18% in men and 31% in women. It is known that, 2 to 3 years after quitting smoking, cardiovascular risk is similar to that of the non-smoking population. [15]

Cardiovascular diseases related to smoking include: coronary heart disease (ischemic heart disease), peripheral vascular disease, atherosclerosis, high blood pressure, myocardial infarction, and abdominal aortic aneurysm. [1]

Smoking is one of the leading causes of coronary heart disease. Mortality rates from coronary heart disease are 60 to 70% higher in older smokers than in non-smokers. Sudden death is the first manifestation of coronary heart disease and is 2 to 4 times more likely in young male smokers than in nonsmokers. Smoking in combination with oral contraceptives increases the risk of coronary heart disease at least 10-fold. Individuals who continue to smoke after a heart attack are more likely to die from coronary heart disease than those who quit smoking. Smokers undergoing coronary artery bypass graft surgery have higher perioperative mortality than nonsmokers. Smoking contributes to both coronary atherosclerosis and acute coronary ischemic, thrombotic, or arrhythmic events. [16]

Smoking also worsens peripheral ischemia and is the most important risk factor for thromboangiitis obliterans and affects peripheral bypass grafts. The mortality rate from atherosclerotic aortic aneurysms is higher in smokers [16].

Tobacco use is the main risk factor for peripheral vascular disease. The association is very high. More than 80% of patients with typical intermittent claudication smoke more than two packs of cigarettes per day. Smokers, especially men, are at increased risk for abdominal aortic aneurysm [14].

The authors consider smoking to be one of the most potent risk factors for ischemic heart disease, from a causal perspective. This is largely due to nicotine, which induces the release of substances such as cortisone, which raises blood pressure, increases heart rate, constricts arteries, blocks oxygen consumption by the myocardium, and increases blood lipid levels, which accumulate on arterial walls, narrowing and hardening them. We also state that smokers of 15 cigarettes per day have twice the risk of having a heart attack than nonsmokers, and those who smoke more than 25 cigarettes per day have four times the risk.

It has also been a risk factor for carotid atherosclerosis since the first studies in the 1950s and is an additive risk to hypertension and can accelerate atherosclerosis [17], [18], [19], [20].

**Respiratory System:** The action of tobacco smoke produces lesions at different levels of the respiratory system: increased secretions in the trachea and bronchi, which is associated with a higher risk of viral and bacterial infections, as well as chronic bronchitis [14].

The irritating action of smoke and the reduction in blood flow to nourish the tissues in contact with smoke are the main causes of chronic bronchitis in smokers, with a productive cough, which causes the elimination of sputum containing pus, and also the frequent pharyngitis, laryngitis, shortness of breath, and emphysema, the latter characterized by a decrease in the elasticity of the lungs, with the consequent difficulty in adequately oxygenating the lungs. 12. The longer and more cigarettes a person smokes, the greater the likelihood of developing bronchitis and its severity. Secondhand smoke can also cause chronic bronchitis, which is worsened by environmental pollution, infection, and allergies. [21]

Tobacco smoke causes destruction of the surface of the alveoli (emphysema), which reduces airflow and is the main cause of COPD in active and passive smokers 14. Currently, it affects both sexes almost equally, partly due to the increase in tobacco use among women in high-income countries. In the absence of interventions to reduce risks, particularly exposure to tobacco smoke, COPD deaths are

expected to increase by more than 30% in the next 10 years [22]. This disease has multiple causes, involving both environmental factors and defects in the body's response to stress. Among the former, tobacco is undoubtedly the main causative agent (generally, 80–90% of all causes). Not only is smoking the single most important factor in chronic airway obstruction, but it also interacts with all other contributing factors. Typically, only 15% of smokers develop COPD that requires treatment, leading to the idea that some smokers are susceptible to the effects of tobacco [21].

Tobacco increases the incidence and severity of various respiratory infections (common cold, pneumonia, influenza, tuberculosis, etc.) by altering the respiratory tract's defenses and immune response, and causes exacerbations of chronic conditions [14].

Exposure to tobacco, both prenatally and postnatally, is associated with an increased risk of developing asthma symptoms in young children. Tobacco smoke, with its large number of irritants, is a triggering factor for attacks [21]. Having just one smoker in the family and the child being indirectly exposed to tobacco combustion products increases the predisposition to asthma, since these products act by generating inflammation of the respiratory epithelium and increasing immunoglobulin E (IgE) levels. Prenatally, smoking can also predispose to the development of this disease, since it has been shown that children born to mothers who smoked cigarettes during pregnancy tend to have preterm birth and low birth weight, which in turn is related to a certain degree of immaturity of the airways, a factor that predisposes to the development of asthma [23].

Tobacco use is linked to diffuse interstitial lung diseases (DILDs); respiratory bronchiolitis associated with DILD, desquamative interstitial pneumonia, and is a risk factor for idiopathic pulmonary fibrosis (IPF). The combination of pulmonary fibrosis and emphysema is also due to tobacco use and is considered a clinical entity with its own characteristics, distinct from those of other interstitial lung diseases. In recent decades, smoking has gained importance and has been implicated in the pathogenesis of DILDs, both in the aforementioned and in other types of DILDs in the context of collagen diseases, primarily rheumatoid arthritis. These tobacco-related interstitial lung diseases are: respiratory bronchiolitis (diffuse interstitial lung disease), desquamative interstitial pneumonia, pulmonary Langerhans cell histiocytosis, idiopathic pulmonary fibrosis, rheumatoid arthritis (interstitial lung disease), combined pulmonary fibrosis and emphysema, acute eosinophilic pneumonia, and pulmonary hemorrhage syndromes [24].

Tobacco use is the main risk factor for lung cancer. Of every 10 people with lung cancer, nine are smokers. This is the second leading cause of death among Spanish

male smokers, often coexisting with chronic obstructive pulmonary disease (COPD). The risk of cancer depends on the duration of smoking (the younger the age at onset, the higher the risk), the number of cigarettes smoked per day, the type of cigarettes smoked, and the number of years since the person quit smoking. The risk increases 13-fold among active smokers and 1.5-fold among those with prolonged passive exposure to tobacco smoke [14, 15, 21]. The risk of death from lung cancer is 20 times more common among women who smoke two or more packs of cigarettes a day than among nonsmokers [25]. The risk of lung cancer decreases when smoking is stopped, although never to the level of a nonsmoker [21].

Heavy tobacco use is generally considered one of the main risk factors for laryngeal cancer. It is estimated that at least 75% of head and neck cancers are caused by cigarette smoking, primarily among heavy users [26].

In several studies analyzed during this study, we observed that smoking has been recognized as a risk factor for previous respiratory infections and that it increases the severity of these types of diseases. It causes inflammatory damage to the airways and lungs, which, when sustained over time, is associated with chronic obstructive pulmonary disease (COPD), cardiovascular disease, and cancer, all risk factors for COVID-19. Smoking is also associated with a weakened immune system and a higher risk of pneumonia, risk factors for acquiring SARS-CoV-2 and developing severe forms of COVID-19.

The World Health Organization has established that smokers are more likely to develop severe symptoms if they contract COVID-19, compared to non-smokers. COVID-19 primarily attacks the lungs, and smoking impairs lung function, making it harder for the body to fight this and other diseases. All the instinctive movements involved in smoking significantly increase the risk of SARS-CoV-2 infection [27], [28].

In these few months of the pandemic, we have observed that smoking patients with COVID-19 have doubled in number compared to non-smokers, presenting severe forms of the disease and deteriorating 14 times more in the first 2 weeks of infection.

**Digestive System:** Dental complications caused by smoking include: teeth tend to become stained by the action of nicotine and tar, producing a surface color (brownish) and favoring the development of adult caries. Halitosis is also favored by changes in the quantity and quality of saliva on the oral microbial flora [14].

Smoking has long been associated with oral diseases, including periodontal disease. It is probably a true risk factor for periodontitis. Smokers are more likely to develop



more severe periodontal disease and tooth loss than nonsmokers. It is associated with increased inflammation of the gingiva, which tends to become fibrous, with thickened margins, loss of periodontal attachment and the formation of periodontal pockets, as well as bone loss [29].

Smoking, in both men and women, is a risk factor for the development of malignant and premalignant neoplastic lesions in the oral cavity. The different forms of smoking, such as conventional cigarette smoking, reverse smoking, and passive smoking, vary in the incidence and prevalence of tumor development, as do the type, quantity, and intensity of tobacco consumption [30]. The annual risk of cancer in women more than doubles among regular smokers compared to women who have never smoked in the age groups between 45 and 74 years [25].

Lip cancer is one of the increasingly important cancers due to its frequency and increase in recent years. In Cuba, it represents 0.6-1% of all malignant tumors and 15% of all tumors. The highest rates are reported in Villa Clara and Camagüey. Smoking is the most important risk factor for the development of this disease [31].

There is one dominant risk factor: smoking, whose carcinogenicity is more than evident, as a quarter of oral cancer cases are attributable to frequent cigarette smoking [30]. The risk of developing oral cavity cancer in a smoker is six times higher than in a nonsmoker. Tobacco is responsible for 50% of oral cavity cancers [14].

It has been shown that smokers have almost three times more digestive tract ulcers than nonsmokers, and a similar trend is observed with gastric cancer. Gastric cancer is the second leading cause of death and the fourth to fifth leading cause of annual incidence of malignant tumors. Smoking appears to be involved in the development of noncardiac gastric cancer. In Latin America, a gastric cancer risk of 1.47 has been established. The risk of smoking 20 cigarettes a day has a risk of developing gastric cancer of 1.62 in men and 1.2 in women. We consider this harmful habit to also be one of the risk factors for esophageal cancer. Various studies indicate that the risk of esophageal cancer is five times higher among smokers than nonsmokers, with a risk up to 10 times higher among heavy smokers [34].

**Other digestive system conditions include chronic gastritis and gastroesophageal reflux disease [14].**

### **Genitourinary system**

**Risk factor for men:** In men, smoking damages the arteries that supply blood to the penis, reducing blood flow. This can lead to erectile dysfunction and impotence. According to most studies published to date, smoking doubles the

risk of impotence in men between the ages of 30 and 45. In smokers who smoke more than a pack a day, the risk of impotence can be 40% higher than in nonsmokers and is dose-dependent [14].

Smoking causes a reduction in ejaculate volume, as well as a decrease in the relative number of sperm and a significant reduction in sperm quality. In fact, smokers have a decrease in fertility of up to 75% compared to nonsmokers [14].

**Risk factor for women:** In addition to the aforementioned risks for men, frequent tobacco use has consequences for women's health, such as menstrual cycle disorders, premenstrual tension, very painful periods, irregular cycles or lack of menstruation, fertility disorders: they tend to have lower fertility and are less likely to become pregnant when undergoing in vitro fertilization treatments, pregnancy disorders: they have more miscarriages, premature births, placental abruptions and placenta previa than nonsmokers, and menopause disorders 2-3 years earlier than nonsmokers [14].

There is also an increased risk of fetal death between 28 weeks of gestation and 28 days after birth (neonatal death) and sudden infant death syndrome. It has been estimated that the risk of sudden infant death syndrome (SIDS) in mothers who smoke during pregnancy is three times higher than that of nonsmokers and is increased by maternal smoking 6. Maternal smoking during pregnancy causes fetal hypoxia due to placental insufficiency and increases the concentration of carbon monoxide and carboxyhemoglobin in the fetus [35].

It also increases the likelihood of contracting the human papillomavirus (HPV) and intensifies the severity of this disease. The risk of cervical cancer increases in women with HIV because the accumulation of nicotine and its breakdown product, cotinine, in the immune surveillance cells of the mucus-producing glands interferes with their normal function [36], [37]. The adjusted risk of this type of cancer in smokers is estimated to be between 3.42 and 2.96 for passive smokers exposed for three or more hours per day [25].

**Nervous system and mental illness:** Tobacco is a major risk factor for the nervous system. Some associated complications include depressive and anxiety-related mood disorders, stroke, multi-infarct dementia, and multiple sclerosis. [1]

The risk of cerebrovascular disease (CVD) is almost twice as likely in people who smoke, with a similar risk in passive smokers. Similar results have been found by several authors who report smoking as a contributing factor to all types of cardiovascular disease, with increased fibrinogen

levels considered the underlying cause. Nicotine produces catecholamine release in the autonomic nervous system, increased platelet aggregation, lipid alterations, and endothelial dysfunction. It also increases the production of free radicals and cytokines, which cooperate with the formation of macrophages and the lipid core [38].

In current smokers, the risk of subarachnoid hemorrhage is close to 5, the relative risk of cerebral infarction is 2.5, and that of intracerebral hemorrhage is 1.5 to 3. The proportion of ischemic cerebrovascular events is related to the number of cigarettes smoked per day. Smokers have a three-fold increased risk of stroke. This risk increases with the number of cigarettes smoked per day [39].

Tobacco produces an excitatory effect and therefore causes anxiety, tremors, tachycardia, palpitations, toxic-type headaches, dizziness, ringing in the ears, and balance disorders [12].

### **Impact on passive smokers**

Various studies have shown that non-smokers who breathe tobacco-polluted air (passive smokers) increase their risk of suffering from the same diseases as smokers by inhaling air contaminated by tobacco smoke. If they also suffer from allergies, asthma, or cardiovascular problems, their condition may be aggravated. These risks are especially significant for pregnant women and children. During pregnancy, there is a higher risk of miscarriage, premature birth, or low birth weight. Smoking mothers produce less milk than non-smokers, but are also less likely to breastfeed and transition to formula feeding sooner than non-smokers. The breast milk of smokers contains less iodine than that of non-smokers. Smoking during lactation can promote iodine deficiency in infants and, consequently, brain damage.

Smoking causes various diseases and is also linked to an increased risk of breast cancer in younger premenopausal women. The risk increases with the intensity and duration of smoking, as these byproducts generate highly reactive free radicals that attack genetic material, promoting mutations. It has been shown that intense exposure to secondhand smoke is related to the risk of breast cancer in postmenopausal women. Therefore, active and passive smokers increase the risk of developing this cancer. Furthermore, women who started smoking at an early age are more susceptible to it [41].

Inhalation of cigarette smoke in children, including adolescents, is much more toxic and harmful than in adults. The components of smoke damage the airway epithelium, decrease mucociliary clearance, induce mucus hypersecretion, and decrease surfactant and alveolar macrophage activity. Structural alterations in the lungs have been described in children born to mothers who smoked

during pregnancy, and they have an average weight loss of 180 to 200 g. Passive smoke inhalation is associated with a decreased rate of lung function growth during childhood, a higher frequency of lower respiratory tract infections (ARIs), particularly tracheitis and bronchitis, an increased rate of hospitalizations for pneumonia and other respiratory infections in children under 2 years of age, and a higher risk of acute and recurrent otitis media [42].

Some studies have indicated that the risk of invasive meningococcal disease in children is influenced by environmental factors, including parental smoking, which increases the likelihood of developing this disease 43. The presence of a habitual cough in children is 13% more common when both parents are smokers; respiratory tract infections are less than 30% more common; and wheezing or asthma is 20% more common 25. Regarding the association between passive smoking in childhood and respiratory disease, it has been estimated that 42% of children with chronic respiratory disease are passive smokers. In children, various studies have found an increased risk of acute leukemia, intracranial tumors, neuroblastomas, Wilms tumor, bone and soft tissue sarcomas 6. Attempts have also been made to link passive smoking to chronic fatigue syndrome, fibromyalgia, and temporomandibular joint disease, and it has been found that individuals suffering from these conditions are more frequently smokers. It has also been linked to Buerger's thromboangiitis, cystic fibrosis, childhood esophagitis, and the development of post-anesthetic complications [43].

In adults, passive smoking has been associated with cancer of the lung, nasal cavity, and cervix; there is less evidence for cancers of the bladder, breast, stomach, brain, hematopoietic system, and lymphatic system. [6]

### **Conclusions**

A comprehensive assessment of the aforementioned information leads us to conclude that smoking is a significant risk factor for human health. It represents the main risk factor for various chronic non-communicable diseases such as respiratory and cardiovascular diseases and various types of cancer. In adult women, it affects pregnancy and the location of the fetus. It also significantly increases the risk of SARS-CoV-2 infection.

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### **Author Contributions:**

- Dionis Ruiz Reyes. Conceptualization, Research, and Writing – original draft.
- Néstor Miguel Carvajal Otaño. Methodology, Visualization, Writing – original draft, and Writing – review and editing.
- Dania María García Rodríguez. Research, Methodology,

and Resources.

- Dr. Aida Pérez Cárdenas. Supervision and Validation.

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