The impact of cannabis use in otorhinolaryngology

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ABSTRACT

Introduction: Cannabis is currently the most widely planted, trafficked and consumed illicit drug in today's society. Its use has increased substantially in the last few decades, mainly in developed countries where its legalization has contributed to an increasingly growth in the number of cannabis users worldwide. The benefits of medical cannabis have been the primary drivers for its legalization however its adverse effects cannot be ignored. Since inhalation is the most common route of administration it is extremely important to try to understand the possible impact of cannabis use in Otorhinolaryngology.

Methods: Narrative assessment for relevant review, opinion and meta-analyses articles, in English, using PubMed, published in the last 10 years and in several medical journals plus official data available in the World Health Organization site.

Discussion: The benefits and advantages of medical cannabis are evident however we need to be aware of the risks related to its use. The most common problems related to its use are worsening of chronic rhinosinusitis, tinnitus, vocal cords alterations e head and neck cancers.

Conclusion: Cannabis consumers are expected to grow in the near future. Since inhalation is the most common route of administration the problems related to the superior respiratory tract are also expected to grow. Therefore it is necessary to stimulate investigations in this area in order to have more concrete evidence about this subject.

Palavras-chave traduzidas: Cannabis, adverse effects, superior respiratory tract, Otorhinolaryngology

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INTRODUCTION

Cannabis is the most frequently planted, trafficked, and consumed recreational drug worldwide and the oldest evidence of cannabis sativa cultivation dates to ~ 12,000 years ago in Asia.[1,2] This plant has been used by ancient civilizations for medicinal, recreational, religious and spiritual purposes.[2,3] Its psychotropic effects have become popularized worldwide thus contributing to its spread throughout the world.[3] Tetrahydrocannabinol (THC) is the main psychoactive component of cannabis, and it is responsible for its psychotropic properties.[4] Its consumption was only considered illegal in the last century, when several countries declared THC to be harmful with no medicinal effects.[2] In addition to THC, cannabis contains phytocannabinoids such as cannabidiol (CBD), which is its main non-psychoactive component.[5] However, studies of THC activities have been scarce and easily overshadowed by strong views regarding its adverse effects.[6]

However numerous people diagnosed with various conditions and prescribed with treatments that were ineffective during the 1990s perceived cannabis a viable option to alleviate symptoms such as pain, muscle spasms, nausea, vomiting, and loss of appetite[1]. They paved the way towards increased interest in investigating the potential medicinal effects and benefits of cannabis. Since then, approximately 560 components of this plant have been identified5 and among approximately 100 known cannabinoids, the effects of THC and CBD have undoubtedly been studied the most.[7] Interest in the potential actions of CBD is increasing, indicating great potential for exploring cannabis' components[6], however it must be considered that its pharmacological effects vary depending on the amount of phytocannabinoids used.[3] Studies of cannabis have become much easier to conduct[6] and the benefits and therapeutic indications of cannabis are consensual[2,3,5,8,10] for specific conditions. The important role that this drug might play in improving the quality of life of many patients has been established.[6] The analgesic, antiemetic and antispasmodic properties of cannabis have been supported by evidence; consequently, cannabis is now definitely indicated for chronic pain, nausea and emesis induced by chemotherapy, and muscular spasms in multiple sclerosis[9].

However, health problems associated with cannabis consumption have been documented[11] and more comprehensive investigation into the potential adverse

effects of cannabis from the perspective of individual specialties such as otorhinolaryngology (ENT) are scarce.

MATERIALS AND METHODS

We searched PubMed using the keywords "cannabis" with "sativa", "tobacco", "side effects", "health effects", "otorhinolaryngology", "ENT", "otolaryngology", "laryngology", "legalization". All review articles, meta-analyses, and opinion articles in English that were considered relevant and published in several scientific journals in the preceding decade were included, as well as all official data available on the website of the World Health Organization. Other information considered pertinent was analyzed and included.

DISCUSSION

The impact of cannabis legalization

Cannabis consumption has been legalized in some countries and decriminalized in others. This is a popular topic worldwide, and citizens who favor its consumption and appreciate its medicinal properties[7] have increased pressure on governments to legalize cannabis. Furthermore, numerous health professionals who have validated the applicability of cannabis to several diseases have stated that its legalization would facilitate and promote dedicated research in this area. However, evidence of the impact of cannabis legalization on the prevalence of its use and on potential health problems that it may cause remains scant[12]. The effects of cannabis on individual health are determined not only by its pharmacological properties but also by the availability and acceptance of its use by society[10]. Social permissiveness and the acceptance of cannabis consumption opens a window for unprejudiced availability, which in turn allows evaluation of its effects. This phenomenon occurs with other legal drugs such as alcohol and nicotine (in tobacco). These drugs damage the health of users, harm others, and have no beneficial effects. However, their legal status allows their generalized availability to consumers[10]. Therefore, sample populations for studying the consequences of their use and abuse are substantially larger than those used to study cannabis, because their consumption is widely popular and is not associated with taboos. Strong evidence supports the notion that the same will occur for cannabis after legalization in more countries as it becomes more available to increasing numbers of consumers. The number of consumers and the amount of consumption is thus expected to increase[10], whether due to a greater accessibility or owing to curiosity associated with discovering the substance and. Canada, the second country to have legalized this drug both for medicinal and recreational purposes, saw an increasing trend of cannabis use after its legalization[13]. The prevalence of regular cannabis consumption in areas of the USA where it was legalized increased more when compared to tobacco use among young people[12]. These data indicates a shift in consumer habits, with cannabis being preferred over tobacco, at least in younger age groups. It is established that the regular daily abuse of cannabis is harmful to the neurocognitive development of adolescents and that the likelihood of long-term dependence is higher when consumption starts at a younger age[13]. Thus, cultural permissiveness, social policies, and uncontrolled long-term use and abuse of cannabis may lead to cannabis dependence[10] if consumption is not controlled. With time, such dependence will inevitably lead to prolonged exposure to this drug hence an increase in complications from its abuse is expected[10], many of which remain unknown, either due to the lack of data on consumption profiles or to the lack of investigation into this new reality.

Forms of cannabis administration

Cannabis legalization, both for medicinal and recreational purposes, influences consumption habits and considerably impacts the forms of administration currently available in the market[12]. Therefore, the range of cannabis administration routes is heterogeneous and diverse, and comprises for example inhalation, ingestion, orodispersible solutions, oils and beverages containing this substance[10,11,14]. The route of administration affects the amount of physiologically absorbed phytocannabinoids which in turn exerts different effects[7] in the organism. The best administration route of medicinal cannabis is inhalation[7] because the drug is absorbed faster through the lungs. Despite a diversity of commercial products, the traditional and most popular form of recreational cannabis consumption continues to be inhalation[10,11]. Cannabis can be inhaled using vaporizers or by smoking joints. Hypothetically, cannabis inhalation causes chemical injury through degradation byproducts, thermal injury due to high inhalation temperatures, and biomechanical injury from coughing[14]. Moreover, cannabis contains carcinogens similar to those in tobacco and its combustion products also have carcinogens such as nitrosamine and polycyclic aromatic hydrocarbons[15]. Moreover, considering that the most common and predominant route of recreational consumption is smoking joints (via inhalation), the risks associated with its consumption are potentially increased because this practice usually means mixing cannabis with tobacco, which appears to be more harmful than inhaling cannabis alone[11]. Consuming tobacco alone has deleterious effects on the nasal mucosa as inhalation of its smoke causes structural and functional changes. Moreover, the severity of these pathological changes is influenced by the duration of exposure to tobacco smoke[16]. The potential harm caused by combined exposure to tobacco and cannabis have thus been highlighted[14].

Impact of cannabis consumption in ENT

The most common route of cannabis administration is inhalation[10] in combination with tobacco[11]. Since cannabis combustion products contains 2-fold greater carcinogen levels than tobacco combustion products[14,15], and the

risk of prolonged exposure associated with long-term dependence may be a reality, the potential repercussions of consuming cannabis should be investigated from an ENT perspective.

Chronic rhinosinusitis is one of the most relevant problems that substantially impacts the global population. Environmental factors such as allergens and tobacco smoke appear to play important roles in the onset and progression of chronic rhinosinusitis[17]. Some evidence supports a relationship between tobacco consumption and chronic rhinosinusitis[16]. This disease worsens with the structural and functional changes in the nasal mucosa caused by tobacco. Such changes include edema between epithelial cells, loss of cilia and columnar cells, reduced goblet cells, and vascular congestion[16]. Since cannabis is usually combined with tobacco, consumers are hypothetically exposed to similar effects. Frequent inhalation of cannabis mixed with tobacco is apparently more harmful to the nasal fossae and perinasal sinuses than is tobacco alone. Moreover, the incidence of thicker and more purulent rhinorrhea, severe edema, and more severe chronic rhinosinusitis is higher after prolonged consumption of cannabis when compared with tobacco consumption alone[17]. Inhaled cannabis similarly causes inflammation of the upper and lower airways. Although the activation of CB1 receptors in the nasal mucosa and lung promotes an immediate anti-inflammatory state, long-term exposure to combustion products induces a generalized state of tissue inflammation, which overrides the anti-inflammatory potential of cannabinoids[17].

Another problem is that regular cannabis consumption is associated with the prevalence8 and exacerbation of tinnitus. Although this relationship is complex and its effects are not entirely understood[8], CB1 and CB2 receptors of the endocannabinoid system are expressed in the cochlear nucleus. The CB1 receptors are partial agonists of exogenous THC that downregulate glutamate release and this mechanism appears to be responsible for neuronal hyperactivity and the consequent onset and exacerbation of tinnitus[20]. The consumption of cannabis does not appear to have acute effects on audition or vestibular function. However, chronic smokers might have significantly altered vestibular function[9].

Another issue of concern is that inhaled cannabis can potentially damage the vocal cords. Individuals who inhale cannabis experience negative effects on the voice, and the vocal cords become visibly darker, erythematous, edematous, and dysphonic. Such conditions should be evaluated by laryngoscopy complemented by stroboscopy particularly in chronic smokers, to determine laryngeal structures and vocal cord vibrations[14].

Irregular and infrequent cannabis use is not a risk factor for head and neck cancer[15]. However, long-term use is associated with an increased risk of laryngeal cancer. Thus, its consumption may be a major risk factor for aggressive laryngeal cancer at an early age[9]. A relationship between cannabis inhalation and other head and neck cancers is also suspected since its combustion products include carcinogens similar to those found in tobacco. In addition tobacco exposure is common with recreational cannabis consumption and tobacco, by itself, is a major risk factor for such cancers[15]. However, these associations are complex considering the impact that the combined use of tobacco and alcohol have on the risk of developing head and neck cancers[15]. Moreover, a causal association between cannabis consumption and oropharyngeal cancer has been documented[15]. Cannabis use is a risk factor for oral infection by human papillomavirus (HPV) and associated oral lesions. This is explained by the behavioral risk factors allegedly associated with the typical population that consumes cannabis. Because HPV is a risk factor for head and neck cancers, specifically oropharyngeal cancer, a causal relationship with cannabis has been suggested[9]. The carcinogenic potential of cannabis inhalation is difficult to assess, however its inhalation is still appointed as a potential source that might be associated with the incidence of head and neck cancer[9].

Impact of research into cannabis consumption

The medicinal use of cannabis has advantages and benefits for some diseases. However, the use of this substance carries risks[19].

The correlation between airway problems and cannabis inhalation is not linear, unlike that with tobacco. However, the combined consumption of cannabis and tobacco is a frequent practice and a major source of problems. In fact, investigations into the deleterious effects of cannabis have focused on its relationship with psychosis and with the lower respiratory tract, while the effects on the upper respiratory tract have been sidelined[17]. Tobacco smoke is a mixture of pharmacologically active, toxic, and carcinogenic molecules[16]. Cannabis exerts a potent inflammatory action on the airways because of the high concentrations of irritants contained in its smoke[17], such as polycyclic aromatic hydrocarbons (benzopyrene and benzanthracene), acetaldehyde and formaldehyde, carbon monoxide, nitrosamines, and ammonia[14,17].

Despite the medicinal properties of cannabis that are especially useful for treating symptoms associated with chronic diseases, the use of this drug and its adverse effects require serious consideration. More investigation into the negative effects of cannabinoids on ENT-related diseases is needed on behalf of patients who benefit from its effects via inhalation. We need to understand how to maximize its beneficial properties while minimizing risks associated with inhalation for those patients as well as for recreational users. Currently, the development of specific medical devices such as vaporizers approved by the relevant regulators allows the administration of almost carcinogen-free cannabis via the respiratory route, and thus the elimination of the carcinogenic potential of smoked cannabis[21]. Hypothetically, a deeper understanding of the dangers inherent to cannabis

inhalation should result in its consumers becoming more aware of the risks and, consequently, may promote more conscientious consumptions. Considering the wave of legalization that is sweeping across developed countries with increasing social acceptance and permissiveness regarding its use, both cannabis consumption and the number of consumers will probably increase in the near future. A greater knowledge of the potential negative impact of cannabis use on humans is also needed. Countries where cannabis has been legalized have unique opportunities to regulate different aspects of cannabis consumption and to inform and educate consumers about public health goals. The poor understanding of the adverse effects of cannabis is associated with an increase in the prevalence of its use. Thus, further investigation into the long-term effects of cannabis on health should be promoted.

Moreover, the variety of commercially available products substantially increases the likelihood of negative consequences due to the lack of adequate regulation. Additional vigilance of the products that appear on the market and of the most prevalent consumption patterns is therefore recommended.

Regarding otorhinolaryngology it is pivotal to understand how patients smoke cannabinoids, whether in the form of a joint or with the aid of medical devices such as vaporizers; Thus, more data about consumption habits should be collected and properly documented to facilitate a more accurate evaluation of the impact of cannabis legalization on health and on society in general. The aim is to improve educational policies and provide adequate information about the potential negative effects of cannabis inhalation.

CONCLUSION

The study of cannabis use and its impact on health and welfare has the potential to unveil endless discoveries. The currently increasing accessibility to cannabis is a new reality and a step forward for individual freedoms. Inevitably, greater freedom goes hand in hand with increased responsibility to make the most appropriate and conscientious choices. Thus, information about the consequences of specific choices must be clear, robust, and accurate. More knowledge in this area can lead to the implementation of health education policies based on more complete and reliable data about the benefits and risks of cannabis consumption. Moreover a greater personal awareness of the consequences of individual consumption might arise. As such, further studies in this area are needed, given the scarcity of data compared with other relevant areas in medicine. Investment and interest in this topic, which is very relevant to today's society, should be promoted because research needs to be adjusted to the needs of modern societies and the new realities that arise within them.

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Conflict of Interest

The authors declare no conflict of interest regarding this article.

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Availability of scientific data

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