RESEARCH ARTICLE

CANNABIS CONSUMPTION AND THE MOST FREQUENT HEALTH PROBLEMS IN PEOPLE WITH HIV: A QUANTITATIVE-QUALITATIVE-MIXED APPROACH

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Abstract: People with HIV face multiple illnesses derived from psychological, social, behavioral and medical factors., the health problems they face include sleep disturbances, anxiety, depression, malnutrition and tuberculosis. Thus, they resort to the use of substances as an alternative to solve these problems or to improve their quality of life. There is evidence of cannabis use to treat HIV symptoms such as nausea, lack of appetite, pain and anxiety. However, governments have not approved its use because the benefits must be greater than the risks of its consumption. The present study was designed to determine the association of cannabis consumption with the most frequent health problems in people with HIV in order to establish if cannabis consumption has a protective or risk effect. Material and methods: The methodology used in this study was qualitative based on the development of health surveys for people with HIV, and logistic regression analysis to model the association among health variables. Results: Participants who reported frequent cannabis use are convinced that the benefits of cannabis use in their health condition are greater than the risks. This plant is attributed effects on the control of hypertension, diabetes, anxiety, sleep disturbances and depression. Conclusions: There is an association among the variables under study, although it was not possible to sustain it statistically. It should be noted that a risk association was found between the use of cannabis and tuberculosis (aOR 9.32 $p < 0.05$).

Keywords: Cannabis consumption, Health, HIV, Risk factors, Tuberculosis, Qualitative methodology

INTRODUCTION

The human immunodeficiency virus (HIV) is the causative agent of AIDS, a condition that without proper medical management can lead to the deterioration of the immune system of people with HIV and consequently to the development of comorbidities that put their health at risk.

People with HIV face multiple illnesses derived from psychological, social, behavioral and medical factors., the health problems they face include sleep disturbances, anxiety, depression, malnutrition and tuberculosis to name a few (Pedroza-Escobar *et al.,* 2016., *ibídem* 2017). People with HIV are more susceptible to malnutrition and opportunistic infections because of the natural history of HIV (published elsewhere). They have sleep disturbances., they do not sleep the same time quantity as a person without HIV (Lim & Thames, 2018)., nor in the same way as when they did not have HIV (Pedroza-Escobar *et al.,* 2017), as well as anxiety and depression (Pedroza-Escobar *et al.,* 2016). Whose mechanisms are not fully understood. However, these conditions make people with HIV resort to the search for alternatives (Pedroza-Escobar *et al.,* 2016) to help them solve these problems or to improve their quality of life, such as the use of substances like alcohol, tobacco and cannabis (Wardell *et al.,* 2018). Perhaps due to their relaxing,

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anxiolytic and antidepressant effects in the short term.

The prevalence of cannabis use is high in the general population and is the most commonly used drug among adults with HIV (Lim & Thames, 2018) whose uses includes both recreational and medicinal due to frequent reports of its potential to treat and manage HIV symptoms for instance nausea, lack of appetite, pain and anxiety (Lee *et al.,* 2019., Vidot *et al.,* 2017., Fogarty *et al.,* 2007., Musty & Rossi, 2001., Prentiss *et al.,* 2004). In population without HIV, some studies characterized the therapeutic use of cannabis., other studies associated the abuse of this plant with deleterious effects on the health of people (Tashkin & Roth, 2019). For example, inhaling cannabis interferes with the production of nitric oxide in lung macrophages, altering the pulmonary defense mechanisms and causing immunosuppression (Appendino *et al.,* 2008)., consequently, an increase in opportunistic infections. The effects of cannabis smoke on the respiratory mucosa include inflammation of the bronchial mucosa with a higher prevalence of acute and chronic bronchitis, alteration of the anti fungal and anti bacterial defenses of alveolar macrophages with predisposition to respiratory infections (Tashkin & Roth, 2019, Torres-Esteche, 2016).

The effects of cannabis are due to the concentration of tetrahydrocannabinol (THC) as it is the main component responsible for the psychoactive properties of the plant, properties, among which are the effects on the consumer's mood (ElSohly *et al.,* 2017). The frequency of cannabis users is much lower than the frequency of tobacco users (Arora *et al.,* 2016., Singh &Balhara, 2017). However, the way of inhaling it, is very different (Tashkin& Roth, 2019). This implies that the body retains more cannabis smoke products compared to a similar amount of tobacco (Tashkin, 2017). Some studies suggest that THC suppresses some cells of the immune system such as macrophages, T lymphocytes and natural killer cells. Other studies report that the use of cannabis is associated with the development of tuberculosis (Torres-Esteche, 2016., Rieder *et al.,* 2010., Reid *et al.,* 2010., French *et al.,*2019).

So the objective of this work was to determine the association of cannabis consumption with the most frequent health problems in people with HIV in order to establish if cannabis consumption has a protective or risk effect.

MATERIALS AND METHODS

The bioethics committee of the Facultad de Medicina of the Universidad Autonoma de Coahuila Unidad Torreon approved this study with reference number C.B/01-04-17.

Study design and data source: A cross-sectional design was implemented in this study, using criteria from the STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies. Used data was from an anonymous and self-administered survey designed to collect adequate data on substance use and health problems encountered by people with HIV conducted between September 2017 and March 2018. Typical completion time was 20 min (calculated from the precise completion time for each survey). No financial incentives were given.

Potential participants were recruited, directly from non-governmental organizations (NGOs) undertaking HIV prevention, using chain-referral sampling method in the cities of Torreon and Gomez Palacio, Mexico. A total of 170 surveys were submitted from men and women 19–79 years old. Of the 170 surveys, 32 (18.8%) were discarded due to data missing (more than 60% of the information), resulting in 138 surveys included in the analysis.

Questionnaire items used for this study focused the three following components:

1) Comorbidities: hypertension, diabetes, dyslipidemia, tuberculosis, sleep disturbances, anxiety and depression during the last 12 months., 2) Consumption of substances such as tobacco, alcohol and cannabis during the last 12 months., and, 3) The personal association between the consumption of substances and the aforementioned comorbidities.

The statistical analysis included descriptive statistics of the survey and a logistic regression analysis to validate the association between comorbidities and substance consumption reported by people with HIV. The multiple-choice questions included in the analysis of this work were those shown in Table 1.

Statistical analysis: The descriptive statistics of the survey's answers included proportions calculation and the inferential statistics included logistic regression analysis to model the association among variables. The backward method was used and the adjusted Odds Ratio (aOR) with its respective confidence intervals (95% CI). The Hosmer-Lemeshow test of goodness of fit proved the model's calibration. The values considered significant were those where $p < 0.05$ calculated with IBM SPSS 21 and GraphPadPrism 6 software.

RESULTS AND DISCUSSION

According to the personal perceptions of the participants, Cannabis users attribute to cannabis, effects on the control of hypertension, diabetes and anxiety. Non-cannabis users, on the other hand, attribute to cannabis effects on sleep disturbances and depression. As shown in Table 2. Consistent results were found through the X2 independence test (although not statistically significant)., However, cannabis consumption was identified as a risk factor for dyslipidemia, tuberculosis, sleep disturbances and depression (only the association with tuberculosis being statistically significant) as shown in Table 3.

Finally, through logistic regression analysis including 76.8% of the participants, the magnitude of the associations found for the case of tuberculosis and sleep disturbances increased to such an extent that cannabis consumption is considered a risk factor for these variables (aOR 9.32 and 2.79, respectively). In the case of dyslipidemia, anxiety and depression, the magnitude of the association decreased to such an extent that cannabis consumption is considered a protective factor for these variables (aOR 0.83, 0.70 and 0.78, respectively). In this model, the association on hypertension disappeared and the association on diabetes was excluded to include the largest number of participants in the model, as shown in Table 4.

Table 1. Multiple-choice questions included in the analysis.

Question
During the past 12 months, has a doctor told you that you have high blood pressure or hypertension?
During the past 12 months, has a doctor told you that you have diabetes or high blood sugar?
During the last 12 months, have you done in any health unit a blood test of high cholesterol or high triglyceride detection?
During the past 12 months, has a doctor told you that you have tuberculosis?
How often do you feel worry, fear or nervousness so strong that it interferes with your daily activities?
How often do you feel sadness, loneliness, discouragement, hopelessness or disinterest in your daily activities?
During the past 12 months, have you had trouble falling asleep, sleeping less than 6 hours, or waking up frequently at night?
How often do you smoke tobacco cigarettes?
How often do you drink alcoholic beverages?
During the past 12 months, have you used cannabis?
Of the following assertions select which one (s) you agree with
Cannabis use helps to control diabetes or high blood sugar.
Cannabis use helps to control high blood pressure or hypertension.
Cannabis use helps to control high cholesterol or triglycerides.
Cannabis use helps to control tuberculosis.
Cannabis use helps to control worry […]
Cannabis use helps to control sadness […]
Cannabis use helps you to fall asleep […]
Mutually exclusive possibleanswers
Yes, Almost always / Weekly, Sometimes / Monthly, No / Never, I do not know.

Table 2. Perceptions between comorbidities and cannabis consumption.

	Is the participant a cannabis user?		
	Yes n = 16	No n = 104	*p-value* [a]
Cannabis use helps to control...			
Hypertension	1 (6.25%)	0 (0%)	0.010
Diabetes	13 (81.25%)	42 (40.38%)	0.002
Dyslipidemia	3 (18.75%)	17 (16.34%)	0.809
Tuberculosis	9 (56.25%)	60 (57.69%)	0.913
Sleepdisturbances	5 (31.25%)	70 (67.30%)	0.005
Anxiety	16 (100%)	84 (80.76%)	0.054
Depression	4 (25%)	75 (72.11%)	<0.001
a. Z-test of proportions difference.			

Table 3. Association between comorbidities and substance consumption.

	Substancesused[a]		
	Tobacco n = 50	Alcohol n = 80	Cannabis n = 16
Comorbidities[b]	OR (*p-value*[c])	OR (*p-value*[c])	OR (*p-value*[c])
Hypertension (n=17)	0.20 (0.031)	1.08 (0.906)	0.37 (0.340)
Diabetes (n=10)	0.48 (0.303)	0.64 (0.559)	0.66 (0.714)
Dyslipidemia (n=64)	0.72 (0.425)	1.51 (0.370)	1.28 (0.667)
Tuberculosis (n=11)	1.58 (0.509)	1.35 (0.713)	4.40 (0.040)
Sleepdisturbances (n=43)	1.08 (0.844)	2.58 (0.061)	2.45 (0.100)
Anxiety (n=52)	1.33 (0.470)	2.18 (0.098)	0.85 (0.788)

Depression (n=69)	0.86 (0.718)	2.59 (0.033)	1.18 (0.757)

a. These categories were not mutually exclusive. b. These categories were mutually exclusive. c. X^2 independence test.

Table 4. Risk factors associated with Cannabis consumption.

Variables[a]	Logistic regression analysis (n = 106)		
	aOR	95%CI	p-value
Hypertension (n = 131)	0	0	0.998
Dyslipidemia (n = 121)	0.83	0.24-2.92	0.781
Tuberculosis (n = 126)	9.32	1.07-81.15	0.043
Sleep disturbances (n = 126)	2.79	0.75-10.27	0.122
Anxiety (n = 124)	0.70	0.14-3.52	0.672
Depression (n = 126)	0.78	0.16-3.85	0.768

( ) Participants included in the analysis. aThe reference category in the analysis of risk factors was the absence of such risk factors. aOR adjusted Odds Ratio. CI confidence interval.

Current reports estimate high frequencies of substance users' worldwide (Chavan *et al.,* 2019). Substances such as alcohol, tobacco and cannabis have been widely used by people for various reasons despite their known ill effects. The main factor leading as reason reported for using such substances is relief from psychological stress (Arora *et al.,* 2016)., as forms of 'self-medication' to manage psychological distress (Jaisoorya *et al.,* 2016). Other findings suggest that cannabis use has an association with mood and anxiety spectrum disorders (Singh and Balhara, 2017).

People with HIV also face this substances consumption (Wardell *et al.,* 2018). Specifically speaking of cannabis consumption, this is prevalent among people with HIV by the potential benefit of its consumption for HIV symptom management, but evidence regarding the impact of cannabis in people with HIV is limited (Lee *et al.,* 2019). Recent studies demonstrate an inverse relationship between sleep health and cannabis consumption (*p=0.03,* Lim & Thames, 2018), which is consistent with our findings (aOR 2.79 however not statistically significant).

The two main forms of cannabis are: 1) Marijuana - made from dried leaves and flowers of the female plant., and, 2) Hashish - made from the resin obtained after compressing leaves and flowers of the female plant.

The chemical compound responsible for the pharmacological properties attributed to cannabis is THC (ElSohly *et al.,* 2017). However, there are different ways of consuming cannabis that affect the concentration of THC supplied to the body. The main way to use cannabis is to smoke cigarettes that include many substances similar to those of tobacco (except nicotine) for example: ammonia, hydrocyanic acid, nitrosamine, phenolic compounds, naphthalene, benzopyrenes, bezanthracens, terpenoids, carcinogens, among others (Tashkin& Roth, 2019., Torres-Esteche, 2016., Sheehan *et al.,* 2018., Chatkin*et al.,* 2017).

Although recent studies associate cannabis consumption with an improvement in the inflammatory state of people with HIV, quality of sleep and anorexia (Vidot*et al.,* 2017., Baron *et al.,* 2018), it is important to consider the effects that cannabis cigarette smoke has on the lung health of the users.

The harmful effects of tobacco smoke are well known, but there is less information about the effects of cannabis smoke on health. People who smoke a lot of cannabis are also likely to damage their lungs because the smoke contains many of the same chemical substances that tobacco smoke has. They expose their lungs to a greater amount of smoke because they tend to inhale more deeply, smoke without filters and hold their breath when they inhale (Tashkin& Roth, 2019., Tashkin, 2013). Consequently, smoking cannabis is associated with symptoms similar to tobacco use such as chronic bronchitis and inflammation of the airways, increased cough, sputum, wheezing and dyspnea (Tashkin & Roth, 2019., Chatkin *et al.,* 2017., Ribeiro & Ind, 2018).

The regular consumption of inhaled cannabis can cause inflammation of the airways, epithelial lesion and alveolar macrophage damage., which may predispose to the development of respiratory infections (Tashkin& Roth, 2019., Torres-Esteche, 2016). Some authors suggest that there is a defect in the bactericidal and fungicidal activity of alveolar macrophages in cannabis smokers, which could be explained by the immunosuppressive effect of THC (Torres-Esteche, 2016., Tashkin, 2013).

Tobacco use is associated with an increased risk of developing tuberculosis, while variations in the method of smoking cannabis are associated with an increased risk of tuberculosis transmission (French *et al.*, 2019., Oeltmann *et al.*, 2006., Rossato-Silva *et al.*, 2018., Lin *et al.*, 2016., Alvarez-Licona *et al.*, 2015).

CONCLUSION

The group of participants who reported consuming cannabis frequently is convinced that the benefits on

the damages of the use of cannabis in their state of health are greater. There is a denying attitude about the harmful effect of the use of cannabis or its risk to health (Alvarez-Licona et al., 2015). This plant is attributed effects on the control of hypertension, diabetes, anxiety, sleep disturbances and depression ($p < 0.05$ personal perception). However, through univariate logistic regression analysis, it was not possible to sustain such assertions., thus, an association against hypertension, diabetes and anxiety., and, association of risk on dyslipidemia, sleep disturbance and depression was calculated. Nevertheless, they were not statistically significant ($p > 0.05$). It should be noted that in the regression model there was a statistically significant risk association between the use of cannabis and tuberculosis (aOR 9.32 $p < 0.05$).

Although it was not possible to statistically document the benefits, social stigma towards cannabis users, the illegality of this plant, the problems to quantify its use, the combination of this plant with other substances and the number of participants must be considered., variables that could underestimate the prevalence of consumption as well as the magnitude of the calculated association measures.

The main limitation of this work consists in the difficulty of establishing consumption parameters to differentiate between medicinal or therapeutic use, recreational and abuse in consumption because the results were self-reported.

Conflict of interest / competing interests

The authors declare no conflict of interest, financial or otherwise.

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