

ORAL AND PERIODONTAL CHANGES IN CANNABIS USERS

ОРАЛНИ И ПАРОДОНТАЛНИ ПРОМЕНИ КАЈ КОРИСНИЦИ НА КАНАБИС

Toshevska S.¹, Janev E.², Redjep E.³, Pandilova M.⁴

¹Department of Oral Pathology and Periodontology, Faculty of Dentistry, UKIM, Skopje, Macedonia, ²Department of Oral Surgery, Faculty of Dentistry, UKIM, Skopje, Macedonia, ³Department of Oral and Maxillofacial Surgery, European University, School of Dental Medicine, Macedonia, ⁴Department of Oral Pathology and Periodontology, Faculty of Dentistry, UKIM, Skopje, Macedonia

Abstract

Background: Non-medical abuse of Cannabis may cause adverse effects on general as well as on oral health. Oral health issues related to cannabis use have been addressed concerning oral soft tissue changes and prevalence of oral cancer yet, data on periodontal involvement are still poorly documented. Aim of the study. was to determine the effects on oral and periodontal health, mouth dryness and infection with *Candida albicans* in patients who regularly use cannabis in comparison to tobacco smokers. **Materials and methods.** Clinical examination of the oral mucosa and periodontal examination regarding the attachment lost on all four surfaces on lower premolars (if missing lower molars) was performed in a total of 90 patients (40 marijuana users and 50 only tobacco users). Gingival bleeding upon probing and inflammation was noted according to Silness and Loe. Mouth dryness, *Candida albicans* presence and lesions of oral mucosa were also noted. **Results.** In our study we found significantly higher gum inflammation, bleeding upon probing, higher attachment lost, presence of candida and mouth dryness, leukoplakia and gingival enlargement in the cannabis users group. **Conclusion.** There is an increased presence of *Candida albicans*, mouth dryness, increased attachment lost as well as bleeding on probing and inflammation of the gums in cannabis users compared to the smokers. **Key words:** cannabis, smoking, gingival and periodontal changes, salivary flow rate, candida infection

Апстракт

Бројот на корисници на канабис постојано расте во светски рамки, па се смета дека 2,5% од светското население користи некоја форма на канабис. Со оглед на се поголемиот број на корисници спроведовме испитување со цел да ги согледаме ефектите врз оралната слузница како и врз пародонталното здравје кај корисниците на марихуана. За реализација на поставената цел оформивме група од 90 испитаници од кои 40 пушачи и корисници на марихуана повеќе од 5 години и контролна група составена од 50 пушачи. Испитаниците беа селектирани така да имаат приближно ист плак индекс. Беа одредени гингивални и пародонтални индекси како и преглед на оралната слузница кај двете групи. Од добиените резултати може да се заклучи дека кај групата корисници на марихуана беа најдени сигнификантно повисоки индекси на гингивална инфламација крварење и губиток на припој како и присуство на сувост на устата и *Candida albicans* само кај еден испитаник беше најдена гингивална хиперплазија и леукоедема.

Introduction

The use of cannabis started with the beginning of the civilization, especially for clothes, food and medication. Cannabis preparations derive from a plant called *Canabis sativa*, which contains a unique group of chemicals with more than 60 types of cannabinoides. The main psychoactive constituent is 9 - tetrahydrocannabinol (THC)¹.

There are three forms of cannabis: marijuana, hashish and hash oil. After tobacco, marijuana is the second most commonly used smoking product. Among illegal drugs, it is also the most commonly used product. It has been reported that 2.5 % of the world population

consumes cannabis on regular basis. With the rising likelihood of cannabis use in youth culture and lifestyle arises an even bigger concern such as the noted decline in the age of first-time users of cannabis compared to other drugs, as well as the fact that marijuana is considered to be the least risk providing drug among the youth¹.

However, the discovery of beneficial health effects of these components prompted research in the medical use of cannabis or even legalization of cannabis use in some countries. Although cannabis has such beneficial effects, non-medical abuse of this product may cause adverse effects on general as well as on oral health. Oral health issues related to cannabis use have been addressed concerning oral soft tissue changes and preva-

lence of oral cancer yet; data on periodontal involvement are still poorly documented.

Aim of the study

The aim of this study was to determine the effect on oral and periodontal health, mouth dryness and candida infection in patients who regularly use cannabis in comparison to tobacco smokers.

Material and methods

Participant selection

Exactly 90 participants, mainly men aged between 16-35 years, took part in the examination.

Group 1/ Control group: tobacco smokers

Group 2/ Examined group: tobacco and cannabis smokers

Participants of the examined group had to meet the following criteria:

- To have used cannabis in the last 5 years
- They claimed not to have any other addictions
- They use cannabis at least once a week.

In order to exclude tobacco effects, a control group was formed of regular tobacco smokers who claimed to:

- have smoked cigarettes in the last 5 years
- have never used cannabis
- have smoked at least 20 cigarettes a day

The average age for both groups was 25±2. In terms of gender representation in the examined group, only 3 women participated and in the control group 9. Participant selection was also conducted according to plaque index. All participants had average plaque score between 1 and 2 according to the Green-Vermilion index.

When we interviewed the participants we found out that they all use marijuana in the same way. Namely, they mix marijuana with tobacco, to enhance burning and afterwards it is rolled up and smoked. All of the subjects were smokers. The subjects were aware of the nicotine effects on periodontal and oral health so we decided to form a control group of smokers who had never used cannabis in order to distinguish the effects of nicotine from cannabis. In the formation of the control group we were faced with another problem, periodontal involvement is largely caused by plaque accumulation, so it was necessary to select a group with an approximately equal plaque index.

Clinical examination of the oral mucosa and periodontal examination regarding the attachment loss on all four surfaces on the lower premolars (and if missing, on

lower molars) was performed. Gingival bleeding upon probing and inflammation was noted according to Sillnes and Loe. Special attention was paid to mouth dryness, loss of taste, paresthesia, microbiological findings of candida albicans, white changes of the buccal mucosa and gingival enlargement.

The measurement of the dental plaque was done according to Green-Vermilion index on teeth no. 16, 11, 26 and 31 on the vestibular side and oral surfaces of teeth no. 36 and 46.

The detection of presence of Candida albicans was done by Buchwald and lingual swab. The samples were analyzed by light microscopy on native preparation. Mouth dryness was self-reported by the patient and a test of dental mirror stickiness was performed.

Periodontal examination was conducted and an assessment of attachment lost on all four surfaces on lower premolars if missing lower molars.

Data were processed using the Computer program Statistika 6.0

Results

The results of the gingival inflammation and bleeding upon probing are given in Table 1. Gingival inflammation showed a higher rate in the examined group – 2.46 versus 1.40 in the control group, with a t value of 6.71.

The values of bleeding on probing in the examined versus the controlled group were 2.76 and 1.56 respectively with a t value of 11.30 showing that the bleeding on probing was much higher in the examined group versus the control group.

Table 1. Gingival index values for the controlled and the examined group

| | Gingival inflammation | Bleeding upon probing |
|----------------|-----------------------|-----------------------|
| Control group | 1.40 | 1.56 |
| Examined group | 2.46 | 2.76 |
| t | 6.71 | 11.30 |
| p | <0.001 | <0.001 |

Table 2. shows attachment lost on different surfaces, all measured on lower premolar teeth, and if missing, on lower molars. The attachment lost was much higher in the cannabis group with the highest rates of significance on distal, lingual, buccal and the least on mesial surface of the teeth.

Table 2. Mean values for attachment lost on different surfaces of lower premolar teeth of the controlled and the examined group

| | Mesial (mm) | Distal (mm) | Buccal (mm) | Lingual (mm) |
|---------|-------------|-------------|-------------|--------------|
| Group 1 | 1.7±0.63 | 2.33±0.96 | 3.05±0.23 | 2.02±0.05 |
| Group2 | 3.11±1.79 | 4.03±0.25 | 5.02±1.92 | 3.06±0.12 |
| t | 5.12 | 10.20 | 5.16 | 6.81 |
| p | <0.001 | <0.001 | <0.001 | <0.001 |

Table 3. Oral changes in both groups

| | Mouth dryness | Candida albicans | White changes | Gingival enlargement |
|------------------|---------------|------------------|---------------|----------------------|
| Group 1 tobacco | 23.30% | 3.45% | | |
| Group 2 cannabis | 52.50% | 43.25% | 2.2% | 2.2% |

Oral changes are shown in Table 3.

Mouth dryness and candida albicans were found to be higher in the cannabis group as well. White changes and gingival enlargement were absent in the tobacco group while 2.2 % of the cannabis group had both white changes and gingival enlargement.

Discussion

Since cannabis use has an increasing trend among the world population, the negative effects of the drug on the general physical health is a major concern. Almost all of the body systems are affected from the use of cannabis (the effect is mainly associated with its administration route and dosage in addition to the present general health condition of the user)².

However, our study was focused mainly on oral changes and periodontal involvement in long term regular marijuana users. We did expect to find higher scores of periodontal destruction since cannabis and its analogues are modulators of immune cell functions because of the high numbers of CB2 receptors distributed in the immune cells^{3,4}. Those receptors exhibit their immunosuppressive effects by suppressing lymphocyte proliferation and antibody production that emerges subsequent cytotoxic activity⁵. During these events, antibacterial effector molecules and nitric oxide are released and the activities of several other critical cytokines affecting macrophages function⁶. Macrophages play a key role in host defense during both gingival inflammation and periodontal destruction. The obtained higher values for gingival inflammation, bleeding on probing and attach-

ment loss in marijuana users compared to tobacco smokers confirmed our presumption of the destructive effects of marijuana on periodontal health.

Marijuana is the most commonly used drug for smoking mainly because it is easy to prepare it and its effects are rapidly received. Marijuana is inhaled with one – third greater volume and the subjects hold their breath four times longer compared to other tobacco products⁷. The smoke of marijuana includes similar carcinogens as the tobacco. Phenols and polycyclic aromatic hydrocarbons such as benzo[α]pyrene are some of the carcinogens present with higher concentrations in cannabis than in tobacco⁸. Therefore, it is safe to conclude that the exposition of oral mucosa to these compounds is greater than in tobacco users.

When compared with non-users, cannabis abusers have generally low oral health level involving higher amount of decayed, missed or filled teeth and increased plaque amounts with accompanying gingival or periodontal diseases⁹.

One of the important negative effects of cannabis is Xerostomia^{10,11}. Accordingly, its use may contribute to the risk of occurrence of several problems such as caries, periodontal problems and oral wounds¹¹. “Cannabis stomatitis” is one of the examples representing the findings of leukoedema of the buccal mucosa and hyperkeratosis caused by cannabis smoking. In our study, the presence of 2.2 % leukoedema and gingival enlargement was detected. The occurrence of Xerostomia was more frequent in cannabis users than in tobacco smokers (Table 3).

While the acute signs and symptoms of the effects of cannabis use are mainly irritation and feeling of superfi-

cial anaesthesia in the oral epithelium, sialostasia and xerostomia may also accompany these findings¹⁰.

According to the relevant literature, there is an increased prevalence of oral candidiasis and density of candida species in cannabis smokers¹², probably due to the residing hydrocarbons in marijuana that may provide energy for candida species¹. Craving for food, sugars are particularly well known marijuana effects used in anorexia treatments. Mouth dryness, poor oral hygiene and sugar consumption explain the prevalence of candida albicans in oral swabs taken from marijuana users (Table 3).

Conclusion

Taken together, our results lead us to a conclusion that:

- There is an increased presence of *Candida albicans*, mouth dryness in cannabis users compared to smokers.
- There is greater attachment lost and bleeding on probing as well as inflammation of the gums in cannabis users compared to the tobacco users.
- Marijuana users are more prone to oral and periodontal diseases.

Reference

1. Hall W, Degenhardt L. The prevalence and correlates of cannabis use in developed and developing countries. *Curr Opin Psychiatry* 2007; 20(4):393-7)
2. Ashton CH. Pharmacology and effects of cannabis: a brief review. *Br J Psychiatry* 2001;178:101-106.
3. Tashkin DP, Baldwin GC, Sarafian T, Dubinett S, Roth MD. Respiratory and immunologic consequences of marijuana smoking. *J Clin Pharmacol* 2002; 42:71S-81S.
4. Pacifici R, Zuccaro P, Pichini S. et al. Modulation of the immune system in cannabis users. *JAMA* 2003; Vol. 289:1929-1931.
5. Friedman H, Newton, C, Klein TW. Microbial infections, immunomodulation and drugs of abuse. *Clin Microbiol Rev* 2003; 16:209-219.
6. Chang YH, Lee ST., Lin WW. Effects of cannabinoids on LPS-stimulated inflammatory mediator release from macrophages: involvement of eicosanoids. *J Cell Biochem* 2001; 81:715-723.
7. Mia Hashibe, Daniel E. Ford, Zuo-Feng Zhang. Marijuana smoking and head and neck cancer; *J Clin Pharmacol* 2002; 42:103S-107S.
8. Hoffmann D, Brunemann K. D, Gori G.B, Wynder E. L. On the Carcinogenicity of Marijuana Smoke. *Recent Adv Phytochem* 1975; 9: 63-81.
9. Darling MR, Arendorf TM. Review of the effects of cannabis smoking on oral health. *Int Dent J* 1992; 42:19-22.
10. Darling MR, Arendorf TM. Effects of cannabis smoking on oral soft tissues. *Community Dent Oral Epidemiol* 1993; 21: 78-81.
11. Hubbard HR. Adverse effects of marijuana. In: Onaivi ES, ed. *Biology of marijuana: from gene to behaviour*. London: Taylor & Francis, 2002:622-623.
12. Darling MR, Arendorf TM, Coldrey NA. Effect of cannabis use on oral candidal carriage. *J Oral Pathol Med* 1990; 19:319-321.