

## **Cannabis Use: Weed My Lips**

<https://www.cdc.gov/marijuana/index.htm>

Professional resources and JADA articles search <https://www.ada.org/en/member-center/oral-health-topics/cannabis-oral-health-effects>

### **Canadian Dental Hygienists Association (CDHA)**

[https://www.cdha.ca/cdha/The\\_Profession\\_folder/Resources\\_folder/Fact\\_Sheets\\_and\\_Resources/CDHA/The\\_Profession/Resources/Fact\\_Sheet\\_and\\_Resources.aspx#tabs-1](https://www.cdha.ca/cdha/The_Profession_folder/Resources_folder/Fact_Sheets_and_Resources/CDHA/The_Profession/Resources/Fact_Sheet_and_Resources.aspx#tabs-1)

[https://files.cdha.ca/Profession/OhCanada/OhCanada\\_Winter\\_cannabis.pdf](https://files.cdha.ca/Profession/OhCanada/OhCanada_Winter_cannabis.pdf)

[https://www.cdho.org/Advisories/CDHO\\_Factsheet\\_Cannabis.pdf](https://www.cdho.org/Advisories/CDHO_Factsheet_Cannabis.pdf)

[https://www.dentalhygienecanada.ca/dhcanada/DHCanada/Substance\\_Use/Cannabis.aspx](https://www.dentalhygienecanada.ca/dhcanada/DHCanada/Substance_Use/Cannabis.aspx)

### **Articles**

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# Impaired in the Chair?

## Cannabis Use and Dental Hygiene Appointments

Cannabis use has many side effects that vary based on the person and potency. These can have implications for both oral health and professional dental hygiene care. In some cases, dental hygiene appointments may need to be rescheduled to minimize risk. Consider the following side effects:

### Fast heart rate and anxiety

Cannabis increases the heart rate and heightens anxiety. These side effects may worsen or last longer with anesthetics used for dental hygiene treatment.



### Confusion and lack of focus

Cannabis use before a dental hygiene appointment may impair judgement and the capacity to provide consent to treatment.



### Interaction with medications

Cannabis may alter the effectiveness of prescribed medications.



### Dry mouth and the munchies

Cannabis reduces saliva, leading to dry mouth. It also stimulates food cravings, which increase the amount of time your teeth are exposed to sugars. As a result, cannabis users have a higher risk of cavities, gum disease, and oral infections.

### Increased bleeding

Cannabis may increase bleeding and complicate dental hygiene care. Healing may also be affected.



**Have a conversation!**  
Cannabis use is an important part of the health record review.

# The Cannabis Use Disorder Identification Test - Revised (CUDIT-R)

Have you used any cannabis over the past six months? YES / NO

If YES, please answer the following questions about your cannabis use. Circle the response that is most correct for you in relation to your cannabis use *over the past six months*

1.	How often do you use cannabis?	Never 0	Monthly or less 1	2-4 times a month 2	2-3 times a week 3	4 or more times a week 4
2.	How many hours were you “stoned” on a typical day when you had been using cannabis?	Less than 1 0	1 or 2 1	3 or 4 2	5 or 6 3	7 or more 4
3.	How often during the past 6 months did you find that you were not able to stop using cannabis once you had started?	Never 0	Less than monthly 1	Monthly 2	Weekly 3	Daily or almost daily 4
4.	How often during the past 6 months did you fail to do what was normally expected from you because of using cannabis?	Never 0	Less than monthly 1	Monthly 2	Weekly 3	Daily or almost daily 4
5.	How often in the past 6 months have you devoted a great deal of your time to getting, using, or recovering from cannabis?	Never 0	Less than monthly 1	Monthly 2	Weekly 3	Daily or almost daily 4
6.	How often in the past 6 months have you had a problem with your memory or concentration after using cannabis?	Never 0	Less than monthly 1	Monthly 2	Weekly 3	Daily or almost daily 4
7.	How often do you use cannabis in situations that could be physically hazardous, such as driving, operating machinery, or caring for children:	Never 0	Less than monthly 1	Monthly 2	Weekly 3	Daily or almost daily 4
8.	Have you ever thought about cutting down, or stopping, your use of cannabis?	Never 0	Yes, but not in the past 6 months 2	Yes, during the past 6 months 4		

*This scale is in the public domain and is free to use with appropriate citation:*

Adamson SJ, Kay-Lambkin FJ, Baker AL, Lewin TJ, Thornton L, Kelly BJ, and Sellman JD. (2010). An Improved Brief Measure of Cannabis Misuse: The Cannabis Use Disorders Identification Test – Revised (CUDIT-R). *Drug and Alcohol Dependence* 110:137-143.



# Is the use of Cannabis associated with periodontitis? A systematic review and meta-analysis

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Recent studies have shown that there is also biological plausibility for a possible relationship between periodontal disease and Cannabis use, thus the aim of this study was to investigate whether the use of Cannabis is associated with periodontitis. Electronic searches were performed in PubMed, Scopus, ISI-Web of Science, BVS-Virtual health library and Scielo without restrictions. Search strategy was performed using relevant keywords considering the structure of each database. Longitudinal and cross-sectional studies that investigated the association between the use of Cannabis and periodontal disease were included. Meta-analyses and sensitivity analysis were conducted. A total of 143 records were found in the initial searches and five articles were included in the systematic review, being four studies included in the meta-analysis. Overall, 13 491 individuals were included, of which 49.5% were males. Three of included studies investigated the relationship between cannabis and periodontal disease in adults and the other two studies were performed in adolescents. A positive association was observed between the use of cannabis and periodontitis (PR 1.12 CI 95% [1.06-1.19]) with 19.0% of heterogeneity. The analysis of sensibility showed that none study influenced the results enough to change the pooled estimate. Regarding to the quality assessment, all studies presented high quality. The results of systematic review and meta-analyses demonstrate that the use of Cannabis is associated with a higher prevalence of periodontitis.

## KEYWORDS

cannabis, marijuana, periodontal diseases, periodontitis, review

## 1 | INTRODUCTION

Periodontitis is a chronic disease characterized by inflammation of support tissues of teeth with progressive loss of attachment and bone<sup>1</sup> causing limitations in function, aesthetic and a significant impact on the quality of life of individuals.<sup>2-4</sup> This disease affects about 11.2% of global population, being the sixth-most prevalent chronic disease in the world<sup>5</sup> and considered one of the main causes of tooth loss.<sup>6</sup> Considering that periodontitis is more prevalent in

elderly individuals and in view of worldwide (especially in developed countries) trend of population aging, an increase of periodontitis prevalence is expected in the near future.<sup>6,7</sup>

Based on the fact that tobacco smoke is a well-known risk factor to periodontitis—mainly due to decrease of oxygenation though the vasoconstriction of tissues caused by the nicotine<sup>8</sup>—recent studies have shown that there is also biological plausibility for a possible relationship between periodontal disease and Cannabis use.<sup>9-16</sup> A longitudinal study carried in a birth-cohort in New Zealand showed that

Cannabis smoking may also play an important role in periodontal disease even after controlling for biofilm presence—the main local factor to periodontitis development.<sup>13</sup> The relationship between Cannabis and periodontitis seems to be independently of the use of tobacco<sup>13</sup> although a synergic effect may be observed leading a higher prevalence of periodontitis among individuals that use both drugs.<sup>13,17</sup> Yet, in a study performed with rats it was observed that cannabis could interfere in osteoblast and osteoclast activity increasing alveolar bone loss in sites when the periodontitis is present.<sup>18</sup> However, the pathway through Cannabis act in the destruction of periodontal tissues is still not clear and some studies have shown contradictory results.<sup>9-15,18</sup>

Cannabis is one of the most commonly recreational drugs used in the world.<sup>19-21</sup> Considering only the United States of America, about 13.1% of the young individuals reported the use of Cannabis,<sup>22</sup> which highlights the importance of more investigations about their effects in terms of public health. Moreover, in recent years, discussions about legalization of Cannabis have been performed and several states and countries already have legalized its medical or recreational use.<sup>23</sup> Therefore, considering the high use of Cannabis in world population and their possible effect in periodontal tissues, the aim of present study was to perform a systematic review and meta-analysis in order to investigate if there is an association between the use of cannabis and periodontitis.

## 2 | MATERIAL AND METHODS

This study was registered in PROSPERO (International Prospective Register of Systematic Reviews) under protocol: CRD42017074680. This review was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline.<sup>24</sup>

### 2.1 | Review question and searches

To structure the research question (Is the use Cannabis associated with periodontitis?) the PICO model was applied.

- Participants/ population: Adolescents, adults, and elderly people.
- Intervention/exposure: Use of cannabis (Marijuana and Hashish)
- Comparator/control: Not use of Cannabis
- Outcome: Periodontitis (AAP—American Academy of Periodontology criteria or the presence of clinical attachment loss  $\geq 3$  mm)

Search strategy was performed using relevant keywords and entry terms related to MeSH Terms considering the structure of each database. The complete search strategy is detailed in the Table S1. Five databases were searched (PubMed, Scopus, ISI Web of Science, BVS—Virtual health library, Scielo), up to 18 November 2018. The retrieved records were uploaded into EndNote™ software (Thomson Reuters, Rochester, New York, NY) and a virtual library was build. Duplicate studies were identified and excluded. Two independent reviewers (LAC and MGC) read titles and abstracts of all papers. Inclusion criteria comprised studies with cross-sectional and longitudinal design, studies

that investigated the possible association between the use of Cannabis and periodontal disease in human populations. Any language restrictions or publication period were considered. Studies with case-control design, reviews, technical reports, case reports and series, abstracts from conferences, letters to the editor and qualitative studies were excluded. The grey literature was investigated manually in annals of International Association for Dental Research (IADR), periodontology conferences and congress.

The same reviewers read the full-text and judged the articles. In cases of disagreements, the same reviewers discussed until obtain a consensus. In cases of disagreement, a consensus was determined by a third reviewer (MBC).

### 2.2 | Data collection

Data extraction was performed independently by two reviewers (LAC and GC) and a predefined electronic spreadsheet was used. The following data were extract: Author, year, country, study design, sample, age, gender of sample, periodontal disease assessment and criteria, Cannabis use assessment and criteria, analytical approach, data analysis (values of crude and adjusted analysis and their respective confidence intervals), and co-variables.

### 2.3 | Quality of studies

Critical Appraisal Checklist for observational studies (Joanna Briggs Institute)<sup>25</sup> was used to assessment the methodological quality of papers. This tool presents 10-questions evaluating different points in the study, which should be answered with “No”, “Unclear” or “Yes”. Each answer “yes” correspond a one point, therefore the tool score ranges from 0 to 10. Studies scored with 0 to 3 are considered low quality; 4 to 6 are medium quality; and 7 to 10 are considered high quality. In order to classify the studies, two reviewers (LAC and MGC) classified independently the studies. Disagreements were healed through discussion until consensus was reached.

### 2.4 | Strategy for data synthesis

A meta-analysis was performed considering periodontitis as outcome and the use of Cannabis as exposure. In studies that presented more than one category for the outcome or exposure variable, it was considered the most severe category. For meta-analysis, it was included preferably the adjusted results. In cases that adjusted results were not reported, crude estimates were considered or calculated. When data were not available, authors were contacted. Prevalence ratio (PR) was used to measure effect size with 95% confidence intervals (CIs). Odds ratio measures presented in studies were converted to PRs throughout the formula proposed by Zhang and Yu:  $PR = \text{odds ratio} / (1 - \text{risk}_0 + \text{risk}_0 \times \text{odds ratio})$ , where  $\text{risk}_0$  is the prevalence of disease among non-exposed individuals.<sup>26</sup> Fixed and random-effects model were used to evaluate the association between use of Cannabis and Periodontitis. Heterogeneity was evaluated with the I<sup>2</sup> statistic and considered when I<sup>2</sup> was higher than 50%. In order to

observe the effect of each study on the pooled estimate, sensitivity analysis was used. All analyses were conducted using Stata 14.0 software (StataCorp, College Station, TX).

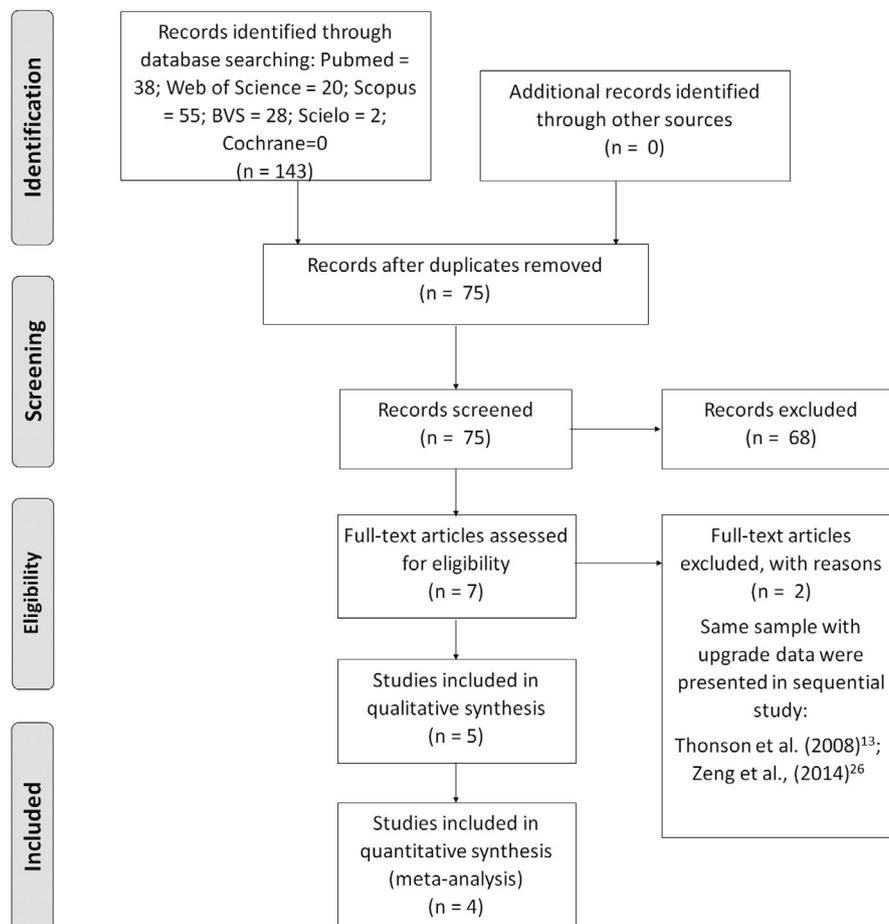
### 3 | RESULTS

A total of 143 records were found in the initial searches. After exclusion of duplicates, 75 papers remained for the title and abstract screening (Figure 1). Sixty-eight studies were excluded and seven studies were included for full-text reading. After the second screening, two studies were excluded<sup>13,27</sup> because the same sample with upgrade data were presented in sequential study.<sup>28</sup> Thus, five articles were included in the systematic review and four studies were included in the meta-analysis. The data on overall sample in Lopez and Baelum<sup>14</sup> study was not available. The author showed perform a stratified analysis by time of marijuana use and frequency of smoking. Consequently, we did not include the study in the meta-analysis.

Table S2 shows the main characteristics of the included studies. Overall, 13 491 individuals were included, of which 49.5% were males. The studies were conducted in New Zealand,<sup>28</sup> Chile,<sup>14</sup> Australia,<sup>29</sup> United States of America,<sup>17</sup> and in the Puerto Rico.<sup>30</sup> The design of most studies was cross-sectional<sup>14,17,29,30</sup> although one was prospective from a birth cohort.<sup>28</sup> Sixty percent of the

studies were population-based<sup>17,28,30</sup> while one was conducted with high school students<sup>14</sup> and another with Aboriginal communities of Australia.<sup>29</sup> Most of studies investigated the relationship between cannabis and periodontal disease in adults<sup>17,28,30</sup> and two studies were performed in adolescents.<sup>14,29</sup>

Periodontal disease was clinically assessed combining measurements of probing depth and attachment loss. Different criteria were adopted in the studies. The CDC/AAP (Center for Disease Control and Prevention/American Academy of Periodontology) was used in three studies.<sup>17,29,30</sup> The others used the presence of clinical attachment loss  $\geq 3$  mm<sup>14</sup> and  $\geq 1$  site with attachment loss  $\geq 5$  mm.<sup>28</sup> The use of Cannabis was assessed by self-report with different categorization in relation to frequency of the use: No ("never or only tried it once") and Yes ("used to smoke, but not any more" or "still smoke sometimes")<sup>29</sup>; Yes (Use marijuana or hashish  $\geq$  once per month for the last 12 months) and No (less than once per month)<sup>17</sup>; Lopez and Baelum<sup>14</sup> question the individuals about "Ever use of cannabis" (yes/no) and "Regular use of cannabis" (yes/no); Similarly, Ortiz et al<sup>30</sup> used the self-report being classified in: no use (never/once in lifetime), occasional use, and frequent use ( $\geq 26$  times during the lifetime,  $\geq 6$  times during the past year, and  $\geq 2$  times during the past 30 days); and only Meier et al<sup>28</sup> investigated the Cannabis dependence diagnostic (diagnosed at 1 wave, diagnosed at 2 waves, and diagnosed at 3 or more waves). Regarding to the quality assessment, all studies presented were of high quality (Table 1).



**FIGURE 1** Prisma flow diagram

Study	NIH criteria										Final score
	1	2	3	4	5	6	7	8	9	10	
Lopez and Baelum <sup>14</sup>	+	+	+	+	+	+	+	-	+	+	High quality <sup>9</sup>
Jamieson et al <sup>29</sup>	+	+	+	+	-	+	/	-	+	+	High quality <sup>7</sup>
Meier et al <sup>28</sup>	+	+	+	-	+	+	/	+	+	+	High quality <sup>8</sup>
Shariff et al <sup>17</sup>	+	+	+	+	-	+	/	+	+	+	High quality <sup>8</sup>
Ortiz et al <sup>30</sup>	-	-	+	+	+	+	/	+	+	+	High quality <sup>7</sup>

+, Yes; -, No; /, Unclear.

Four studies were included in the meta-analysis. A positive association was observed between the use of cannabis and the presence of periodontal disease (PR 1.12 CI 95% [1.06-1.19]). A 19.0% of heterogeneity was found. For this reason, it was not necessary to employ the randomized model (Figure 2). In order to evaluate the influence of included studies in the present results, the sensibility analysis was performed (Figure 3). None study influenced the results enough to change the pooled estimate. Publication bias could not be analyzed because less than 10 publications were included in the review.

## 4 | DISCUSSION

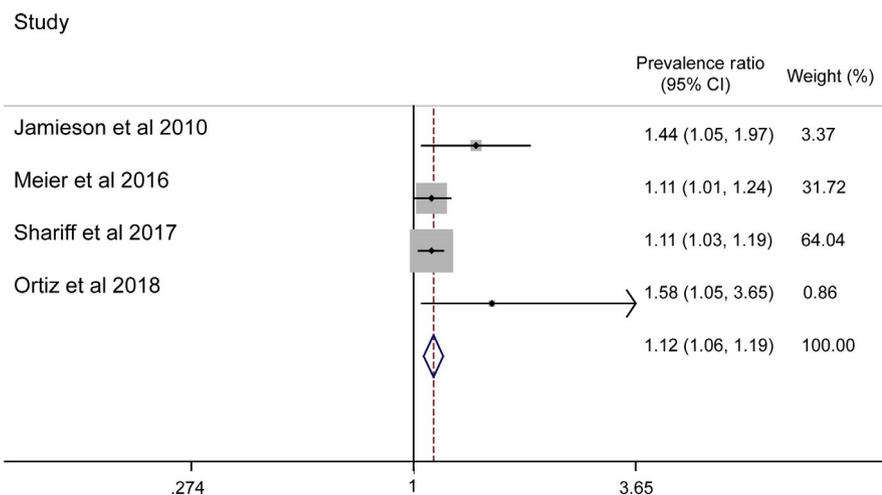
To the best of our knowledge, this is the first systematic review and meta-analysis investigating the association between the Cannabis use and periodontal disease. The present findings showed that individuals who use Cannabis presented a higher prevalence of periodontitis when compared with those individuals who not use. Moreover, the findings from sensitivity analyses strengthen the robustness of our results showing a consonance between data, although most of evidence is provided from cross-sectional studies.

Cannabis presents about 400 compounds (around 60 Cannabinoids), differing from the cigarette just by the presence of Cannabinoids and absence of nicotine.<sup>31</sup> The compound with highest psychoactive action is the *delta 9-tetrahydrocannabinol*,

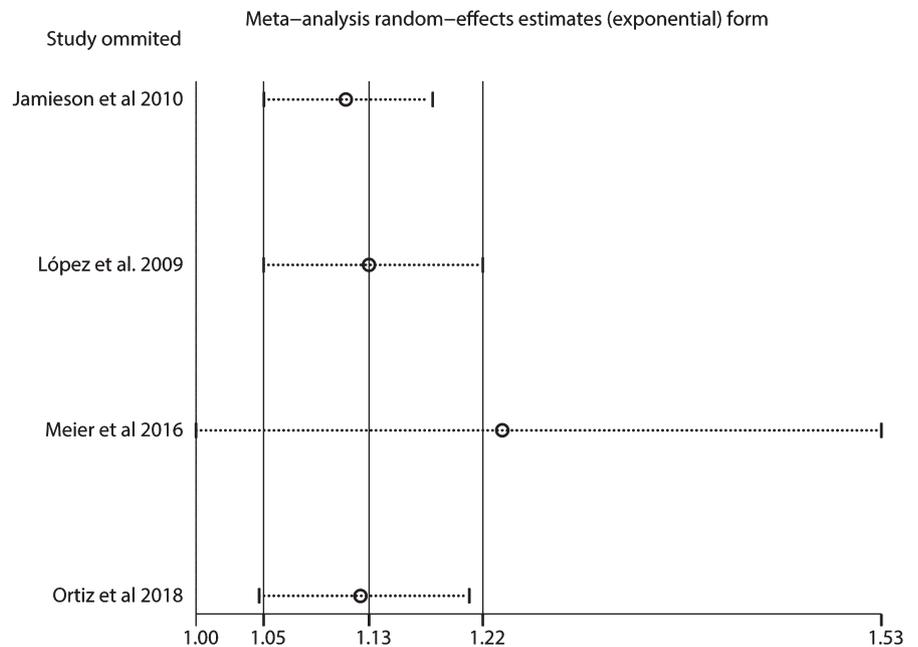
which also presents anticonvulsant, immunosuppressant and anti-inflammatory properties. The *delta 9-tetrahydrocannabinol* is an agonist to the CB1 and the CB2 receptors, two receptors-specific-cannabinoids. The CB1-receptor has been found in cells of several animals including rat, pig, dog, and monkey, which mediates the cannabinoid psychotropic, analgesic and orectic effects.<sup>32</sup> The CB2-receptor has been found in the macrophages, spleen and in immune cells,<sup>33</sup> which may explain the action in the immune response since it has been replicated in the regulation of liver fibrosis and atherosclerosis.<sup>32</sup> The endocannabinoid system comprehends the receptors CB1 and CB2-receptors as well as several enzymes and ligands, which present an action in appetite and pain suppression. These endocannabinoids also act modifying the cytokine release and inhibiting T-cells, hence, modeling the immune response of organism.<sup>34</sup> The CB2-receptor also presents a role in the regulation of bone metabolism, with an osteoclast function,<sup>35</sup> being considered as a molecular target for the diagnosis and treatment of osteoporosis.<sup>32</sup>

Although Cannabis promote an anti-inflammatory response, possibly the effect of bone remodeling seems to overlap in periodontal tissues contributing/increase the periodontal destruction. Nogueira-Filho et al<sup>18</sup> tested the inhalation of Cannabis in rats with and without teeth with induced-periodontitis and observed that bone loss was greater in the teeth with periodontitis and exposed to Cannabis; while no differences were observed in teeth without periodontal disease when exposed to Cannabis. This indicate that

**TABLE 1** Critical Appraisal Checklist for observational studies (Joanna Briggs Institute) in the systematic review according to the 10-items



**FIGURE 2** Pooled effect of Cannabis on periodontitis. Data are presented as prevalence ratio for each study (boxes), 95% CIs (horizontal lines) and summary as prevalence ratio with 95% CI (diamond)



**FIGURE 3** Sensibility analysis of included studies

Cannabis may did not start the bone loss, but increase the loss when present. In fact, we observed that the higher impact of Cannabis was in the studies that evaluated adults and elder individuals compared with those assessed adolescents. This could be explained in two ways: (a) prevalence of periodontitis in young individuals is low, compromising the statistical power to identify differences; (b) considering that bone loss related to Cannabis act main in individuals with periodontitis, the lower prevalence of periodontitis in young individuals could mask its possible effect. Both hypothesis highlight the need of more investigations regarding the Cannabis effect considering individuals from different ages and with different stages of periodontitis. However, the pooled estimation in the meta-analysis shown that Cannabis can play an important role in the periodontal disease.

All studies<sup>14,17,28-30</sup> included in this systematic review, with the exception of López' study,<sup>14</sup> presents an elevated prevalence of periodontal disease associated with marijuana use was found. Data related to review question on overall sample in Lopez and Baelum<sup>14</sup> study were not available, once the authors showed a stratified analysis by time of marijuana use and frequency of smoking. For this reason, the López' study<sup>14</sup> was not included in the meta-analysis. Despite of that, Lopez and Baelum<sup>14</sup> did not show a positive association between periodontitis and cannabis use among adolescents with age ranging from 12 to 21 years. The authors hypothesized that lack of association could be due to the young population investigated and, consequently, short time of exposure to the drug.

Noteworthy, the use of tobacco should be discussed, since the prevalence of tobacco is high among individuals that use Cannabis.<sup>17</sup> Most of included studies presented a stratified analysis for smokers and non-smokers of tobacco. Shariif' study<sup>17</sup> reported that tobacco smoking was the only identified confounder among all other covariates. However, an interaction term between Cannabis and tobacco was not observed,<sup>17</sup> which corroborate with a study using

animal model, which suggests that the mechanisms of induction of periodontitis may be different between these drugs<sup>17,32</sup>. When only participants who had never smoked tobacco were considered, Shariff et al<sup>17</sup> reported a significance increase of the chance to have severe periodontitis among Cannabis users. This positive association could not be observed in the studies of Jamieson et al<sup>29</sup> and Lopez and Baelum.<sup>14</sup> Jamieson et al<sup>29</sup> discuss that this result should be interpreted with caution, once this group was comprised by a small number of individuals (13 marijuana users), which become this result unreliable. According to López et al<sup>14</sup>, the missing of association may be explained due to the young sample (12-21 years old) of the study and consequently low periodontitis prevalence in this population (3.9%-5%), as aforementioned. When only tobacco smokers were considered, no significant associations were observed between the cannabis use and severe periodontitis in the studies of Shariff et al<sup>17</sup>, Jamieson et al<sup>29</sup> and Lopez and Baelum.<sup>14</sup>

Some limitations of this systematic review should be pointed out. Initially, all studies performed clinical examination, but with different definitions of periodontal disease. The assumption of different measures and criteria can lead to different results and this should be taken into account on interpretation of results. The assessment of Cannabis use was performed using a self-reported measure. While Shariff et al<sup>17</sup> consider user of Cannabis individuals that used once or more for month (in the last 12 months), Jamieson et al<sup>29</sup> consider have already used or even used and Ortiz et al<sup>30</sup> consider three categorizations (no, occasional and frequent use); only in the study of Meier et al<sup>28</sup> the Persistent Cannabis Dependence following the Diagnostic and Statistical Manual of Mental Disorders criteria was investigated.<sup>36</sup> These different approaches to measure the use of Cannabis could explain, in part, the variances in the effects observed among the investigated study even as the heterogeneity. It is important that studies attempt to quantify the amount of cannabis used by participants,

since a greater amount of Cannabis influences the results more significantly. Although the included studies had showed an increase in periodontitis prevalence among individuals that use Cannabis, this result could be underestimated, since it depends on the individual self-report. Laboratory test is still considered as the "gold standard" to evaluate drug consumption. However, this measurement is very difficult to apply in observational studies due to high-cost and ethical reasons. Thus, the self-report is an interesting option, which was adopted for all included studies. On the other hand, no standard question was adopted to identify the Cannabis users and the amount of cannabis used. Few studies in the literature assessed the association between Cannabis use and periodontal disease, limiting the meta-analysis and the search for the causes of heterogeneity.

On the other hand, our study has strengths that should be emphasized. Approximately 13 491 individuals were included on final sample providing a robustness to our findings. Although four studies were included in our meta-analysis, a high-quality assessment and a low heterogeneity (19.0%) among the included studies were observed. A sensitivity analysis was performed in order to identify the effect of omitting each study in the combined result, showing that the association between Cannabis use and periodontal disease as outcome remain even with the omission of any study. Unfortunately, we could not present a meta-analysis stratified by smokers and non-smokers groups. Lack of data made it impossible to carry out a stratified analysis. Thereby, we strongly suggest that stratified analysis by these groups be also included in future studies.

## 5 | CONCLUSION

The results of our systematic review and meta-analyses demonstrate that the use of Cannabis is associated with a higher prevalence of periodontitis regardless of the use of tobacco. In addition, our findings highlight the importance of health agencies recognize the significant role played by Cannabis use on the development of periodontal disease and the needs of public health policies' adoption in order to control the Cannabis use and the consequences resulting of their indiscriminate use.

## CONFLICT OF INTEREST

No conflict of interest.

## ETHICAL APPROVAL

This article does not contain any studies with human participants or animals performed by any of the authors.

## INFORMED CONSENT

For this type of study, formal consent is not required.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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