

Association Between Substance Use and Periodontitis: A Cross-Sectional Analysis of NHANES Data on Marijuana, Hashish, and Cocaine

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Purpose: This study aimed to examine the association between the use of marijuana, hashish, cocaine, methamphetamine, and heroin with the severity of periodontal disease in adults.

Patients and Methods: Data were obtained from the National Health and Nutrition Examination Survey (NHANES) 2011–2012 and 2013–2014 cycles, from 3609 participants, including demographic information, clinical examinations, and questionnaires. Key covariates assessed in the analysis included age, sex, race/ethnicity, education level, socioeconomic status, poverty/income ratio, marital status, occupation, alcohol consumption, body mass index (BMI), dental insurance coverage, and frequency of dental visits. Logistic regression models were employed to investigate the association between drug use and periodontitis, adjusting for potential confounders.

Results: Among 3690 participants, 54% reported using marijuana or hashish, while 16% had tried cocaine, heroin, or methamphetamine. Marijuana or hashish use was significantly associated with severe periodontitis, affecting 39% of users (OR: 4.276; 95% CI: 3.682–4.967; $p = 0.001$). Cocaine use was also linked to increased periodontitis, with most users presenting with mild disease. Alcohol consumption was positively associated with periodontitis (OR: 1.255; 95% CI: 1.066–1.477; $p = 0.006$). No significant associations were found for heroin or methamphetamine use.

Conclusion: Within the limitations of this study, marijuana, hashish, and cocaine users were found to have significantly higher odds of developing periodontitis. However, no clear relationship was established between the use of methamphetamine or heroin and periodontal disease. These findings suggest the need for public health interventions targeting substance users to mitigate the risk of periodontal disease.

Keywords: periodontal disease, marijuana, hashish, cocaine, methamphetamine, NHANES

Introduction

Periodontal disease originates from the accumulation of dental biofilm, but its progression is influenced by a complex interplay of modifiable and non-modifiable risk factors.¹ Systemic conditions such as diabetes have been well-established in exacerbating periodontal conditions, further complicating the disease's management and treatment.² Similarly, behavioral factors, particularly substance use, play a critical role in the severity and advancement of periodontal disease. Substances like cocaine, cannabis (in the forms of marijuana and hashish), prescription opioids, methamphetamine, and heroin are all known to impact oral and periodontal health negatively.³ Recent literature has also emphasized the bidirectional impact of periodontal inflammation on systemic health and the microbiome, reinforcing the broader implications of studying substance use and periodontal disease.^{4,5}

Cannabis is available in several forms, including marijuana, hashish, and hash oil. Marijuana, which is less concentrated, is widely used recreationally, especially in regions where it has been legalized. Hashish, a more concentrated form of cannabis, is often consumed in similar ways.⁶ Both marijuana and hashish are primarily smoked, and there is growing evidence that these

forms of cannabis contribute to oral health problems. Notably, cannabis use has been associated with dry mouth (xerostomia), an increased risk of dental caries, gingival inflammation, periodontitis, and even oral cancers.⁷

Cocaine is among the most abused substances in the United States,⁶ second only to marijuana. Its use has been linked to a range of adverse oral health outcomes, including enamel erosion, cervical abrasion, and severe dry mouth.⁸ Cocaine users also exhibit an increased prevalence of periodontal disease, gingival lesions, and bruxism, which can lead to temporomandibular joint disorders.⁹ The direct contact of cocaine with oral tissues, whether smoked or ingested, exacerbates these oral health issues, increasing the severity of dental decay and soft tissue damage.

Methamphetamine, often referred to as “meth”, is the third most used illicit drug.¹⁰ It is typically distributed in tablet form and has a range of damaging effects on oral health like other illicit drugs. Methamphetamine use is strongly associated with “meth mouth”, characterized by severe tooth decay, periodontal disease, and tooth loss due to the drug’s acidic nature and the dehydration it causes, leading to dry mouth and rampant caries.¹⁰

Heroin, a derivative of the opium poppy, is a highly addictive substance that is primarily injected, though other forms of consumption are also prevalent. Heroin users frequently suffer from poor oral health, including elevated rates of dental caries, gingival inflammation, and periodontitis.¹¹ The use of heroin is often associated with poor oral hygiene practices and a high prevalence of periodontal disease characterized by bleeding gums, increased probing depths, and bone loss.¹⁰ Alcohol is commonly used among individuals who abuse these substances, although it may influence overall health, its impact on periodontal tissues is considered minimal or possibly masked by the effects of other substances.^{8,12}

While prior studies have explored the effects of substance use on oral health, many have been limited by small sample sizes and lacked generalizability. For instance, a self-reported questionnaire study conducted among Australian Aboriginal young adults found an elevated risk of periodontal disease associated with tobacco, marijuana, and petrol sniffing—but not alcohol—underscoring the need for further research among marginalized populations.¹² An umbrella review on periodontal health and psychiatric disorders identified substance use disorders as having the strongest association with increased periodontal disease risk, emphasizing the influence of intertwined biological, behavioral, and psychosocial factors.¹³

Moreover, a comprehensive review of the effects of various substances on periodontal health highlighted the limited data available regarding the specific impacts of certain drugs.⁶ These limitations emphasize the need for large, population-based studies to better understand the substance-specific associations with periodontal disease.^{14,15} In addition, a detailed comparative analysis of individual substances, along with coexisting factors, may offer a more nuanced understanding of their roles in the development and progression of periodontal conditions. Encounters with patients under the influence of illicit drugs are also becoming more frequent in dental settings, making it increasingly important for clinicians to be informed of the oral health implications of substance use.⁶

Despite growing evidence on the oral health impacts of substance use, there is still a lack of evidence on how specific substances affect periodontal disease in large, nationally representative populations. To address this, the current study aims to evaluate the association between the use of marijuana, hashish, cocaine, methamphetamine, and heroin and the severity of periodontal disease. Using nationally representative data from the National Health and Nutrition Examination Survey (NHANES), this study offers substance-specific insights that may enhance understanding and inform future research and public health strategies targeting oral health among substance users.

Methods

The present study utilizes data from the National Health and Nutrition Examination Survey (NHANES), a cross-sectional survey aimed at assessing the health and nutritional status of non-institutionalized individuals residing in the United States. NHANES employs a combination of interviews, physical examinations, and laboratory tests to gather information across a broad range of health topics. For this study, data were obtained from the NHANES cycles conducted between 2011–2012 and 2013–2014, which included extensive oral health assessments. These two cycles were specifically selected because they are the most recent NHANES datasets that provide both full-mouth periodontal examination data and self-reported information on illicit substance use, allowing for an integrated analysis aligned with the study objective. This analysis was based on a publicly available dataset deposited at Figshare by the author.¹⁶

Ethical approval for data collection was granted by the National Center for Health Statistics (NCHS) Research Ethics Review Board, and all NHANES participants provided written informed consent. The current study is a secondary analysis of publicly available, de-identified NHANES data and is therefore exempt from Institutional Review Board (IRB) approval, as determined by Imam Abdulrahman Bin Faisal University in accordance with national guidelines for research involving human subjects.

In this study, participants were included if they were aged 18 years or older, had undergone a dental examination, and had complete data on full-mouth periodontal assessments and self-reported substance use. Participants were excluded if they were edentulous, pregnant, or had missing data on key covariates such as smoking status, diabetes diagnosis, or sociodemographic characteristics. These inclusion and exclusion criteria ensured a representative and analytically appropriate sample for evaluating the association between substance use and periodontal disease.

The primary exposure variable for this investigation was self-reported use of illicit substances, which included marijuana, hashish, cocaine, heroin, and methamphetamine. Marijuana use was further categorized into Frequent/Recreational Cannabis (FRC) use and non-FRC use based on frequency of consumption. For the remaining substances, participants indicated whether they had ever used the drug, which was recorded as a binary variable (yes/no). While the dataset included self-reported information on lifetime use of each substance, it did not provide details regarding the method of administration (e.g., smoking, inhalation, or injection). As such, the analysis is limited to the presence or frequency of use without accounting for differences in exposure routes.

The outcome of interest, periodontal disease, was assessed using clinical periodontal examination data from NHANES. Disease severity was determined based on the definitions established by Eke and Genco, which classify periodontal disease into severe, moderate, and mild categories. Severe periodontitis was defined by the presence of two or more interproximal sites with clinical attachment loss (LOA) of ≥ 6 mm and one or more interproximal sites with a probing depth (PD) of ≥ 5 mm. Moderate periodontitis was characterized by two or more interproximal sites with LOA ≥ 4 mm or two or more interproximal sites with PD ≥ 5 mm. Mild periodontitis was defined as two or more interproximal sites with LOA ≥ 3 mm and two or more interproximal sites with PD ≥ 4 mm, or one site with PD ≥ 5 mm. Participants who did not meet the criteria for mild, moderate, or severe periodontitis were classified as having no periodontitis.

To control for potential confounding factors, a variety of covariates were included in the analysis. These covariates were selected based on their potential impact on periodontal health and included age, sex, race/ethnicity, education level, socioeconomic status, marital status, occupation, alcohol consumption, body mass index (BMI), dental insurance coverage, and frequency of dental visits. Age was stratified into five categories, ranging from 18–30 to over 60 years. Race and ethnicity were grouped as non-Hispanic White, non-Hispanic Black, Mexican American, other Hispanic, and non-Hispanic Asian. Educational attainment was categorized as less than high school, high school diploma, or college degree, and BMI was categorized into underweight, normal, overweight, and obese. Additional variables, such as the poverty-income ratio and dental visit frequency, were included to provide a more comprehensive assessment of the study population.

Statistical analyses were conducted using SAS software version 9.4. Sampling weights were applied to account for the complex survey design of NHANES, ensuring that estimates were nationally representative. Chi-squared tests were used to examine the demographic characteristics of the study population, while logistic regression models were employed to evaluate the relationship between drug use and periodontal disease, controlling for the covariates mentioned above. The level of statistical significance was set at $p \leq 0.05$ for all analyses.

Results

Demographic Characteristics

The demographic characteristics of the study sample, comprising 3,690 participants, are presented in [Table 1](#). The majority of subjects were over 40 years old (60%), with a near-equal gender distribution (47% male and 53% female). The racial and ethnic composition of the sample showed that 43% of the participants were non-Hispanic White. Regarding educational attainment, 30% of the subjects held a college degree, and a significant portion (45%) fell within the high-income category. As for dental care, 60% of the participants had visited a dentist within the previous year.

Table 1 Demographical Characteristics and Drug Use Information

		Frequency	Percent (%)
Age	18–30	857	23
	31–40	581	16
	41–50	606	16
	51–60	600	16
	More than 60 years	1046	28
Gender	Male	1742	47
	Female	1948	53
Race	Mexican American	509	14
	Other Hispanic	318	9
	Non-Hispanic White	1569	43
	Non-Hispanic Black	757	21
	Non-Hispanic Asian	417	11
	Other Race - Including Multi-Racial	120	3
Education level	Less than High School	741	20
	High School Level	776	21
	AA or College Degree	1111	30
	College graduate or above	1062	29
BMI	Underweight	639	17
	Normal	1170	32
	Overweight	889	24
	Obese	992	27
Household income	Below Poverty Line	1129	31
	Near Poverty	135	4
	Low-Income	153	4
	Middle-Income	614	17
	High-Income	1659	45
Diabetes	Yes	303	8
	No	3387	92
Time of most recent dental visit	Less than 1 year	2225	60
	1–2 years	430	12
	More than 2 years	407	11
	Never Visited	628	17

(Continued)

Table 1 (Continued).

		Frequency	Percent (%)
Periodontal status	Severe	798	22
	Moderate	570	15
	Mild	1084	29
	Not present	1238	34
Insurance	Yes	2541	69
	No	1149	31
Alcohol consumption status	Non-drinker	2683	73
	Drinker	1007	27

Regarding substance use, 73% of the samples reported that they did not consume alcohol. [Figure 1](#) presenting the usage of substance, 54% had used marijuana or hashish at least once, 16% had tried cocaine, heroin, or methamphetamine, and 4% had injected illegal drugs.

Effects of Sociodemographic Factors on Periodontitis Prevalence

Participants were classified based on the severity of periodontitis, as outlined in [Tables 2](#) and [3](#), distinguishing among no periodontitis, mild, moderate, and severe periodontitis. Statistically significant associations ($p < 0.05$) were observed between the use of marijuana, hashish, and cocaine and the severity of periodontitis. Among individuals who reported marijuana or hashish use, 39% were found to have severe periodontitis. In contrast, many cocaine users presented with mild periodontitis.

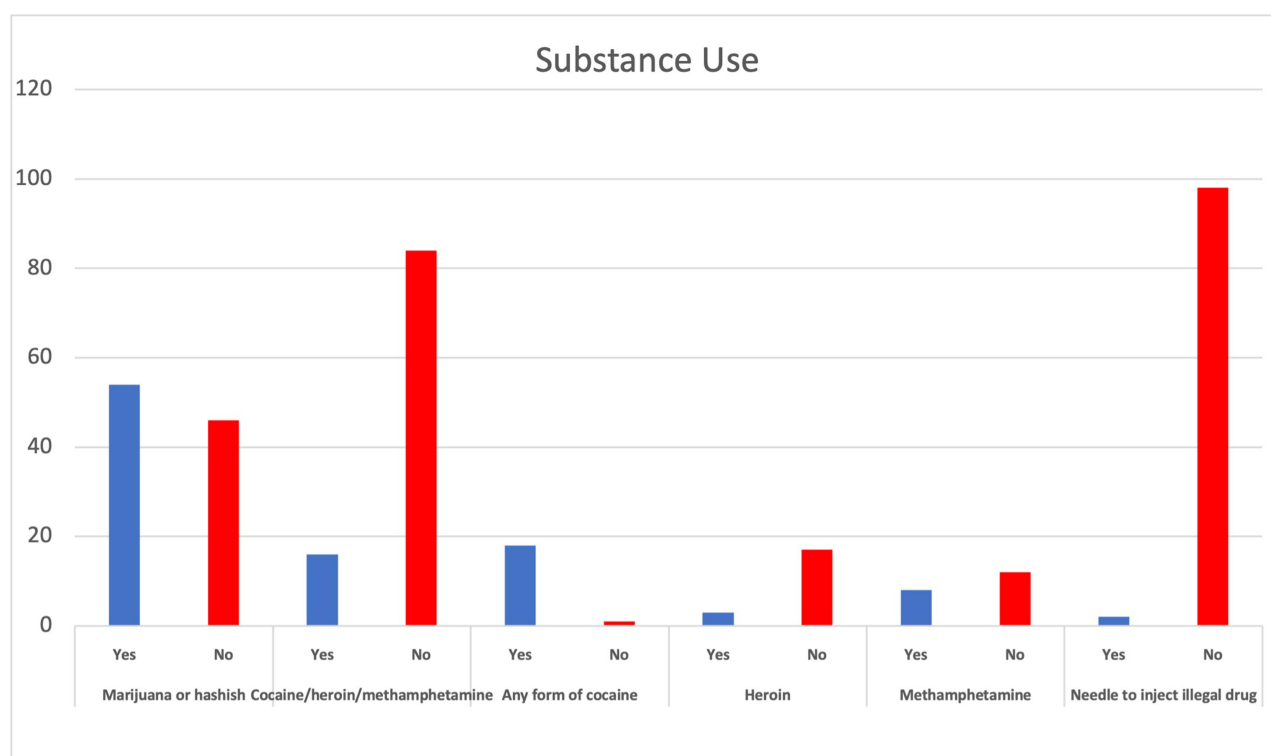
**Figure 1** Substance uses among participants.

Table 2 Association of the Periodontal Status with Drug Use

		Periodontal Status					
		Total	Severe	Moderate	Mild	Not Present	p-value
Ever used marijuana or hashish	Yes	1991	39.0%	13.9%	27.4%	19.7%	0.001*
	No	1699	1.3%	17.2%	31.7%	49.7%	
Ever used cocaine/heroin/methamphetamine	Yes	580	22.1%	14.8%	29.5%	33.6%	0.971
	No	3110	21.5%	15.6%	29.4%	33.5%	
Ever use any form of cocaine	Yes	674	23.9%	18.1%	35.0%	23.0%	0.034*
	No	47	38.3%	4.3%	36.2%	21.3%	
Ever used heroin	Yes	110	25.5%	16.4%	38.2%	20.0%	0.826
	No	611	24.7%	17.3%	34.5%	23.4%	
Ever used methamphetamine	Yes	284	23.2%	18.0%	36.6%	22.2%	0.794
	No	439	25.7%	16.6%	34.2%	23.5%	
Ever use a needle to inject illegal drug	Yes	161	22.2%	16.0%	33.3%	28.4%	0.77
	No	3529	21.6%	15.4%	29.3%	33.7%	

Notes: *Statistically significant at 0.05.

Table 3 Subject Demographics and Demographic Predictors of Periodontitis

		Periodontal Status					
		Total	Severe	Moderate	Mild	Not Present	p-value
Age	18–30	857	24.4%	15.9%	27.7%	32.1%	0.394
	31–40	581	19.4%	16.2%	31.0%	33.4%	
	41–50	606	20.0%	13.5%	31.5%	35.0%	
	51–60	600	22.3%	15.8%	26.7%	35.2%	
	More than 60 years	1046	21.1%	15.6%	30.2%	33.1%	
Gender	Male	1742	21.1%	16.0%	30.5%	32.4%	0.316
	Female	1948	22.1%	15.0%	28.4%	34.5%	
Race	Mexican American	509	25.0%	15.9%	27.9%	31.2%	0.393
	Other Hispanic	318	20.1%	16.0%	31.4%	32.4%	
	Non-Hispanic White	1569	21.3%	14.6%	28.9%	35.2%	
	Non-Hispanic Black	757	21.8%	16.5%	28.7%	33.0%	
	Non-Hispanic Asian	417	20.6%	17.5%	30.9%	30.9%	
	Other Race - Including Multi-Racial	120	18.3%	9.2%	35.0%	37.5%	

(Continued)

Table 3 (Continued).

		Periodontal Status					p-value
		Total	Severe	Moderate	Mild	Not Present	
Household income	Below Poverty Line	1129	22.6%	13.8%	31.8%	31.8%	0.089
	Near Poverty	135	14.8%	17.8%	36.3%	31.1%	
	Low-Income	153	19.6%	15.0%	32.0%	33.3%	
	Middle-Income	614	19.9%	17.6%	28.7%	33.9%	
	High-Income	1659	22.4%	15.6%	27.2%	34.8%	
Education level	Less than High School	741	20.5%	16.5%	28.9%	34.1%	0.653
	High School Level	776	21.6%	15.7%	31.1%	31.6%	
	AA or College Degree	1111	23.0%	14.5%	29.8%	32.7%	
	College graduate or above	1062	20.9%	15.5%	28.1%	35.5%	
Drug injected	Cocaine	55	41.8%	41.8%	9.1%	7.3%	0.001*
	Heroin	55	12.7%	41.8%	14.5%	30.9%	
	Methamphetamine	47	34.0%	17.0%	40.4%	8.5%	
	Steroids	4	0.0%	0.0%	100.0%	0.0%	
BMI	Underweight	639	21.8%	14.9%	27.9%	35.5%	0.718
	Normal	1170	21.3%	16.0%	30.6%	32.1%	
	Overweight	889	22.7%	15.6%	27.4%	34.2%	
	Obese	992	21.0%	15.0%	30.6%	33.4%	
Diabetes	Yes	303	23.4%	14.5%	33.0%	29.0%	0.215
	No	3387	21.5%	15.5%	29.1%	34.0%	
Time of most recent dental visit	Less than 1 year	2225	26.2%	16.8%	27.6%	29.4%	0.0001*
	1-2 years	430	7.9%	10.5%	35.1%	46.5%	
	More than 2 years	407	9.6%	12.5%	34.4%	43.5%	
	Never Visited	628	22.5%	15.9%	28.7%	33.0%	
Insurance	Yes	2541	25.4%	13.9%	30.2%	30.5%	0.0001*
	No	1149	13.3%	18.9%	27.6%	40.2%	
Alcohol consumption status	Non-drinker	2683	22.1%	16.0%	29.8%	32.2%	0.033*
	Drinker	1007	20.4%	14.1%	28.3%	37.2%	

Notes: *Statistically significant at 0.05.

Significant differences in periodontitis prevalence were also found based on the types of drugs injected by the participants. Additionally, individuals who visited the dentist within the past year had the highest prevalence of severe periodontitis at 26.2%, compared to 7.9% among those whose last visit was 1–2 years ago. Similarly, participants with dental insurance had a higher rate of severe periodontitis (25.4%) compared to those without insurance (13.3%), with

these differences being statistically significant ($p = 0.001$). No significant differences in periodontitis prevalence were observed based on age, race, household income, or education levels. These prevalence rates are detailed in [Table 3](#).

Multivariable Analysis of Factors Associated with Periodontitis

The results of multiple logistic regression analyses revealed significant associations between gender, dental visits, health insurance, and alcohol consumption with periodontitis prevalence. Male participants were 1.161 times more likely to develop periodontitis compared to females (95% CI: 1.002 to 1.346, $p = 0.046$). Interestingly, individuals who had not visited a dental clinic within the last year had significantly lower odds of developing periodontitis (OR: 0.532, 95% CI: 0.406 to 0.696, and OR: 0.633, 95% CI: 0.480 to 0.833, respectively, for visits longer than one year ago) ($p < 0.05$).

Additionally, participants who used marijuana or hashish were found to be 4.276 times more likely to have periodontitis (95% CI: 3.682 to 4.967, $p = 0.001$). Alcohol consumption was also positively associated with periodontitis, with those who consumed more alcohol having higher odds of developing the condition (OR: 1.255, 95% CI: 1.066 to 1.477, $p = 0.006$). These findings are summarized in [Table 4](#).

Table 4 Logistic Regression Analysis of the Effects of Age, Gender, Dental Visits, Insurance, and Different Drug Usage on Periodontitis

		OR	95% C.I. OR		p-value
			Lower	Upper	
Age	18–30	Ref			
	31–40	0.935	0.736	1.189	0.584
	41–50	0.919	0.725	1.165	0.485
	51–60	0.833	0.657	1.056	0.132
	More than 60 years	0.992	0.807	1.22	0.939
Gender	Female	Ref			
	Male	1.161	1.002	1.346	0.046*
Time of most recent dental visit	Never Visited	Ref			
	Less than 1 year	1.158	0.946	1.417	0.154
	1–2 years	0.532	0.406	0.696	0.001*
	More than 2 years	0.633	0.48	0.833	0.001*
Insurance	No	Ref			
	Yes	1.573	1.345	1.839	0.001*
Ever used marijuana or hashish	No	Ref			
	Yes	4.276	3.682	4.967	0.001*
Ever used cocaine/heroin/methamphetamine	No	Ref			
	Yes	0.971	0.793	1.188	0.772
Ever use a needle to inject illegal drug	No	Ref			
	Yes	1.345	0.798	2.265	0.266
Alcohol consumption status	Non-drinker	Ref			
	Drinker	1.255	1.066	1.477	0.006*

(Continued)

Table 4 (Continued).

		OR	95% C.I. OR		p-value
			Lower	Upper	
Ever use any form of cocaine	No				
	Yes	0.905	0.440	1.861	0.786

Notes: *Statistically significant at 0.05.

Discussion

The primary objective of this study was to assess the association between the use of marijuana, hashish, cocaine, methamphetamine, and heroin and the severity of periodontal disease. The results showed statistically significant associations for marijuana/hashish and cocaine, with marijuana/hashish users being approximately four times more likely to have periodontitis compared to non-users. No such associations were found for heroin or methamphetamine. These findings highlight the differential impact of specific substances on periodontal disease severity.

The findings of this study align with previous research by Shariff et al, which also used NHANES data to investigate the impact of marijuana on periodontal health. That study found frequent recreational cannabis users had more sites with increased probing depth and attachment loss compared to non-frequent users. A large cohort study by Thomson et al¹⁵ also described the possible effects of cannabis smoking as a risk factor for periodontal disease in young adults. The increased severity of periodontitis observed in cannabis users is likely attributable to the harmful byproducts generated from smoking rather than the direct effects of cannabinoids, which are known to suppress inflammatory pathways.^{6,17–19} This suggests that while cannabis itself has anti-inflammatory properties, the combustion process involved in smoking may exacerbate periodontal tissue damage.

Several studies have struggled to disentangle the specific effects of cannabis from those of smoking tobacco. However, independent studies across various age groups have confirmed the significant impact of cannabis use on periodontal health.^{15,18,20} Chronic cannabis use has been associated with gingival enlargement, similar to the effects seen in individuals using phenytoin. This similarity may arise due to shared pharmacological properties between cannabis and phenytoin, which include anticonvulsant and anti-inflammatory effects.

The increased risk of periodontal disease with cocaine and other users ascertains that there is an underlying immune-inflammatory mechanism either or both; systemic and local factors playing an important role. The possibility of systemic biologic mechanism seems to be more relatable, since the previous study results pointed out the same amount of dental biofilm in substance users and non-substance users after adjusting for clinical variables with increased periodontal destruction in non-substance users.

In the pathogenesis of periodontitis, immune mechanisms including the release of pro-inflammatory cytokines and growth factors considered to affect the functioning of host cells including fibroblast and osteoclast, with connective tissue destruction and bone loss. Studies have shown that substances like cocaine can alter cell functions related to the immune system.^{21,22} The functioning of neutrophils, including chemotactic activity, considered to be accelerated due to some substance, with resultant increase in the production of interleukin (IL)-8.²³ Substance like cocaine may also be affecting the production of IL-17, which stimulates osteoclastic bone resorption through osteoblasts.²⁴ There is also increase in the metalloproteinase activity among rats exposed to certain substance, which in turn affect metabolism of collagen with resultant connective tissue destruction.²⁵ In addition to the functioning of neutrophils alteration of homeostatic balance of cytokines produced by Th1 and Th2 cells after exposure to substance.²⁶ It can be thus hypothesized that, initial activated dysbiosis can trigger an excessive host response, with increased production of cytokines, and resultant alteration in the balance of free radicals and antioxidants leading to pathologic process of generation of matrix metalloproteinases, (connective tissue matrix destruction) and osteoclastic activity (bone resorption).²⁷

Moreover, oxidative stress is increasingly recognized as a key factor in the pathogenesis of periodontitis. It arises when reactive oxygen species (ROS) outweigh the body's antioxidant defense mechanisms, leading to cellular damage and

inflammation in the periodontal tissues. Clinical studies have reported elevated levels of oxidative stress biomarkers, such as 8-hydroxydeoxyguanosine (8-OHdG), in saliva and serum samples of individuals with advanced periodontitis.^{28,29} These ROS contribute to the progression of periodontal disease by amplifying inflammatory signaling pathways, promoting collagen breakdown, and impairing tissue regeneration. Given that substance use is associated with increased oxidative stress, this mechanism may partly explain the heightened risk and severity of periodontitis observed among users. Understanding this pathway adds to our knowledge of how systemic factors contribute to periodontal destruction.

In contrast, our findings do not support the results of some earlier studies, such as one cross-sectional study that found no association between cannabis use and signs of periodontitis.¹⁹ These differences may be due to variations in study design, population samples, or definitions of periodontitis severity.

Regarding cocaine use, this study found a significant association with periodontal disease severity, consistent with previous research. Cocaine users were more likely to have elevated levels of visible plaque, gingival bleeding, and increased probing depths. The direct local effects of cocaine, such as vasoconstriction and tissue necrosis, likely contribute to this increased risk of periodontal destruction.^{27,30,31} Despite similarities in microbial composition between cocaine users and non-users, the systemic and local effects of cocaine likely accelerate periodontal damage.⁴ Cury et al provided contrasting findings, reporting no significant association between cocaine dependence and periodontal destruction, but this discrepancy could be attributed to differences in how cocaine is administered—whether by smoking, injecting, or rubbing the substance intraorally.³²

Interestingly, no statistically significant relationship was found between heroin or methamphetamine use and periodontal disease in this study. There is limited research specifically examining the effects of these substances on oral health, although some studies suggest that methamphetamine use can lead to increased plaque buildup and gingival inflammation due to poor oral hygiene practices.^{33,34} Biological mechanisms, such as methamphetamine's effect on lipopolysaccharides and interleukin-1 β levels, may also play a role in tissue destruction.³⁵ Differences in drug administration methods, including inhalation or injection, might explain the variability in oral health outcomes observed among users of different substances.⁴

In our study, alcohol users showed an increased risk of periodontal disease. In contrast, reports of previous studies showed that alcohol users did not show increased periodontal disease.⁶ The reason for the difference could be the masking effect of various other substances commonly used by the substance users and usually alcohol users often use the other substances, which makes it difficult to segregate the actual or sole effect of alcohol on the periodontal tissues. Further, the number of participants who were alcoholics in our study is very less.

The results of this study also showed that among sociodemographic factors, household income was significantly associated with substance use and periodontal disease. This finding underscores the importance of addressing socioeconomic disparities in health interventions aimed at improving periodontal outcomes. However, in our study, the risk of periodontitis is seen more among individuals with dental visits and having dental insurance. These results may seem to be bizarre, however, it may be that substance users, although had the dental visit, may have visited for the emergency treatment and not given attention to the oral hygiene maintenance or attention to the periodontal status. Otherwise dental visits and having health insurance should have helped them to have less periodontitis.

In conclusion, this study highlights the need for targeted public health efforts to mitigate the increased risk of periodontal disease among users of marijuana, hashish, and cocaine. It also gives the opportunity to influence the law makes and governance to further consider the importance of health issues including the dental health issues among the substance users. Dental clinics and dentist need to train specifically to deal with the substance users during their undergraduate studies. A deeper understanding of the specific mechanisms by which these drugs contribute to periodontal destruction, as well as the diverse methods of drug administration, will be essential for shaping effective treatment and prevention strategies.

This study has several limitations. First, apart from marijuana, data on substance use were limited to binary (yes/no) lifetime use, which may have constrained the depth of the analysis. Additionally, information regarding the route of substance administration was not available. Since different methods of use may have varying effects on periodontal tissues, this limitation could have influenced the observed associations. Furthermore, not all NHANES participants underwent dental examinations, which may introduce selection bias, as the analyzed population could be more health-conscious than the general adult population. Lastly, due to the cross-sectional design of the study, causality cannot be inferred from the observed associations.

Conclusion

This study demonstrated a significant association between the use of marijuana, hashish, and cocaine and higher odds of developing periodontitis, based on nationally representative data. No such association was observed for methamphetamine or heroin. These findings align with the study's objective of assessing substance-specific effects on periodontal health and emphasize the need for targeted public health strategies to mitigate oral health risks and enhance periodontal outcomes among substance-using populations.

Disclosure

The author(s) report no conflicts of interest in this work.

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