



IMPACT OF DRUG ABUSE ON ORAL AND PERIODONTAL HEALTH - AN OVERVIEW.

Dental Science

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ABSTRACT

Drug abuse is a serious public health concern that affects not only the general well-being of individuals but also their oral and periodontal health. This literature review aims to summarize and compare the current and past evidence on the effects of various drugs on the oral cavity and adjacent tissues.

KEYWORDS

Alcohol, Cannabis, Methamphetamine, Drug abuse, Periodontal health.

INTRODUCTION

Abuse of substances such as cannabis, alcohol, and illicit drugs like Methamphetamine is an emerging global oral health crisis. In 1992, the WHO described the term drug addiction as "a psychic or physical state formed as an interaction between a living organism and a drug, resulting in behavioral responses that include the obligation to take the drug regularly to encounter its psychic effects and sometimes to avoid the discomfort of its absence".^[1] As of today drug abuse prevails as one of the world's most destructive oral health problems, a leading cause of violent, risky behaviors and social issues.^[2] According to the worldwide drug report, in 2020, an estimated 284 million people worldwide aged 15–64 had used a drug within the last 12 months. The majority was seen in males. This corresponds to approximately 1 in every 18 people in that age group, or 5.6 percent, and represents a 26 percent increase from 2010 when the estimated number of people who used drugs was 226 million and prevalence was 5 percent. Qualitative information suggests that 2020 saw an overall increase in the use of cannabis – still by far the world's most-used drug – and in the use of amphetamines. A World Health Organization report published in 2018 estimated that there are 2.3 billion alcohol consumers across the globe. Substance Abuse and Mental Health Services Administration reports in 2021 correlated heavy alcohol and illicit drug intake to serious health problems.^[3]

A Comprehensive National Survey on the Extent and Pattern of Substance Use in India conducted by The Ministry of Social Justice and Empowerment in 2018 estimated that approximately 150 million adults (males and females) in the age group of 18 - 75 years abused alcohol, the prevalence being 17 times higher in men than women. 20 million adults abused cannabis; the least abused at 1.5 million is Methamphetamine. Chhattisgarh, Punjab, Uttar Pradesh, and Delhi are the top states in India reporting higher than the national average in terms of prevalence of drug abuse.

Prolonged use of abused substances has destructive and injurious effects on oral health. These substances contribute to decreased salivary flow in the mouth, a condition called 'xerostomia' or 'dry mouth' increasing the incidence of dental caries. Studies have also reported higher incidences of mucosal lesions like oral leukoedema, leukoplakia, oral submucous fibrosis, hyperkeratosis, oral cancer, and fungal infections like *Candida Albicans*.^[4] The oral cavity of such patients is prone to developing uvulitis and oral papillomas.^[4] Decayed, broken, and missing teeth have been reported in large numbers. Moreover, dental wear and dental erosion are prevalent findings. Jaw clenching, sore TMJ muscles, tooth grinding or 'bruxism', and fractured teeth are often found.^[4]

It is interesting to note that the 'microbial biofilm' or 'dental plaque' and dental calculus are deposited at a high rate on tooth surfaces of addicts which in turn puts them at increased susceptibility to developing periodontal disease.^[5] The most important clinical manifestations observed in drug abusers are higher CAL (clinical attachment loss), increased probing or pocket depths (>4mm), gingival enlargement, and, mucosal ulcerations like ANUG (Acute necrotizing Ulcerative gingivitis).^[6]

Researchers have also described an association between the use of

illicit drugs and periodontal tissue destruction causing alveolar bone loss.^[7] All these findings profoundly influence developing chronic periodontitis in its most mild to severe forms.

Moreover, it is one of the most common inflammatory diseases encountered in the oral cavity. Although the microbial biofilm (plaque) is required but insufficient to cause disease, the host's inflammatory response to the microbial challenge is the key to periodontal destruction. Dental caries is a prevailing chronic infectious disease of the oral cavity in humans resulting in the breakdown or demineralization of the outer enamel layer of the tooth by acid-producing bacteria.^[8]

Currently, the Etiology of caries is fuelled by the four-factor theory that is based on the interaction between the oral microbiome, oral environment, host, and time.^[9]

The oral cavity of such individuals shows a trend of being at a higher risk of caries and periodontal disease.^[10] The most common findings were advanced caries more commonly referred to as severe tooth decay, and tooth loss all of which may be attributed to the lifestyle patterns followed by drug users.^[11] This may be directly or indirectly related to the fact that addicts fail to take care of their oral hygiene, have poor nutritional intake, and have salivary dysfunction.^[12]

DISCUSSION

Drug abuse or substance abuse is described as the consumption of chemicals to create pleasurable effects on the brain. The target audience ranges from young adults to older individuals. The present studies in this literature review aimed to investigate and summarize the existing evidence of the effect of three major drugs- Methamphetamine, Cannabis/Marijuana, and Alcohol on oral and periodontal health in adults. The findings of these research studies shed light on the detrimental impact of drug abuse on oral health, specifically concerning periodontal health. To the best of our knowledge, this is the only literature review that provides a comprehensive outline of three major drugs under one roof - methamphetamine, cannabis/marijuana, and alcohol.

According to Jason Clague et al., methamphetamine use is linked to a range of oral health issues, including dental caries, missing teeth, and periodontal disease. The authors attributed these problems to various factors, such as the drug's impact on saliva production, oral hygiene practices, and dietary habits. One key mechanism discussed is the drug's ability to reduce salivary flow, leading to xerostomia or dry mouth. This decreased salivary production contributes to an increased incidence of dental caries and periodontal disease, as saliva plays a crucial role in neutralizing acids, remineralizing enamel surfaces, and washing away food particles and bacteria. The authors also highlighted that individuals who abuse methamphetamine tend to neglect oral hygiene, leading to the accumulation of plaque and bacteria. Moreover, stimulant effects cause bruxism or teeth grinding which worsens oral health.^[13]

Furthermore, the authors discuss the association between methamphetamine users' preference for sugary and acidic beverages.

These dietary choices coupled with the drug's effect on saliva and oral hygiene create an environment conducive to dental decay and erosion.^[13] Vladimir W. Spolsky et al., established that high frequency of methamphetamine use alone did not impact the severity of periodontal disease however cigarette smoking was a major risk factor.^[14] According to Michele Ravelele et al., similar oral health issues were noted in participants abusing methamphetamine. A higher number of DMFT (decayed, missing, filled) tooth surfaces were present in the oral cavity.^[15] The authors also studied salivary analysis which showed reduced pH making tooth surfaces more susceptible to acidic breakdown and erosion as discussed by Jason Clague et al.^[13,15] Studies by Ye Tao et al. also included periodontal indices like pockets depths, calculus, and gingival bleeding which was much higher in meth users.^[16] A case report by Turkyilmaz described similar findings which included dental pain from rampant carious lesions, halitosis, and compromised esthetics.^[17] Niklas Rommel et al. reported larger numbers of caries, higher bleeding on probing, and periodontal disease in chronic methamphetamine users.^[18] Mukherjee Armita et al. discovered that while caries mainly affected root surfaces in meth abusers, they also experienced pain and discomfort while eating. Furthermore, this affected their social well-being in terms of feeling embarrassed while being around friends and the general public.^[19]

The effect of cannabis on oral and periodontal health is a topic that has gained attention in recent years. While research on this specific area is ongoing, there are several potential effects that cannabis use may have on oral and periodontal health. Studies by Benjamin Chaffee and Thompson Murray et al. reported that cannabis use positively accelerated the progression of periodontal disease.^[20,21] Through their research Le, A.; Khoo, E.; and Palamar, J.J et al. all established that cannabis can lead to an increased risk of caries through its potential to affect salivary production leading to xerostomia or dry mouth. Moreover, these individuals frequently crave sugary and acidic foods and beverages which makes them extremely susceptible to developing carious lesions.^[22] Additionally, Le, A.; Khoo, E.; Palamar, J. et al have suggested a potential link between cannabis use and oral lesions which may be pre-cancerous. Evidence is still limited and more research is required to establish a definitive connection.^[22]

Alcohol use may have various effects on oral and periodontal health. While light to moderate alcohol consumption may not have significant harm, excessive or chronic alcohol use can lead to serious oral health issues. Several studies have investigated the relationship between alcohol consumption and the progression of oral and periodontal diseases. Studies by Priyanka, Kakarla et al. and Rooban T et al. established that alcohol consumers are at an increased risk of oral mucosal lesions like leukoplakia, erythroplakia, oral submucous fibrosis, candidiasis few of which may be pre-cancerous.^[23] Evidence suggests that alcohol when combined with tobacco interacts to form a synergistic effect that can amplify the risk of oral cancer many times more than drinking alone.

The study by Tezal, M. et al. concluded that alcohol consumption was not significantly associated with alveolar bone loss or the presence of subgingival micro-organisms which is a measure of periodontal support.^[24] This data highlights that the need for further research is warranted to investigate mechanisms and pathways linking alcohol consumption and periodontal disease.

It is important to understand that the literature reviewed in this paper has a few limitations like relatively small or variable sample size. Therefore, the generalizability of the findings may be limited. The prevalence and severity of findings may be different in different countries and cultures. The mode of administration of cannabis and methamphetamine is not taken into consideration in these studies. So further research and longer-term studies with diverse and larger populations are required to gain a more comprehensive understanding of the oral health implications of drug abuse on oral and periodontal health.

Overall, the findings emphasize the importance of raising awareness among healthcare professionals and the general public about the undesirable consequences of drug abuse. This oral health crisis requires extra attention from clinicians, researchers, policymakers, and educators. By gaining an in-depth understanding of the causes and repercussions of drug-related oral and periodontal diseases, as well as the barriers and facilitators to oral health care for drug users, it is possible to improve oral health and overall health outcomes of this

vulnerable population.

CONCLUSION

In conclusion, this literature review has provided a comprehensive understanding of the effects of drug abuse on oral and periodontal health. The drug abuse, particularly the use of methamphetamine, cannabis, and alcohol, has detrimental effects on oral health resulting in a multitude of oral diseases. These include but are not limited to dental caries, periodontal disease, xerostomia, oral mucosal lesions, and oral cancer. The management of oral health problems in drug abusers requires a multidisciplinary approach involving collaboration between dental professionals, psychologists, addiction specialists, behavioral health specialists, and doctors. Timely identification, prevention, and intervention strategies are essential to address the oral health challenges faced by drug abuse.

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