Alcohol consumption and oral health

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Abstract

Alcohol consumption poses a significant global public health issue. Substantial evidence associates alcohol intake with mouth, throat, voice box, esophagus, colon (by men), and breast (by women) cancer. Additionally, there is plausible evidence that alcohol increases the likelihood of colon cancer in women and liver cancer. An observed correlation shows that increased alcohol consumption is associated with a higher risk of developing these cancers.

Poor oral health is a significant problem among people who drink alcohol regularly (chronic alcoholics), but little is known about their oral health care needs and whether interventions and guidelines are implemented within alcohol-dependent treatment services. alcohol.

Thus, the present study primarily proposes the identification of frequent oral pathology in chronic alcohol users, the assessment of existing oral health care needs, the assessment of oral health problems in relation to alcohol consumption as well as the assessment of the need for an oral health education program specially intended for people who consume alcohol chronically.

Keywords: alcohol, oral health, addiction, intoxication, dental health services, oral pathology, etiology

INTRODUCTION

Alcohol significantly contributes to the global disease burden and is a major factor in injury and violence [1]. Its consumption imposes substantial social and economic costs worldwide. The World Health Organization identifies alcohol abuse as the third leading risk factor for poor health and a major risk factor for disability and premature death, accounting for 5.1% of disability-adjusted life years. About 5.9% of all deaths (3.3 million people) in 2012 were attributed to alcohol [1]. Estimated costs attributable to alcohol range from 1.3 to 3.3% of gross domestic product in high- and middle-income countries [2]. However, some evidence has suggested that people who consume alcohol may tend to undermine its negative effect in order to justify their behaviour [3] and minimize their uncomfortable experience of Cognitive Dissonance. The latter refers to the effect caused by the inconsistency between the knowledge of the dangerous effect of alcohol consumption and the contradictory desire to drink [4, 5].

Drinking patterns are typically established during adolescence and early adulthood [6,7]. Early initiation of alcohol consumption, particularly between the ages of 11 and 14, is a significant risk factor for poorer health outcomes later in life [8]. Although adolescent alcohol consumption has declined in Australia over the past decade [9], as well as in Europe and the USA [10, 11], alcohol remains one of the most used substances among school students. Notably, while the number of current drinkers has decreased, the rate of consuming more than four drinks at once in the past week has not declined among current drinkers [9]. In 2011, research indicated that 50.7% of Australian high school students had consumed alcohol in the past year, with rates increasing from 5.1% at age 12 to 36.7% at age 17 [12].

Recent evidence has shown that the health, economic and social harms resulting from alcohol use can be reduced through alcohol interventions and policies implemented by governments. In recent years, a growing body of knowledge has shown that strategies that focus on increasing prices and tighter control over alcohol availability (i.e., sales hours and density of alcohol outlets) are highly effective in reducing alcohol-related problems compared to other commonly used strategies. such as educational campaigns, age restrictions and alcohol advertising bans [13-14]. In general, it is expected that strategies that go beyond providing information to mobilizing public opinion and support could be more effective in reducing alcohol-related problems [15]. Therefore, the population's perspective in this regard can be a key component in choosing and implementing appropriate alcohol control strategies in a given society. Previous studies in the UK found that among the general population greater enforcement was strongly supported, while support for pricing policies and restricting access to alcohol was more divided [16,17].

Based on the theoretical assumptions underlying strategies aimed at controlling alcohol-related harm [5], it is expected that alcohol-related interventions and policies can be generally applied within societies. However, as recommended in the global strategy to reduce the harmful use of alcohol proposed by the WHO [18], strategies aimed at reducing alcohol-related harm should be adapted according to national priorities and contexts.

Studies have shown a tendency to minimize negative alcohol-related feelings among drinkers [13]. Furthermore, previous studies have explored the effectiveness of alcohol strategies and policies mainly from objective perspectives such as police records, health care utilization, vital statistics, etc. [19-26]. However, to our knowledge, the population's beliefs about the harms caused by alcohol and the perception of the best strategies that should be used by the government to control alcohol-related problems have not been explored among people with hazardous alcohol use in all countries using a homogeneous system. approach. We hypothesized that hazardous drinkers might have similar perceptions of alcohol policies within societies with similar socioeconomic characteristics.

Enhancing community awareness of lifestyle risk factors associated with cancer has been recognized as a crucial strategy for global cancer prevention [13]. Cancer is one of the most feared diseases among adults in Australia and worldwide. Increasing awareness of the connection between alcohol and cancer may encourage individuals to consider moderation or abstinence. However, international evidence indicates that most people are unaware of this link. In Australia [14], a recent study found that only 36.6% of adults were aware of the significant link between alcohol and cancer. Additionally, the study revealed that those aware of the risk were less likely to exceed the health guideline threshold for lifetime alcohol consumption [15, 16, 17, 18]. Few studies have examined this awareness among young people; a UK study reported that only 37% of individuals aged 15-24 were aware of the link [18]. To our knowledge, awareness of the link between alcohol and cancer has not been previously studied among Australian high school students [19].

Understanding adolescents' reasons for drinking is essential for developing intervention strategies. The social development model posits influence from social controls, social learning, and patterns of association (whereby antisocial attitudes and behaviours are acquired through interaction with others) as important predictors of poor and good behavioural choices in adolescence [20]. Consistent with this model, youth alcohol use has been associated with parental drinking attitudes [21], peer use, and perceptions of peer drinking attitudes [22]. According to this model, peer influence becomes increasingly important in later adolescence, when parental involvement and family influence decline [20]. The role of peer influence, particularly in late adolescence, has been supported in both theoretical and empirical alcohol studies [23].

Alcohol consumption among school children has been associated with several other associated variables, including more weekly spending money [24]; self-reported academic difficulty among women [25]; and engaging in other risk-taking behaviours, including smoking [26]. The relationship between alcohol consumption and socioeconomic status (SES) is less clear than it is with other cancer risk factors. People with higher SES tend to drink more often than others, but among those who drink, lower socioeconomic groups tend to drink larger amounts [27, 28].

Alcohol consumption has been strongly associated with various negative effects on human health [29] and with the occurrence of all types of unintentional injuries, including motor vehicle accidents [30]. It is clear from this survey that almost the entire population studied understands the potential dangers of alcohol consumption. However, the results of the present study suggest that hazardous drinkers perceive lower risks from drinking in both locations. Educational strategies, which are among the most common approaches implemented by governments, may have failed to reach the population most at risk of alcohol use [27]. In this case, strategies aimed at increasing awareness of alcohol-related dangers in this specific group should be implemented with an emphasis on negative health outcomes in Romania, but also in the EU (European Union). Education has been shown to be successful in raising awareness and can also create a positive atmosphere for the implementation of interventions, however, evidence has shown that alcohol consumption remains largely unaffected by this strategy [7,31,32]. On the other hand, it is possible that hazardous drinkers tend to undermine the harmful effects of alcohol as a defence mechanism associated with their own addiction [33], to justify their behaviour and/or minimize their uncomfortable experience of Cognitive dissonance [33, 34], where a different approach will be required. Further studies should aim to establish the causes and consequences of these findings, and potential interventions aimed at increasing awareness of the dangers of alcohol among hazardous drinkers should be explored.

Despite the severe and far-reaching consequences of alcohol use, success in preventing these problems has been limited. The purpose of this chapter is to describe a model of public

health prevention, which the committee used as a framework to organize its discussion of promising avenues of prevention research. The model's focus on the interplay of factors related to alcohol problems, as well as its ability to encompass a wide variety of intervention approaches, appears particularly useful.

To gain insight into the interplay of multiple factors, prevention specialists have adopted an epidemiological or public health model of alcohol-related problems. The model presents three major elements that act together to either produce or alleviate specific problems: the agent—alcoholic beverages or ethanol itself; the individual (host) — traits that affect a person's susceptibility or vulnerability to the effects of alcoholic beverages; and the environment – the physical, interpersonal, or social environment surrounding alcohol consumption that either regulates the individual's exposure to the agent or mediates the risk the agent poses to the individual.

This concept includes both macro and microenvironments, such as the legal environment (alcohol beverage control) laws, drink driving laws, minimum purchase age laws, zoning); the economic environment (prices, excise duty rate, promotions); the normative environment (general attitudes and beliefs about alcohol, the effects of mass media); and physical aspects of the drinker's immediate environment. As the model suggests, a specific alcohol-related problem does not result from just one or the other of these sources. Rather, the model emphasizes the interplay of sometimes subtle forces that shape the type and magnitude of problematic outcomes. The etiology of the specific problem—whether intoxication, addiction, or drink driving—can often be best understood from a public health perspective by isolating the relevant individual, agent, and environmental variables that contribute to the influences. The preventive study provides a method to determine the influence of a particular variable and its implications for subsequent interventions to prevent problem outcomes.

The public health approach to primary prevention has traditionally been aimed at decreasing the rate of occurrence (incidence) of a disease or disorder in a defined population. Prevention interventions, in general, can be seen as attempts to either modify an agent, host (individual) or environmental factor that contributes to an alcohol problem or, conversely, to exploit a factor that reduces risk.

Poor oral health is a significant problem among people who drink alcohol regularly (chronic alcoholics), but little is known about their oral health care needs and whether interventions and guidelines are implemented within alcohol-dependent treatment services. alcohol.

Aim and objectives

The present study primarily proposes the identification of frequent oral pathology in chronic alcohol users, the assessment of existing oral health care needs, the assessment of oral health problems in relation to alcohol consumption as well as the assessment of the need for an oral health education program specially intended for people who consume alcohol chronically.

MATERIAL AND METHODS

To carry out this study, a cross-sectional comparative clinical study was carried out, which considered two groups: the test group - people addicted to alcohol and the control group - non-alcoholic subjects who visited 4 dental offices in Arad, between August and December 2023. Subjects were classified as alcohol dependent based on the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnostic criteria [12].

Subjects who agreed to participate in the study and who gave their written consent had to be at least 18 years old and have at least 20 permanent teeth. Subjects with systemic diseases and those using antibiotics could not participate in the study.

Data were collected using interview and clinical examination. The proforma consists of two parts: The first part consists of socio-demographic details, tobacco use and DSM-5 criteria for alcohol dependence. The second part was the assessment of the oral health status. The subjects' oral health status was assessed using a modified WHO Proforma [13]. The dental condition index was used to assess the prevalence of dental caries; Periodontal status was assessed using the CPI index, mucosal lesions were assessed using modified WHO criteria [13].

Convenience sampling was used, with a total of 86 alcoholic patients examined, of whom only 56 patients were included in the study according to the criteria, and a total of 104 non-alcoholic subjects, of whom 76 were matched controls who met the inclusion criteria. All subjects who entered the study were explained the study procedure.

Oral examination was done using mouth mirror, OMS probe under adequate light (type III clinical examination). Alcohol-dependent subjects were examined in the psychiatric ward by being asked to sit on a chair. The controls were carried out in the dental offices where the subjects were chosen. Oral examination was performed to evaluate dental caries using dentition status index, CPI and LOA, was used to evaluate periodontal status, oral mucosa lesions were evaluated using WHO criteria. This procedure was followed by saliva and plaque collection for pH assessment.

Saliva collection. Whole unstimulated saliva specimens were collected by instructing subjects (study group, control group) not to use any oral stimulation such as eating and drinking for 90 min before collection. Subjects were in a sitting position and in an anterior head-prominence position. Saliva samples were obtained by expectoration into plastic cups.

The plaque sample was collected by Fosdick's method [14]. Plaque was collected using the blunt probe from the buccal, lingual and proximal surfaces of selected teeth (16, 21, 26, 36, 31 and 46) and was mixed in 10 ml of distilled water. The pH of the plate was tested using a digital pH meter.

Statistics were performed more descriptively between the two groups and comparisons, where p was considered significant at $p<0.05$. This was performed in Excel 365 and SPSS 19.0.

RESULTS

The analysis of socio-demographic criteria revealed that the average age was approximately the same in the two groups: Test group - 34.39 years, dev std 5.3, minimum 19 years, maximum 66 years, Control group - 35.79, dev. Std. 4.97, minimum 19, maximum 65 years It is observed that both groups have male subjects in the proportion of 87.5% and 89.75% respectively, thus there are no statistically significant differences between the two groups. Regarding the environment of origin, it can be observed that the subjects from the two batches are similar, most coming from the urban environment 73.21%, respectively 71.82%. The situation remains relatively the same also regarding the level of education, the only significant difference is the presence of only one subject with secondary school education among the control group. Demographic data have been summarized in the following table:

Table 1. Demographic data of the study groups

Variable	1st Group – test	2nd Group - control
Age	Average age = 34,4 yrs ± 5,3y Minimum age = 19 yrs	V average = 35,8 ani ± 4,97 ani Minimum age = 19 yrs

	Maximum age = 66 yrs		Maximum age = 65 yrs	
Gender				
Male	49	87,50%	50	89,29%
Female	7	12,50%	6	10,71%
Residence				
Urban	50	89,29%	53	94,64%
Rural	6	10,71%	3	5,36%
Tobacco use				
Smoking	50	89,29	53	94,64
Nonsmoker	6	10,71	3	3
Completed studies				
Gymnasium	6	10,71%	1	1,79%
Highschool	31	55,36%	33	58,93%
College	19	33,93%	22	39,28%

In both groups most subjects are smokers 89.29% of the test group and 94.64% of the control group. The average number of cigarettes smoked/day is 18.7 with a standard deviation of 6.3 in the test group and 15.2 with a standard deviation of 4.1 in the control group.

Prevalence of dental caries among alcohol-dependent subjects and non-alcoholic subjects: In the entire experience dental caries among alcohol-dependent subjects and non-alcoholic subjects was assessed using dentition status.

Table 2. Oral evaluation results at the two study groups

Variable	1st Group – test		2nd Group - control	
Dental caries				
Present	11	37,50%	7	15,50%
Not present	35	62,50%	49	87,50%
Root residues				
Present	7	15,50%	4	7,14%
Not present	49	87,50%	52	92,86%
Missing tooth				
Present	22	39,29%	17	30,36%
Integral arch	34	60,71%	39	69,64%
Presence of periodontitis				
Severe +	19	33,93%	9	16,07%
Moderate -	37	66,07%	45	80,36%
Not present	0	0%	2	3,57

Caries experience was significantly higher among alcoholics (5.92±2.89) compared to non-alcoholic subjects (4.51±2.04). When individual damaged, missing, filled components were compared between alcohol-dependent and non-alcoholic subjects, the missing component was significantly greater among alcoholics (1.81±2.31) compared to non-alcoholic subjects (0.65± 0.96). No significant difference was observed for the decayed and filled components of the teeth.

Root remnants are more common in patients in the test group, as well as missing teeth, however the differences are not statistically significant, p=0.079 for root remnants and p=0.81 for missing teeth. The presence of periodontitis 33.92% of subjects in the test group and 16.72% of subjects in the control group.

Periodontal status among alcohol dependent and non-alcoholic subjects was assessed using the CPI index showing the prevalence of periodontitis was higher (89.61%) in alcohol dependent subjects compared to controls (78.67%). Periodontal disease was significantly

higher among alcoholics (2.31±1.68) compared to non-alcoholic subjects (1.39±1.22). Only non-pouching bleeding was significantly higher among non-alcoholic subjects (1.43±1.00) compared to alcohol-dependent subjects (0.83±0.80). Attachment loss up to 4–8 mm was significantly greater among alcohol-dependent subjects (0.96±1.61) compared to non-alcoholic subjects (0.43±0.99).

Table 3. Periodontal status

Signs of periodontitis CPI	1st Group – test Media/ Mediana	2nd Group - control Media/ Mediana	Test Mann-Witney p
No symptoms	0/0	0,3/0	0,081
Bleeding	0,83/ 1	1,45/1	0,002
Calcutta	2,80/ 3	3,15/ 3	0,078
4-5 mm pocket	1,98/ 2	1,27/ 1	0,003
Over 6 mm pocket	0,32/ 0,5	0,12/ 0	0,054

The prevalence of oral mucosal lesions was high in alcohol-dependent subjects (39.28%) compared to non-alcoholic subjects (26.78%). Among the various types of oral mucosal lesions reported, leukoplakia had the highest prevalence in alcohol-dependent subjects (16.07%), followed by oral submucosal fibrosis (5.67%), erythroplakia (7.14%) and candidiasis (10.71%).

The following table shows a comparative analysis of salivary and midpalate pH between alcohol-dependent subjects and non-alcoholic subjects. Subjects who were classified as alcohol dependent had lower plaque pH (6.59±0.25) and salivary pH (6.79±0.28) compared to non-alcoholic subjects (plate pH 6, 63±0.25, salivary pH 6.86±0.23), but the difference was not statistically significant.

Table 4. Plaque pH at the two groups

pH	Test group	Control group	Comparative test p
plaque pH	6,59 (0,25)	6,63 (0,25)	0,49
saliva pH	6,79 (0,28)	6,86 (0,23)	0,47

DISCUSSIONS

During the entire dental caries experience among alcohol-dependent subjects (test group) and non-alcoholic subjects (control group) was evaluated using dentition status. Caries experience was significantly higher among alcohol-dependent subjects (5.92±2.89) compared to non-alcoholic subjects (4.51±2.04), with a significantly higher number of missing teeth observed among alcoholics (1.81±2.31), this finding was like the conclusions of previous studies [5,15-18]. Subjects in the test group had permanent tooth loss three times greater than the national age-matched average as reported by the US Alcoholic Patient Survey [19]. Alcoholics and substance abusers are known to have poor oral health. Alcohol drinkers suffer from dry mouth at night and neglect both personal and professional health care and consume large amounts of refined carbohydrates, which may be the likely reason for the increased caries experience observed in them [5].

Alcohol addicts had an increased risk of periodontal disease. Pockets were significantly elevated among alcoholic subjects compared to non-alcoholic subjects. Like a study in Japan that reported that alcoholics have more than one-third of teeth with pocket depth ≥ 4 mm compared to non-drinkers [10]. The same study showed an association between amount of alcohol consumption and periodontal disease in Japanese factory workers [20].

Periodontal problems in alcoholics have been mainly associated with poor oral hygiene and poor dental care [21].

Alcohol addicts had an increased risk of loss of clinical attachment. Attachment loss was significantly greater among alcoholics compared to non-alcoholic subjects. Another study reported comparable advanced clinical periodontal attachment loss (≥5 mm) in alcoholics compared to community controls [23]. They reported that persistent alcohol abuse, as indicated by elevated levels of gamma glutamyl transpeptidase (GGTP) in the blood, is significantly associated with attachment loss. Additionally, greater attachment loss in alcoholics may be the result of abnormalities in cytokine production. This cytokine is toxic to various cells and can lead to apoptosis and cell death [24]. Alcohol can damage periodontal tissues having a negative effect on host defences. It results in complement deficiency, defective neutrophil function (decreased adhesion, motility, phagocytic activity) and increases the frequency of periodontal infections. Alcohol has a toxic effect on the liver. Prothrombin production, vitamin K activity, and the coagulation mechanism may be disrupted, and haemorrhage may occur. Exaggerated gingival inflammation, red-bluish discoloration, and bleeding with mild provocation are common in alcoholics [22].

The prevalence of mucosal lesions was high in alcoholics (39.75%) compared to non-alcoholics (26.97%). These findings are like other studies in specialized literature [2,7,25]. Alcohol abuse is an established risk factor for oral and pharyngeal cancer [1]. Evidence suggests that the increasing incidence of oral cancer, particularly in younger people, is associated with increased alcohol consumption rather than tobacco use [8]. Tobacco consumption and alcohol consumption synergistically influence the development of oral epithelial dysplasia, [6]. Alcohol alters mucosal permeability by altering the rate of penetration of substances from the oral environment through the mucosa, and this may play a role in carcinogenesis [8]. These findings were supported because the etiology of oral mucosal abnormalities is multifactorial, with lifestyle factors such as tobacco and alcohol consumption playing a major causal role in many lesions. This pattern of combined tobacco and alcohol use is not unusual, as unhealthy behaviours often occur in combination. Even in the present study, both alcoholics and controls were smokers, but the amount of smoking was greater among subjects who were classified as alcoholics.

Saliva and plaque pH in subjects who were classified as alcoholics had lower plaque pH (6.59±0.25) and salivary pH (6.79±0.28) compared to non-alcoholics (plate pH 6.63±0.26, salivary pH 6.81±0.23), but the difference was statistically insignificant. Another study conducted in the USA reported that the pH values of both unstimulated and stimulated saliva were lower in the alcoholic group [26]. Chronic excess consumption of acidic beverages such as alcohol can directly lead to a decrease in pH, chronic alcohol consumption can influence the decrease in salivary flow. Differences in salivary pH values are obviously caused by differences in flow rates, as low flow rates result in low pH values.

Alcohol consumption can have both short-term and long-term effects on oral health. While moderate alcohol consumption may not pose significant risks, excessive or chronic alcohol consumption can lead to various oral health problems. Our study demonstrated that alcohol consumption can affect oral health in several ways:

• **Dry mouth:** Alcohol is a diuretic, which means it increases urine production and can lead to dehydration. Dehydration can cause dry mouth, a condition where there is a decrease in saliva production. Saliva plays a crucial role in maintaining oral health by lubricating the mouth, neutralizing acids, and preventing tooth decay. Dry mouth can contribute to bad breath, tooth decay, gum disease and oral infections.

• **Increased risk of oral cancer:** Excessive alcohol consumption is a known risk factor for oral cancer. When alcohol is combined with tobacco use, the likelihood of developing oral

cancer increases significantly. Alcohol irritates and damages cells in oral tissues, making them more susceptible to cancerous changes.

- **Diseases of the gums.** Alcohol abuse weakens the immune system, making it harder for the body to fight infections, including gum disease. Long-term alcohol consumption can lead to gum inflammation, gum recession and periodontal disease. Gum disease, if left untreated, can lead to tooth loss and overall deterioration of oral health.

- **Dental caries.** Alcoholic beverages often contain sugars and acids, which can contribute to tooth decay. Frequent consumption of sweet and acidic drinks, such as cocktails or sweet wines, increases the risk of tooth decay. Alcoholic beverages can erode tooth enamel, making teeth more susceptible to decay.

- **Tooth staining and discoloration.** Alcoholic beverages, especially red wine and dark liquors can stain teeth over time. The pigments in these drinks can adhere to the tooth enamel, resulting in visible discoloration and a dull appearance of the teeth.

- **Delayed healing.** Alcohol affects the body's ability to heal and regenerate tissues. After oral surgery, drinking alcohol can hinder the healing process, increase the risk of complications, and delay recovery.

To minimize the potential negative impact of alcohol on oral health, it is advisable to consume alcohol in moderation or consider abstaining altogether. Practicing good oral hygiene, including regular brushing, flossing, and using antimicrobial mouthwashes, can help maintain oral health. In addition, regular visits to the dentist for professional check-ups and cleanings are crucial for early detection and treatment of any oral health problems. If drinking becomes a problem, it may be beneficial to seek professional help and support from health care providers or support groups.

To develop a prevention program aimed at reducing alcohol consumption and preventing the oral health problems associated with it, the following strategies can be implemented:

- <u>Education and awareness</u>: increasing public awareness of the link between alcohol consumption and oral health problems; providing educational campaigns, seminars and workshops highlighting the risks of excessive alcohol consumption on oral health and stressing the importance of moderation and responsible drinking.

- <u>Screening and intervention</u>: Implementing screening protocols in dental clinics, primary care settings, and substance abuse treatment centres to identify individuals at risk of alcohol abuse or binge drinking and providing brief interventions and referrals to specialized treatment programs, when appropriate.

- <u>Collaborative Care</u>: Encourages collaboration between oral health professionals, primary care providers, and substance abuse specialists on the one hand while developing referral networks and communication pathways to ensure comprehensive care for individuals who require both health oral as well as alcohol-related interventions.

- <u>Counselling and behavioural support</u>: Providing counselling and behavioural support services to people seeking help to reduce alcohol consumption and providing guidance on setting realistic goals, developing coping strategies, and accessing support groups or counselling services to address the underlying factors that contribute to excessive alcohol consumption.

- <u>Motivational interviewing</u>: Using motivational interviewing techniques to increase individuals' intrinsic motivation and willingness to change their drinking behaviour. This approach can help individuals explore their reasons for changing, identify barriers, and develop a plan to reduce alcohol consumption.

- <u>Oral health promotion</u>: Incorporating oral health promotion messages into alcohol prevention programs and materials. Highlighting the impact of alcohol consumption on oral health, including the risk of gum disease, tooth decay, oral cancer, and dry

mouth. Encouraging regular dental visits, proper oral hygiene practices and the importance of a healthy lifestyle.

• **Community Partnerships**: Collaborating with community organizations, schools, and local government agencies to implement comprehensive prevention programs and engaging in community events, health fairs and awareness campaigns to reach a wider audience and promote a culture of responsible consumption of alcohol and oral health.

• **Policy initiatives**: supporting policies that support responsible drinking and oral health. These may include regulations on the marketing and availability of alcohol, taxation, and measures to discourage alcohol abuse.

• **Virtual Reality Therapy:** Virtual reality (VR) can be a valuable tool in the treatment of alcohol addiction. By using VR programs that gradually expose patients to scenarios involving alcohol, such as being in bars or social situations where others are drinking and offering drinks, patients can develop and strengthen their ability to resist temptations. This method, known as exposure therapy, allows patients to face their triggers in a controlled environment, helping them build resilience and the capacity to say no to alcohol. Over time, this gradual exposure can reduce the power of these triggers, making patients less likely to relapse when they encounter similar situations in real life.

VR therapy can be customized to the specific needs and triggers of individual patients. For instance, scenarios can be designed to mimic bars or social environments where the patient has previously experienced difficulties. This personalized approach enhances the effectiveness of the therapy, as patients are more likely to encounter realistic simulations of their own experiences. Additionally, VR can be used to practice coping strategies in real-time, such as engaging in alternative activities, using refusal skills, or employing relaxation techniques, all within the safety of a virtual setting.

Moreover, the use of VR in addiction treatment offers a significant advantage in terms of accessibility and convenience. Patients who may find it difficult to attend in-person therapy sessions due to geographical, financial, or personal constraints can benefit from VR therapy sessions conducted at home or in local clinics. This flexibility can lead to higher engagement and adherence to treatment programs, ultimately improving outcomes. As technology advances, the integration of VR into addiction therapy holds promise for creating more immersive and effective treatment options, offering new hope for individuals struggling with alcohol addiction.

CONCLUSIONS

Subjects classified as alcohol-dependent exhibited slightly lower mean pH levels in dental plaque and saliva, along with a higher prevalence of dental caries, root remnants, missing teeth, periodontitis, and mucosal lesions compared to non-alcoholic subjects. Alcoholics often face an increased risk of missing teeth, cavities, and periodontal disease. The combination of alcohol consumption and poor oral hygiene practices can exacerbate these oral health issues. Our study highlighted the impact of alcohol on missing teeth, cavities, and periodontal disease in alcoholics, and we describe the possible causes below:

Chronic alcohol consumption can contribute to tooth loss in several ways. Firstly, alcohol abuse is often associated with poor nutrition, which can weaken teeth and gums, increasing the risk of tooth loss. Additionally, alcohol can impair judgment and coordination, leading to accidents or injuries that result in tooth loss. Lastly, neglect of oral health related to alcohol use, such as skipping routine dental care and necessary treatments, can further the progression of oral health problems and lead to tooth loss.

Alcohol consumption, especially when combined with sugary drinks or alcohol high in sugar, can contribute to the development of dental caries. Frequent consumption of sugary drinks and poor oral hygiene practices among alcoholics can create an environment conducive to the growth of harmful bacteria that cause dental caries. Furthermore, alcohol's acidic properties can erode tooth enamel, making teeth more susceptible to cavities.

Alcohol abuse weakens the immune system, affecting the body's ability to fight infections, including those of the gums. This compromised immune response can increase the risk of periodontal disease (gum disease) in alcoholics. Gingival inflammation, bleeding gums, gum recession, and even tooth loss can occur due to the combined effects of alcohol-induced immune suppression and poor oral hygiene practices.

Alcoholism often leads to the neglect of oral health care. Individuals struggling with alcohol dependence may prioritize alcohol consumption over routine dental care, including regular check-ups, professional cleanings, and necessary treatments. This neglect can further contribute to the progression of oral health issues, including tooth loss, dental caries, and periodontal disease.

Addressing these oral health issues in alcoholics requires a comprehensive approach that combines oral health education, access to dental care, substance abuse treatment, and behavioural support. Integrating oral health care into substance abuse treatment programs and providing tailored interventions can help individuals improve their oral health while addressing underlying addiction issues.

The integration of virtual reality (VR) therapy into the treatment of alcohol addiction represents a promising advancement in addiction management. By providing a controlled environment for gradual exposure to alcohol-related triggers, VR therapy helps patients build resilience and develop effective coping strategies. This innovative approach not only personalizes treatment to individual needs but also enhances accessibility for patients who may face barriers to traditional therapy methods. As VR technology continues to evolve, its application in addiction therapy holds the potential to significantly improve treatment outcomes, offering a novel and effective tool in the ongoing effort to combat alcohol addiction. The findings and discussions presented in this study underscore the importance of incorporating such cutting-edge technologies into comprehensive treatment plans, ultimately contributing to better health and recovery outcomes for individuals struggling with alcohol dependence.

As such, collaborative efforts between dental professionals, substance abuse specialists, healthcare providers and Virtual Reality Therapies are crucial in supporting the oral health needs of alcoholics.

Study Limitations

The small sample size was a limitation of the study, as it was conducted over a short duration, resulting in a smaller sample being obtained. Therefore, further studies on a larger sample size are recommended.

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