



EFFECT OF CHRONIC CONSUMPTION OF ALCOHOL IS ASSOCIATED WITH THE DEVELOPMENT OF PERIODONTAL POCKETS OVER A PERIOD OF 1 YEAR FOLLOW-UP

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Abstract

Background: Alcohol consumption not only affects the general health yet in addition the dental and gingival health of a person. Heavy drinkers are at high danger of creating dental caries, gingival health alteration and tooth disintegration. This condition brings about change in the salivary gland function. Alcohol consumption, like smoking, may be related to periodontal disease independently of oral hygiene status.

Aim: This study presented to assess the relationship between alcohol consumption severity and development of periodontal pocket. This may help dental practitioners to efficiently manage periodontal conditions.

Materials and Method: One hundred and twenty 35-40 years old men with alcohol consumption selected randomly. Alcohol consumption individuals classified into three groups according to frequency of alcohol consumption: regular drinker (GA), frequent drinker (GB) and occasion drinker (GC). Each group consists of 40 individuals. Gingival (GI), calculus (CI), plaque index (PII) and dental caries (DMFT) indices were utilized to assess dental and gingival health for all individuals. Periodontal examination included gingival bleeding (GB), probing

depth (PD), clinical attachment loss (CAL), and Alveolar bone loss (ABL) were also determined. The results of present study were dissected utilizing SPSS version 23.

Results: The median is higher in GA than GB and GC with highly significant difference between groups. For PII, median is higher in GC than other groups, but the mean rank is higher in GA than other groups (no significant difference). For both GI and CI, median and mean ranks are higher in GA than others with significant difference between them. GA also had greater levels of PD, GB, CAL, and ABL compared to the low drinking groups.

Conclusion: Dental caries and periodontal diseases were more presented in individuals with more frequent alcohol consumption. Alcohol drinking increase the occurrence of dental caries. The results suggest that alcohol consumption is associated with moderately increased severity of periodontal disease. Longitudinal studies are needed to determine whether alcohol is a true risk factor for periodontal disease.

Keywords: Alcohol consumption; Regular drinker; DMFT; Periodontitis; Clinical attachment loss; Inflammation; Gingival recession.

Introduction

Periodontitis is invariably described as having a systemic host-mediated component. Several studies have sought to identify and further understand relationships between periodontitis and potential systemic risk factors including consideration of possibilities such as genetic disorders, osteoporosis and alcohol.¹ Increased alcohol consumption is known to have a broad range of detrimental systemic effects with the attendant potential of modifying the host-mediated response and affecting risk.²

Periodontal disease is caused by three or more presumed disease-causing periodontal pathogens. The disease is categorized as mild, moderate or severe. It damages the bone and connective tissue that supports the teeth. When pockets around the tooth become 4mm deep on probing, the tooth is at risk for infection. When pockets are 6mm to 7mm or more and there is attachment loss, the tooth is at risk for falling out. The greater the number of teeth lost, the higher the extent of severe periodontal disease.³

While many studies have linked alcohol consumption to other diseases, few have looked at its effects on periodontal disease.⁴ Since excessive alcohol intake can contribute to faster biofilm formation and alcohol users are more likely to have poor oral hygiene, the researchers wanted to see if alcohol consumption was associated with periodontitis. Alcohol consumption, like smoking, may be related to periodontal disease independently of oral hygiene status. Established risk factors for periodontal disease are far from explaining the total variability for disease severity. Researchers are considering other possible factors, with life-style among the proposed additional factors.⁵

Alcohol consumption and oral health share a cause-and-effect relationship, with alcohol serving as the catalyst for the development of many diseases that affect your oral health. Dental decay, gum disease and increased chance of oral cancer are among the risks associated with excessive alcohol consumption.⁶

Alcohol impairs neutrophil, macrophage, and T-cell functions, increasing the likelihood of infections, possibly raising the risk of periodontitis. Despite the plausible mechanisms, information relating alcohol consumption to periodontitis risk is sparse. Previous cross-sectional and case control have shown positive associations between alcohol use and periodontal disease however, prospective data are not yet available.⁷ Furthermore, this was the only study to assess the relationship between alcohol consumption severity and development of periodontal pocket.

Periodontitis results from bacterial growth in the mouth. Sugars in alcohol feed these bacteria such as *Bacteroides forsythus*, *Actinobacillus*, *Actinomycetemcomitum*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Campylobacter rectus*, *Fusobacterium nucleatum*, *Eubacterium saburreum* and can cause inflammation of the gingiva leading to bleeding, swelling and bad breath among other symptoms.⁸ As periodontitis progresses, it can lead to loosened gum tissue and tooth loss. Recent research has even suggested that alcohol and oral health may have even more far-reaching effects on your overall health, with periodontitis thought to play a major role in conditions such as premature birth and diabetes.⁹

Established risk factors for periodontal disease are far from explaining the total variability for disease severity. Researchers are considering other possible factors, with life-style among the proposed additional factors. It is estimated that up to 90% of the U.S. population drink alcohol,

40 to 50% of men have temporary alcohol-induced problems, and 10% of men and 3 to 5% of women develop pervasive and persistent alcoholism.¹⁰

An investigation got more caries activity among drunkards, likewise the heavy drinkers had more number of endodontically filled teeth in correlation non-heavy drinkers. Alcoholic drinkers had an extracted tooth three times more than the non-drinker for comparing ages. Other research also found a positive relation between alcohol abuse and caries activity.¹¹

Alcohol consumption can prompt periodontal impairment for various reasons involving: gingival tissue aggravation; less oral cleanliness propensities among incessant liquor consumers; improper dietary patterns causing nourishing inadequacies among interminable heavy drinkers causing alteration of defense mechanism to exposing destructive compounds; less salivary discharge from liquor misuse make the microbes and plaque develop on the grounds that they are not eliminated away by salivation; progression of diseases to more serious condition as a result of ignorance of early symptoms of gingival diseases may lead periodontal impairment.¹²

Aim

The purpose of this study was to assess the relationship between alcohol consumption severity and development of periodontal pocket using gingival bleeding, clinical attachment loss, alveolar bone loss.

Materials and Method

One hundred and twenty 35-40 years old males with alcohol consumption from Kanpur City were included in this cross-sectional study. The study was approved by the Institutional Ethics Committee (RDCHRC/ETHICSCOMMITTE/0167). Written informed consent was obtained from each study participants. Exclusion criteria were the need for antibiotic premedication to prevent infective endocarditis, and edentulousness. Self-reported alcohol consumption was assessed by means of previously validated questionnaires. Subjects were asked about the usual number of drinks/ week they consume.

Alcohol consumption individuals classified into three groups according to frequency of alcohol consumption¹³: Each group consists of 40 males.

1. Regular drinker (GA) (More than four a week)
2. Frequent drinker (GB) (One to four days a week)
3. Occasion drinker (GC) (Less than three days a week).

Gingival aggravation evaluated by utilizing gingival index (GI) of Loe and Silness¹⁴. Oral cleanliness status assessed by using Ramfjord calculus index (CI)¹⁵, and plaque index (PII) from claiming Silness and Loe¹⁶. Caries experience for each drinkers recorded according to WHO criterion utilizing DMFT index¹⁷.

Periodontal examination included gingival bleeding (GB), probing depth (PD), and clinical attachment loss (CAL) measurements on all teeth present except third molars as described previously. Gingival bleeding measurements were performed on 3 sites per tooth. For the assessment of GB, a score of 1 for bleeding and 0 for no bleeding was assigned to individual tooth surfaces in response to the periodontal probe run along the gingival sulcus. The percentage of sites with bleeding to total number of sites described the subject's GB scores. PD measurements were done with an automated probe with a constant force of 20 grams on 6 sites per tooth (distobuccal, midbuccal, midpalatal/lingual, mesiopalatal/lingual), excluding third molars and tooth remnants, and the deepest pocket on each tooth was registered. The pocket depth of each tooth was recorded as follows: no pathologically deepened periodontal pocket (probing depth <4mm), periodontal pockets with a depth of 4-5mm and periodontal pockets with a depth of ≥ 6 mm and CAL were calculated according to the formula: $CAL = PD - (GM - CEJ)$. Alveolar bone loss (ABL) was determined by the method of Hausmann et al. using an operator interactive program on digitized radiographic images.¹⁸

The reliability of the self-reported alcohol consumption was assessed by comparing responses of the cross-sectional study to those of the follow-up study 1 year later. Percent of complete agreement and its chance-corrected version Kappa statistics were calculated for this purpose. Periodontal examinations were performed by calibrated examiners. Replicate measurements of CAL and ABL on randomly determined patients were done throughout the study to control inter and intra-examiner variability. The examiners were blinded to patients' alcohol consumption status.

Statistical Analysis

Statistical analysis consisted of descriptive and analytic statistics. Selected parameters were analyzed by utilizing SPSS 23 version (Statistical Package for Social Sciences).

Results

Table 1 illustrates the median and mean rank values of DMFT index among drinkers groups with statistical significance. The median and mean rank are higher in GA than GB and GC with highly significant difference between groups (Kruskal Wallis value = 10.000, p-value = 0.007). Mann-Whitney test for DMFT index shows highly significant difference between GA and GC (Mann-Whitney value = 487.000, Z = -3.050, p-value = 0.002), and significant difference between GB and GC (Mann-Whitney value = 579.500, Z = -2.150, p-value = 0.032), while no significant difference between GA and GB.

Table 1: Mean rank and median of DMFT among drinker groups with statistical significance.

	Drinker group	Median	Mean Rank	Kruskal Wallis Test (Chi square)	p-value
DMFT	GA	14	70.88	10.000	0.007**
	GB	13	63.46		
	GC	12	47.16		

Median and mean rank of PII, GI and CI among drinker groups are demonstrated in Table 2. For PII, median is higher in GC (1.73) than other groups, but the mean rank is higher in GA (69.03) than other groups (no significant difference). For both GI and CI, median (1.71, 1.67 respectively) and mean rank (74.74, 72.39) are higher in GA than others with significant difference between them (Kruskal Wallis value = 11.214, 8.087, p-value = 0.004, 0.018 respectively). Mann-Whitney test for GI and CI record significant difference between (GA and GB), also between (GA and GC), while no significant difference between GB and GC.

Table 2: Mean rank and median of gingival, calculus and plaque indices among drinker groups with statistical differences.

Variables	Drinker group	Median	Mean Rank	Kruskal Wallis Test (Chi square)	p-value
PII	GA	1.71	69.03	3.63	0.163
	GB	1.69	55.74		
	GC	1.73	56.74		
GI	GA	1.71	74.74	11.214	0.004**
	GB	1.61	57.51		
	GC	1.50	49.25		
CI	GA	1.67	72.39	8.087	0.018*
	GB	1.49	58.56		
	GC	1.33	50.55		

Table 3 compares periodontal status in drinking groups. The high drinking groups had significantly higher levels of probing depth than the low drinking groups. They also had greater levels of GB, CAL, and ABL compared to the low drinking groups.

Table 3: Periodontal Status of the Study Population by Alcohol Consumption at 1 year follow-up.

	GA	GB	GC
PD (mm)	0.70 ± 0.28	0.68 ± 0.29	0.67 ± 0.29*
GB (%)	0.43 ± 0.25	0.38 ± 0.23	0.37 ± 0.22
CAL (mm)	2.61 ± 1.25	2.57 ± 1.29	2.24 ± 1.06
ABL (mm)	2.86 ± 1.60	2.60 ± 1.39	2.58 ± 1.35

* Mean ± SD.

Discussion

The problems of severe alcoholism have been linked with alteration in oral tissues and neglecting of oral health. Many researches recorded the association between alcohol drinking and oral health.¹⁹

This study showed that dental caries experience was higher in regular drinker than other groups. The amount of alcohol taken and prevalence of dental caries are associated positively. This finding is agreed with many studies.²⁰ Alcohol drinkers are known to have bad oral hygiene. It was found that alcohol user had incorrect personal and professional health care and also had dry mouth at night. Also, the consumption of high amount of refined carbohydrates may be the cause for high caries experience noted among them.

Periodontal disease represents many problems that can be ranged from simple inflammation of the gingiva to more serious one. Usually, it started in the mouth with bacterial growth along with building of plaque on the gingiva. This can lead to inflammation or even a severe infection. Some kinds of gingival disease may be also become worse by alcohol consumption. It has been found in this study that mean rank of PII, GI, CI are higher in GA group than others and this is may be due to irritation to the gingival tissue. This result is in line with many studies.²¹ Also, the individuals who are involved in alcohol user tend to have a bad dental hygiene habits. This result in making them more susceptible to such problems. The alcoholics persons tend to eat poorly, and this may cause nutritional deficiencies leading to all kinds of a disease to happen. Deficiencies in the diet can also make lowering in effectiveness of the immune response and so increasing the developing of gingiva disease. The persons who drink alcohol will often display the early symptoms of gingival disease which mean that easily treatable case of gingivitis will be progressed to a more serious one that involved permanent damage to the gums and teeth. In general, a poor oral health and bad dental care were associated with the periodontal problems in alcohol abusers.

Although biologic plausibility of alcohol effect on periodontal tissues exists, most articles concentrated on its behavioral effect, poor oral hygiene, to explain the higher incidence and severity of periodontal disease found in chronic alcohol consumers. In our study we controlled for the confounding effects of plaque, putative periodontal microorganisms, and other explanatory variables for periodontal disease. Alcohol consumption was still significantly related

to GB and CAL, and there was a significant trend in the odds of more ABL with increasing levels of alcohol consumption.

Alcohol may affect periodontal tissues through different mechanisms. 1) There is evidence that alcohol has an adverse effect on host defense. It is associated with complement deficiency, defective neutrophil function (decreased adherence, motility, phagocytotic activity), and increased frequency of infections. 2) Alcohol has a toxic effect on the liver. Prothrombin production, vitamin K activity, and clotting mechanism may be disrupted and hemorrhage may take place. Exaggerated gingival inflammation, bluish-red discoloration, and bleeding with slightest provocation are commonly seen in alcoholics. 3) Alcohol may interfere with protein metabolism and tissue healing. A history of combined vitamin B-complex and protein deficiency is often obtained from alcoholics. 4) In vitro studies suggest that ethanol stimulates bone resorption and blocks the stimulation of bone formation. 5) Finally, alcohol may have direct toxic effects on periodontal tissues. Most of the plausible mechanisms described above were studied in alcoholics.²²

Our study is the first to use quantitative measurements of PPD, GB, CAL and ABL as dependent variables in the alcohol consumption periodontal disease relationship. Sakki et al., in a sample of 780 subjects from a 55 year-old Finnish population, using stepwise multiple logistic regression controlling smoking and tooth brushing frequency in the final model, found that mean percentage of PDs deeper than 3 mm was significantly related to alcohol consumption of >7 drinks/2 weeks (3.5 drinks/week) (OR = 2.52, 95% CI: 1.40 to 4.54). PD does not necessarily reflect the amount of periodontum lost. Also, tooth brushing frequency does not represent the quality of oral hygiene. However, this study suggests an association between alcohol intake and periodontal disease.²³

The results of this study suggest that alcohol may affect soft and hard tissues of the periodontum differently. The strongest effect of alcohol seems to be on the gingiva, followed by periodontal ligament, and finally alveolar bone. This may be an implication of the direct toxic effect of alcohol on periodontal tissues, gingival tissues being the first to be affected, followed by deeper structures such as periodontal ligament and bone.²² This does not rule out the possible systemic effects of alcohol which may act independently.

Our results suggest that the relationship between alcohol and CAL may be dose-dependent, but the one between alcohol and gingival bleeding may not. The net result of alcohol's effect on periodontal disease or other diseases may depend on dose, frequency, timing, and pattern (including regular, random, or periodic) of exposure. Accurate information on alcohol consumption is rarely elicited, and different questions elicit varying degrees of reliability and validity. We can conclude that alcohol intake may be a risk indicator for periodontal disease. Further studies to confirm this relationship and to test possible underlying mechanisms are needed.

Conclusion

The purpose of this study was to assess the relationship between alcohol consumption and severity of periodontal disease using periodontal pocket, clinical attachment loss and alveolar bone loss controlling for principal confounding variables. Alcohol intake may be a risk indicator for periodontal disease. Further studies to confirm this relationship and to test possible underlying mechanisms are needed. The results suggest that alcohol consumption severity is associated with increased severity of periodontal disease. Longitudinal studies are needed to determine whether alcohol is a true risk factor for periodontal disease.

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