

Assessment of Alcohol Consumption as a Potential Risk Factor On Periodontal Attachment Loss: A Longitudinal Study

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In this modern society of ours alcohol has become a tradition and this relationship is deeply rooted. Apart from other health risk issues, its use has also emerged as a possible risk factor for periodontitis in reported recent reviews. Numerous prospective studies are already reported in literature but lack of such longitudinal studies to review the association of alcohol consumption on periodontal health status of the patients are rare. The aim of this study was to assess the relationship of alcohol consumption as a potential risk factor on periodontal attachment loss. It is a population-based cohort study conducted for a period of 4 years. A total of 1385 individuals were included in the study and only 730 individuals were left for the follow up after 4 years. Alcohol consumption and clinical examination for clinical attachment loss was recorded for each patient. Majority of subjects belonging to age group 35-44yrs, 45-54 yrs and 55-64 yrs showed high frequency intake of alcohol. Overall when measured, alcohol consumption and CAL progression was found to be significantly higher in males as compared to females. The subjects who were high and chronic drinkers, had 40% higher risk for CAL progression than non-drinkers. We concluded a positive linear relationship of alcohol consumption and periodontal attachment loss with more pronounced effect on males as compared to females. Thus alcohol proves to be a potential risk factor in progression of periodontitis in both high and chronic alcohol dosage.

Keywords: Alcohol consumption, Periodontal Attachment loss, Longitudinal study, Risk factor.

In this modern society of ours alcohol has become a tradition and this relationship is deeply rooted. It has become a social taboo now a days. As excess consumption of anything is bad, excessive intake of alcohol is now a major world wide public health problem. Globally, alcohol misuse was the fifth leading risk factor for premature death and disability in 2010. Among people between the

ages of 15 and 49, it is the first.¹ In the age group 20–39 years, approximately 25 percent of the total deaths are alcohol attributable.²

Apart from other health risk issues, its use has also emerged as a possible risk factor for periodontitis in reported recent reviews. Documented Studies have shown linear relationship between risk of periodontitis and alcohol consumption.³



Chronic periodontitis is an inflammatory microbial disease that affects the tooth supporting structures. The micro-organisms present in the subgingival biofilm is the causative agent that precipitates the host immune response. Because of this immune response numerous cytokines are activated which ultimately causes destruction of the tooth supporting structures and leads to periodontal problems along with pocket formation and tooth mobility.⁴ Evidence shows that consumption of alcohol has emerged as a major risk indicators which is correlated with periodontal attachment loss /Clinical attachment loss (CAL)⁵.

Numerous prospective studies are already reported in literature but lack of such longitudinal studies to review the association of alcohol consumption on periodontal health status of the patients are rare. Therefore the aim of this present 4-yr long longitudinal study was to assess the relationship of alcohol consumption as a potential risk factor on periodontal attachment loss.

MATERIAL AND METHODS

This study was designed to be a population-based cohort study which included a larger sample size and was conducted for a period of 4 years i.e from September 2013 till October 2017, in the department of Oral Pathology. The study population included the adults visiting the department, ageing 25yrs and above with history of alcohol consumption from atleast last 1 years. Ethical clearance was obtained from the institutional ethical committee. Individuals included in the study were duly informed and an informed consent was obtained from all. A total of 1385 individuals showed interest in the study and thus were included in the study sample. Complete oral examination along with proper history was obtained from each subject laying more stress specifically on habit and history of alcohol consumption. Clinical examination included examination of all permanent completely erupted teeth for periodontal/CAL (Clinical attachment loss), except all the erupted third molars, using a colour coded periodontal probe. The obtained CAL was combined sum of probing depth and gingival recession. CAL progression was considered when showed proximal CAL progression ≥ 3 mm in ≥ 2 teeth over the 4-years of follow-up.

All the study subjects were categorized on basis of frequency of alcohol intake as follows :a)Group 1: Non drinker/Low frequency of alcohol intake(≤ 1 glass in a week), b) Group 2: moderate frequency(>1 glass in a week, c) Group 3: High frequency of alcohol intake (≥ 1 glass a day), d) Group 4: Chronic alcoholics(>1 glass in day).

A follow up was also performed for all these subjects after a period of 4 years and Mean proximal CAL progression over 4 years was calculated for all the subjects that reported back. During follow up examination those teeth which were extracted were excluded from the study evaluation. Change in calculated values of CAL during 1st and follow up examination was assumed as progression of the disease.

Statistical analysis

All the recorded details and values were tabulated and sent for statistical analysis. Data analysis was performed using statistical software SPSS version 21. Non parametric evaluations were done using wald test for level of significance. A modified Poisson regression test was used to estimate the relationship between alcohol consumption and disease progression. $P < 0.005$ was considered as significant value.

RESULTS

Out of the total sample size selected at time of 1st examination (n=1385) only 730 subjects responded for follow up evaluation in 2nd visit after 4 yrs. The population of subjects which could not be evaluated for follow up included 387 subjects which refused to participate, 109 subjects could not be contacted because of change in place, 18 subjects died, and for rest no information could be gathered.

The age wise distribution of the study group was done as 25-34 yrs, 35-44yrs, 45-54yrs, 55-64yrs and above 65. Majority of the individuals belonged to 35-44 years of age range with an average age being 39.5 years. All the considered patient characteristics in the study are tabulated in table

It was observed that majority of subjects belonging to age group 35-44yrs, 45-54 yrs and 55-64 yrs showed high frequency intake of alcohol. (TABLE2). Overall when measured, alcohol

consumption was found to be significantly higher in males as compared to females.

Clinical attachment loss was recorded and categorised as ≥ 3 mm, ≥ 5 mm, ≥ 7 mm. It was observed that on an average CAL ≥ 3 mm was seen in 78%, CAL ≥ 5 mm in 52%, and CAL ≥ 7 mm in 39% of the study subjects. (TABLE3) Average CAL progression was found to be significantly higher among males as compared to females ($P < .0001$). Further, when progression of CAL was calculated, 67.67% of high frequency alcohol drinkers and

87.5% chronic drinkers reported a significant increase in the CAL after a 4 year follow up. (Table 4). Thus the subjects who were high and chronic drinkers, had 40% higher risk for CAL progression than non-drinkers.

DISCUSSION

The aim of this population-based cohort study was to assess alcohol consumption as a potential risk factor on clinical attachment loss in local population. Initially we managed to include 1385 individuals in our study but were restricted to a final sample of 730 individuals over a 4 year follow up period. For age wise distribution of individuals, we categorised them into 5 major age ranges which helped us to make the comparative analysis of the large sample easier. The male and female population in our study was almost comparable with no significant difference in percentages where male population came to be 53.6% and female population was 46.3%. Also on basis of socioeconomic status as well, no such significant difference was observed.

In this present study, on basis of alcohol consumption we divided the subjects into four major groups. As observed high frequency of alcohol consumption was seen in subjects belonging to age group 35-44yrs, 45-54 yrs and 55-64 yrs. Similarly, when progression of CAL

Table 1. Characteristics Of The Study Subjects (Sample Size, Age, Gender Distribution And Socioeconomic Status)

Sample (n)	
At time of 1 st examination	1385
At time of Follow up examination	730
Age	
• 25-34	239 (32.74%)
• 35-44	264 (36.16%)
• 45-54	103 (14.11%)
• 55-64	82 (11.23%)
• >65 YRS	42 (5.76%)
Gender:	
Male	392 (53.6%)
Female	338 (46.3%)
Socioeconomic status:	
High	49%
Low	51%

Table 2. Showing Age Wise Distribution Of The Study Groups Along With Alcohol Consumption

Groups Based On Alcohol Consumption Yrs	Age Wise Distribution			
	25-34yrs	35-44 Yrs	45-54yrs	55-64
Non-drinker/ low frequency	52 (21.7%)	48(18.1%)	16 (15.53%)	18 (21.9%)
Moderate frequency	149 (62.3%)	46 (17.4%)	32 (31.06%)	26 (31.7%)
High frequency	36 (15.06%)	171 (64.7%)	54 (52.4%)	36 (43.9%)
Chronic drinker	2 (0.8%)	3 (1.1%)	1 (0.1%)	2 (2.4%)
TOTAL	239	268	103	82

Table 3. Age Wise Distribution Of Average Clinical Attachment Loss In The Study Subjects

Clinical Attachment Loss	Age Groups				Total
	25-34yrs	35-44 Yrs	45-54yrs	55-64 Yrs	
≥ 3 mm	74%	82%	100%	100%	78%
≥ 5 mm	46%	79%	92%	100%	52%
≥ 7 mm	28%	52%	68%	86%	39%

Table 4. Table Showing Progression Of Clinical Attachment Loss Observed In Study Groups Based On Alcohol Consumption Over 4 Years

Groups Based On Alcohol Consumption	Cal Progression (Within 4 Years)	
	No	Yes
Non-drinker/ low frequency	62 (46.2%)	72 (53.7%)
Moderate frequency	124 (49.01%)	129 (50.98%)
High frequency	96 (32.32%)	201 (67.67%)
Chronic drinker	1 (12.5%)	7 (87.5%)

was calculated, 67.67% of high frequency alcohol drinkers and 87.5% chronic drinkers reported a significant increase in the CAL after a 4 year follow up. Thus, we can assume here that our results show a direct correlation with high intake of alcohol with that of clinical attachment loss in the subjects.

Also Overall when compared, alcohol consumption was found to be significantly higher in males as compared to females which also had a direct relation with average CAL progression which was also found to be significantly higher among males as compared to females ($P < .0001$). These results of ours are consistent with studies done by previous workers like Albandar *et al*⁶ and Grossi *et al*⁷ in both developed and developing countries. Albandar *et al* reported that the prevalence of periodontal probing depth ≥ 3 mm was 1.3 times higher in males and that ≥ 5 mm was 1.7 times higher in males. This was justified by the authors saying that males have poorer oral hygiene practices than females and dental care approach is different for both genders.^{9,10}

Many studies have been done to assess risk factors in different study groups but this study to best of our knowledge is the only study to have estimated the CAL prevalence in a study population. In a meta-analysis by Wang *et al*¹¹, 14 cross-sectional studies were evaluated and estimates were taken from these studies to mark down the association of periodontitis and the alcohol as a risk factor. It stated that the risk of having periodontitis was 66% higher for the highest versus the lowest alcohol consumption categories evaluated by them.¹¹ On the other hand in contrary it was observed that few studies like reported by Ogawa *et al*¹² showed association between alcohol consumption and periodontal disease, along with increased risk of periodontitis which came to be at

28%. Thus, they reported no association between progression of disease and daily alcohol intake.

Rao SR *et al*¹³ in his study to evaluate prevalence, severity and risk factors of attachment loss in an urban population of South India reported a low prevalence of CAL ≥ 5 mm. among the risk factors evaluated smoking proved to contribute significantly to the periodontal attachment loss. Okamoto *et al*¹⁴ in his study on Japanese population observed no association between alcohol consumption and presence of probing depth ≥ 4 mm. On contrary to this above-mentioned study, another study done by Nishida *et al*¹⁵ on Japanese population reported a significant association between alcohol intake and increase in probing depth.

Alcohol consumption has been well reported in previous literature to have negative effects on health outcomes. Chronic alcohol use makes a person more susceptible to infections due to decreased inflammatory response, altered cytokine production, and abnormal reactive oxygen intermediate generation.¹⁶ Chronic alcohol use affects Cellular immunity, specifically decreased antigen presenting cell functions in ethanol-induced cell-mediated immunity. At molecular level induction of Th2 vs Th1 immune response has been suggested, as a cause of these increased immunoglobulin levels. Also functional abnormalities of T and B lymphocytes, natural killer cells and monocytes/macrophages resulting in the altered immune response has also been demonstrated after alcohol use.¹⁶

This study has its own limitations, one being a limited sample size of the study. More descriptive studies with larger sample size have to be conducted for extracting more accurate and detailed information regarding the studied

population so that the results can be generalised. Secondly, we in our study focussed on only alcohol as a risk factor for periodontitis though more studies should be conducted taking in consideration other risk factors as well. Also, further studies using specific questionnaires should also be conducted to test the relationship of alcohol and periodontitis.

The clinical significance of this study lies in that as alcohol has become a common practice worldwide, this study helps to understand the relationship of oral and periodontal health with its continuous use. This longitudinal study helps us to derive a relationship between alcohol consumption and periodontal attachment loss progression in individuals. Thus focussing on the risk factors involved in periodontal loss we can help the patients in improving and treating their periodontal problems and overall delivering a good oral health to patients.

CONCLUSION

From our study we concluded a positive relationship of alcohol consumption and periodontal attachment loss with more pronounced effect on males as compared to females. Thus alcohol proves to be a potential risk factor in progression of periodontitis in both high and chronic alcohol dosage. Further we recommend more such longitudinal studies to confirm this and validate the results of this study.

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