Summary

AND

Conclusion
There is scanty data on the effects of chewing pan masala and mawa (contains areca nut, lime and tobacco) which are used abundantly in this part of the world. A cross sectional study was conducted to find out the association between oral health status with the chewing habits, the genotoxic potential of these substances by studying the micronuclei in buccal mucosa cells and the levels of copper and zinc in chewers and non-chewers. These metals are having important role in various physiological functions in the body. Further, copper is also implicated in the causation of OSMF.

The subjects were enrolled randomly and divided according to habits as chewers (168 subjects) and non-chewers (197 subjects). A detailed history was recorded on predesigned proforma from all the subjects. Clinical examination of oral hard tissues (involving determination of caries, attrition, staining and sensitivity) and soft tissues (involving periodontal involvement, mucosal lesions) was performed. Maximal interincisor and intermolar distance was also recorded to note the role of chewing habit on mouth opening. Micronuclei were studied in the buccal mucosa cells of representative number of chewers and non-chewers. Copper and zinc levels in saliva and serum were measured utilizing atomic absorption spectrophotometer. The concentration of these metals was also determined in few samples of areca nut and pan masala, which are used in this part of the country. Further, immunoglobulin levels in serum of representative number of chewers and non-chewers were determined using radial immunodiffusion method.
The findings revealed that about two-third of chewers were young, lying between the age group of 20-39 years. Further, about 5% chewers were in the younger age group also (10-19 years). In addition, results indicated higher numbers of males (55%) were indulged in chewing habits as compared to females (11%). Most of the subjects indulged in the chewing habit belonged to the Hindu community (91.07%) followed by Muslim community (7.73%), which reflected the population structure of this part of the country. Most common cause for initiation of chewing habit was found to be encouragement by friends (peer pressure). Other reasons cited for initiation of the habit included curiosity, euphoria, increased salivation, relief from tooth pain etc. Analysis of occupations of the subjects revealed that 50.6% of chewers i.e. 85 subjects were physical labourers doing strenuous work and this was found to be statistically significant (p<0.005) as compared to other occupational groups.

Most of the chewers (90.48%) and non-chewers (87.31%) were well aware of the fact that the chewing habit might lead to cancer. Further, significantly higher numbers of chewers than non-chewers were aware that chewing habit also leads to financial loss. In addition, most of the chewers (92.26%) considered chewing as a bad habit and were willing to quit. Higher prevalence of chewing habit was reported in family of chewers than non-chewers, which was statistically significant. Suggesting that the habits in the family had a significant role in acquiring the same.

The results also revealed that majority of chewers consuming mixtures without tobacco did not place the mixture constantly at one place. However, about 50% of chewers using product with tobacco preferred to keep the quid at one fixed place in the oral cavity constantly. Thus, this practice might be responsible for the higher prevalence of certain oral lesions at the site of placement. Although not statistically significant, smoking and alcoholism were found with greater frequency among chewers as compared to non-chewers.
There was no significant difference between chewers and non-chewers with respect to oral hygiene measures adopted by them. About 87-90% of the subjects in both groups reported use of brush/powder regularly. However, clinical examination adopting Oral Hygiene Index Score, the oral hygiene status of chewers was found to be more deteriorated than non-chewers. The difference between the two groups was found to be statistically significant. Further, poorer periodontal health was observed in chewers as compared to non-chewers.

Dental attrition showed higher prevalence in chewers (58.33%) than non-chewers (40.1%), which was statistically significant. The present study further indicated that hardness of areca nut might be responsible for the dental attrition along with other natural factors such as age, etc. as the number of cases with attrition was higher among the mawa chewers as compared to other chewers. Duration of chewing was observed to be associated with the increased attrition in this study thereby confirming the direct role of chewing habit in causation of attrition. The loss of enamel due to attrition may expose the underlying dentine, which contains odontoblastic processes in the dentinal tubules capable of conveying various stimuli to the nerve endings present in the pulp. This resulted in dentinal sensitivity to hot, cold, etc. In this study, 58.9% chewers complained of sensitivity compared to only 35% in non-chewers that was also statistically significant.

The mean DMF index of non-chewers was 3.58 ± 2.50 and that of chewers was 2.51 ± 1.65, the difference of which was statistically significant. Thus, the caries rate as found with DMF Index was inversely related to the habit of chewing. However, this should be weighted with respect to the adverse effect of chewing habit.

Mean staining score was significantly higher among the chewers with respect to non-chewers. Further, there was a statistically significant relationship between staining score and duration of chewing habit in years.
indicating towards cumulative effects of the chewed material. However, frequency of chewing/day did not have statistically significant association in the severity of staining.

The oral mucosal lesions were found more among the chewers than non-chewers. It was observed that 1.5% of non-chewers and 29.1% of chewers had oral mucosal lesions. All the cases of leukoplakia and oral submucous fibrosis were found in chewers only. However, lichen planus was observed in both chewers and non-chewers. Other lesions observed included nicotine stomatitis, tobacco quid lesion, leukoedema and ulceration on soft tissues, which were observed in 6.5% among chewers and 0.5% among non-chewers.

All the 36 subjects having oral submucous fibrosis (21.4%) were found among chewers and none among non-chewers. Among chewers, there were greater number of cases with severe OSMF who included tobacco in the quid. However, there was no particular correlation between prevalence of OSMF and any particular chewing product e.g. mawa, khaini, pan masala etc. and also in severity of oral submucous fibrosis with the frequency or duration chewing.

Similarly, all cases of leukoplakia were found in chewers only (5 out of 168 chewers) with majority in chewers using a product with tobacco. A significant correlation was observed between leukoplakia and chewing habit. However, such was not the case with oral lichen planus. Almost same distribution of lichen planus was found in both chewers and non-chewers. Two subjects out of 197 non-chewers i.e. (1.0%) and 2 subjects out of 168 chewers (1.19%) had lichen planus. Thus chewing had a definite role in oral diseases including premalignant conditions such as oral leukoplakia and oral submucous fibrosis.
Micronuclei were significantly elevated in buccal mucosa cells of chewers as compared to non-chewers. Further, duration of chewing is also significantly associated with the induction of micronuclei in the buccal mucosa cells. This clearly indicates towards the direct genotoxic potential of the chewing products.

The samples of arecanut and gutkha analyzed for copper and zinc concentration. The data indicated appreciable amount of copper and zinc in the arecanut (7.5 and 6.7 μg copper and zinc /g of arecanut respectively). Even greater concentrations of copper and zinc were found in gutkha i.e. about 11.8 and 10.1 μg/g, respectively. This showed that in addition to arecanut, gutkha contains some other ingredients also, which contain copper and zinc. Analysis of serum, saliva and urine revealed that serum copper level was highest in subjects with oral submucous fibrosis followed by chewers and non-chewers in descending fashion. The saliva copper level was also highest in subjects with oral submucous fibrosis. Urine copper level was almost similar in both chewers and non-chewers, whereas it was lowest in subjects with OSMF. The reason for lower levels of copper among OSMF subjects is not understood. However, we suspect that a portion of copper is accumulated in the submucous fibrosis tissues thereby lower level of copper is available for excretion.

Serum zinc level was found to be in descending fashion in non-chewers, chewers and subjects with OSMF respectively, the difference in each group being statistically significant. The saliva zinc level also showed a similar pattern.

Serum IgG level was found to be higher in chewers as compared to non-chewers. On the other hand, IgA level was higher in non-chewers than chewers. IgM level was found to be almost similar in both the groups. This suggests that chewing had some effects on the immune system of the chewers.
In conclusion, the study clearly indicates that chewing of areca nut and pan masala with or without tobacco have adverse effects on oral mucosa as evident through higher number of cases with precancerous lesions like OSMF and leukoplakia in chewers. The raised frequency of micronuclei as found in case of chewers also points toward genotoxic potential of areca nut, pan masala and tobacco. This study further indicated that chewing habits has deleterious effects on hard tissues of the oral cavity in the form of attrition, staining and sensitivity. Disturbed homeostatic mechanism as observed in the form of altered levels of copper, zinc and immunoglobulin in case of chewers may have adverse effects on health and immunity, the mechanisms of which still lie unexplored and merit further investigations.

The involvement of educated and younger individuals in chewing habit suggested that there is need for information, education and communication about the role of these materials on causation of various health consequences including oral cancer. The disease associated with chewing areca nut and tobacco could be reduced drastically by stopping chewing of these materials. This could be achieved not only through legislation, but creating awareness among the population regarding the deleterious consequences of chewing habits.