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Buccal Mucosal Changes in Chronic Alcoholics

Research Article

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Abstract

Introduction: The consumption of Alcohol has been increasing now-a-days and the same has been attributed to the development and progression of oral and Mucosal diseases. Meanwhile, the dangers of drinking alcohol to human body as well as the influence on oral mucosa remains unknown to the general public. Exfoliative Cytology is a rapid diagnostic method which depends on scrapings obtained from the mucosa.
Objectives: The aim of the study was to determine the changes in the exfoliative cytology of the cells of the buccal mucosa in people who consume alcohol chronically.
Materials and Methods: The study was carried out among 18 individuals, out of which 10 were known to chronically consume alcohol and the other 8 participants had no habits and were chosen as the control category. Once the consent was obtained, the scrapping was collected. The smears were then stained and observed under the microscope for cytological and cytomorphometric assessment.
Results: On cytological analysis it was also observed that various slides showed the presence of micro nuclei which reveals that the cells have an increased replicative potential which in itself might be due to dysplasia. On cytomorphometricanalysis a change in the nuclear cytoplasmic ratio was also observed.
Conclusion: There are buccal mucosal changes which are present in people who chronically consume alcohol and awareness about the same should be brought about to reduce the incidence of such diseases.

Keywords: Alcohol; Exfoliative Cytology; Buccal Mucosa; Oral Cancer; Oral Squamous Cell Carcinoma; Dysplasia.

Introduction

From the point of epidemiology, it is observed that chronic alcoholism is an important factor in the development and progression of oral and its mucosal diseases. Many studies have shown that ethanol plays a key role in the progression of pre-cancerous and cancerous lesions of oral mucosa. However, the specific pathological process remains partially unclear, which may be attributed to the fact that ethanol per se is not a carcinogen. However, ethanol can increase the permeabilityof oral mucosa, resulting in epithelial tissue atrophy. Thus, it is believed that ethanol can have a synergetic ability but in itself cannot cause a malignancy. Besides, alcohol is able to decompose the lipid composition of the outer epithelial membrane of mucosal tissue, which augments the susceptibilityof oral mucosa to other carcinogens. In addition, ethanol can also act on the large and small salivary secreting glands in oral cavity to increase saliva secretion and viscosity. The detailed function of alcohol is still undefined hitherto. Meanwhile, the dangers of drinking alcohol to human body as well as the influence on oral mucosa remains unknown [1, 2].

Exfoliative cytology is a technique that has been in use since the

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19th Century.In 1941, Papanicolaou and Traut [3] carried out various studies involving the uterine cervix, and in 1946 Papanicola [4] reported its use to various other body secretions. The first cytologic study of the oral mucosa was conducted in 1951 by Montgomery [5]. In 1953, Pomeranz and Stahl [6] correlated exfoliative cytology and biopsy and showed that the former can be used as an examination complementary to biopsy, as reported by several other investigators [7, 8]. Exfoliative cytology has been credited to provide early diagnosis in several oral lesions and also in the early detection of cancer.

Exfoliative cytology has been proven to be a very simple and result oriented laboratory assessment. It is based primarily on the scraping of desquamated cells from the stratum superficial layers of the oral mucosa. It is a rapid method of testing and has been proved to be accurate in diagnosis. The use of cyto-diagnosis in salivary smears has been increasing, and is currently not only applied as a complementary examination in diagnosis but also used in the detection of preneoplastic lesions and neoplasms and in the diagnosis of various autoimmune, viral and fungal diseases [9, 10]. The use of exfoliative cytology in the evaluation of alcohol induced cellular alterations in the oral mucosa has not been reported extensively in the literature, although the oral cavity is one of the most susceptible sites for changes.

Materials And Methods

This prospective study was carried out in Saveetha dental college and hospital, Chennai among 18 individuals, out of which 10 were known to chronically consume alcohol and the other 8 participants had no habits and were chosen as the control category. The selection criteria were followed for the selection of participants as well as the processing method of the sample.The inclusion criteria of the present study was the participants should be of the 40-50 years old age category with no apparent lesions in the oral mucosa and must be systemically healthy. The exclusion criteria included participants who did not fall into the specifiedage group with habits, oral lesions and those who were systemically not healthy.

Once the participants were chosen for the study, verbal consent was obtained from the same group of participants.The purpose of the study was explained to the same population to bring about awareness regarding the same. Once the consent was obtained, the scrapping was collected with a wooden stick from the right buccal mucosa (region inferior and anterior to the parotid duct) with no previous rinsing of the mouth. Once the scraping was collected from the buccal mucosa a smear was made on to labelled glass slides. The slides were fixed in an Alcohol solution for about half an hour.

Once the slides were fixed, they were stained using the Rapid PAP method. Following the staining process, the slides were mounted after dipping the same in xylene and using a cover slip with DPX. The sample collection, staining and mounting procedure was done by the same individual to ensure that there is no discrepancy regarding the same as it would interfere with the results of the study. The stained smears were first observed under a light microscope by a skilled professional and cytological scoring was done for all the slides. The various parameters that were assessed in the cytological scoring included any changes in the nuclear cytoplasmic ratio, presence of micro nuclei, binucleation, cellular pleomorphism, inflammatory cells,microorganisms and cell lysis. Once the cytological scoring was completed cytomorphometricanalysis was carried out and the parameters assessed were the area of the cell, area of the nucleus, diameter of the cell, micro nuclei and cellular pleomorphism. Cytomorphometry was alsocarried out by a skilled professional and the results obtained from both were tabulated, statistically analyzed and results obtained.

Results

The results from the cytomorphometricanalysisof the control group is displayed in Table 1and the experimental group in Table 2.Various photo micrographs were taken. Figure 1 depicts the nuclear area, Figure 2 depicts the cell diameter and Figure 3 represents the cell area. Values obtained were compared and statistically analyzed. It was observed that the mean area of the nucleus in the alcoholic group was higher than the mean area of the nucleus in the control group [Figure 4]. The mean area of the cell in the experimental group was lower than the mean area of the cell in the control group [Figure 5]. Thus, there was a change in the nuclear cytoplasmic ratio in the experimental group which is a dysplastic feature.

On cytological analysis it was also observed that various slides showed the presence of micro nuclei which reveals that the cells have an increased replicative potential which in itself might be due to dysplasia. On cytological analysis there were also microorganisms and inflammatory cells that were observed and this may be attributed to the stimulus of collecting the sample. Also, the oral cavity is filled with microorganisms and hence it is natural to get the presence of microorganisms in the collected sample. Table 3 shows the percentage of the various substances found in the smear.

Table 1. Cytomorphometric analysis of the control group.

CONTROL GROUP

	Bl	B2	B3	B4	B5	B6	B7	B8
AREA OF CELL	64898	64895	64890	64889	64897	64891	64897	64898
AREA OF NUCLEI	15925	15924	15926	15928	15926	15927	15925	15924
DIAMETER OF CELL	33400	33402	33401	33402	33399	33403	33397	33389
MICRONUCLEI	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
CELLULAR PLEOMORPHISM	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Table 2. Cytomorphometric analysis of the experimental group.

EXPERIMENTAL GROUP

	Al	IQ	A3	A4	AS	A6	A7	A8	M	AlO
AREA OF CHL	64889	64887	64885	64884	64885	64886	64889	64886	64884	64887
AREA OF NUClEI	15931	15933	15934	15935	15932	15934	15931	15932	15932	15932
OIAMETER OF CELL	33394	33397	33396	33394	33395	33393	33398	33385	33383	33382
MICRONUClEI	Absent	Absent	Absent	Absent	Absent	Present (2)	Present(1)	Absent	Absent	Absent
CEUULAR PlEOMORPHl5M	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Figure 1. Nuclear Area.

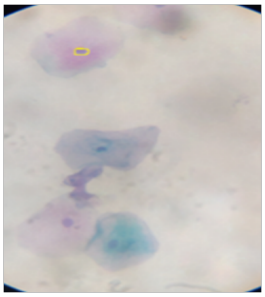


Figure 2. Cell Diameter.

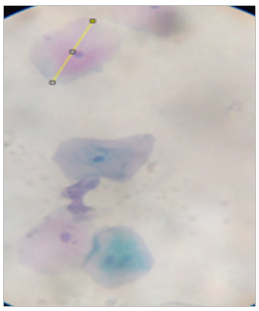


Figure 3. Cell area.

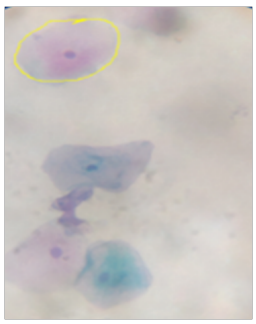
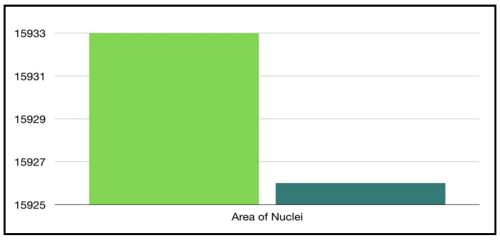


Figure 4. Graphical representation of the nuclear area between the two groups.



Discussion

It was noted that alcohol had an effect on the oral mucosa. Alcohol can alter and destroy the lipid components present in the protective layer of oral mucosa which covers acanthosis granules. This will disrupt the normal metabolism and function of epithelial lipid molecules resulting in the formation of a gap between the epithelial cells, thereby increasing oral mucosal permeability [11]. Alcohol serves as an agent which opens a pathway for deep soft tissues which are not otherwise available. Previous researcheshave confirmed that the most important risk factor in the development of head and neck cancers are smoking and alcoholism [11]. Other

Figure 5. Graphical representation of the cell area between the two groups.

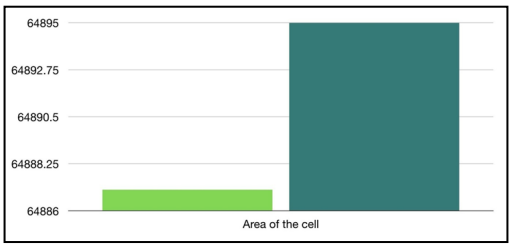


Table 3. Substances found in the smear.

	Control Group	Alcoholic
Micronuclei	20%	80%
Inflammatory cells	30%	90%
Microorganisms	10%	90%
Cellular oleomorohism	0%	10%
Cell lysis	0%	0%

scholars have found that alcoholic beverages mainly accounted for the oral and pharyngeal cancers in non-smoking patients [12]. There are several pathogens for the action of ethanol on the oral mucosa. Active oxidation may directly undermine DNA. The invasive ability of carcinogen surrounding oral mucosa is increased, which relies on the enhanced solubility of the carcinogen or increased mucosal permeability [13]. The carcinogenic effect of ethanol depends on the quantity consumed and commonly occurs in case of daily ethanol intake higher than 45 ml [14].

Acetaldehyde is the first metabolite that is formed due to ethanol which has the largest carcinogenic potency. Acetaldehyde has been proven to be highly toxic, highly mutagenic, carcinogenic nature and has been proven in different cell cultures and animal models [15]. Homann et al [15] demonstrated the presence of increased salivary acetaldehyde levels even after ingesting moderate amounts of ethanol, thus allowing significant acetaldehyde accumulation in oral tissues during chronic ethanol consumption.This may explain some of the cytologic anomalies that were observed in the oral mucosa of the experimental group in the present study. Several scholars have also reported some anomalies such as increased nuclear area [16], epithelial atrophy due to decreased basal cellular size, dysplastic changes with keratosis and increased number of mitotic figures [17]. In our study there was alteration in the nuclear cytoplasmic ratio which is in accordance to several other studies. In sevaral other studies exfoliative cytology of established oral cancers exhibited polyploid DNA profiles and reduced cytoplasmic area [18].

The presence of contaminants, such as polycyclic aromatic hydrocarbons and nitrosamines, is a significant carcinogenic factor in alcoholic beverages [19]. Regardless, the total amount of ethanol and the duration of ethanol consumption may be more important than the type or composition of thealcoholic beverage consumed [20, 21].The deleterious effects of components of alcohol in the oral cavity has been extensively documented in our previously published literature [22-28].

Conclusion

Several experimental studies have proven that the stratified structure of oral mucosa is damaged in the presence of alcohol, thus resulting in a gap between epithelial cells, increasing the permeability of oral mucosa, and facilitating deep penetration of carcinogen. Alcohol evidently promotes the development of oral cancer and thus awareness should be brought regarding the same to benefit the entire population in general.

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