RESEARCH ARTICLE

Significance of Oral Brush Cytology of Oral Mucosal Lesions in Gutkha Chewers: A Prospective Study

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ABSTRACT

Aims and objectives:
1. To know the patterns of clinical and pathological manifestations of oral mucosal lesions in Gutkha chewers and its potential impact on the population,
2. Assess the significance of the oral brush cytology in oral mucosa of Gutkha chewers.

Materials and methods: A total number of 2396 patients with oral mucosal lesions were screened. A total of 150 cases were studied with oral mucosal lesions diagnosed in patients with Gutkha chewing habit. The distribution of patients included both males and females of all age groups and socioeconomic status compared with the controls. In this aspect, oral brush cytology can be used to detect such precancer and cancerous conditions in advance.

Results: On cytological diagnosis, 88 were normal/inflammatory, and five were inconclusive on brush cytology smears seen of 93 OSMF cases. Out of 30 clinically diagnosed carcinoma cases, brush cytology was four normal/inflammatory, 25 dysplasia positive and one inconclusive. Only three cases of leukoplakia and one case of moderate dysplasia were expressed suspicious on brush cytology. All the clinically diagnosed cases were proven on histopathology.

Conclusion: This study supports the hypothesis that Gutkha chewing elevates the risk of oral submucous fibrosis, leukoplakia and cancer. Oral brush cytology has been found to be very helpful to detect precancer and cancerous conditions; hence we recommend the use of oral brush cytology as a screening tool in all suspicious intraoral lesions for rapid diagnosis.

Keywords: Gutkha, Oral submucous fibrosis, Oral brush cytology.

INTRODUCTION

Smokeless tobacco (ST) is tobacco that is not burned when it is used. It may be used alone or in combination with other substances and used at any site that permits the absorption into the human body of nicotine and/or other constituents in tobacco or added to tobacco.[1]

Gutkha was introduced in Indian market in early 1970s. Gutkha is a mixture of substances that is placed in mouth, where it is sucked or actively chewed and thus remains in contact with the mucosa over an extended period.[2] It usually contains three basic ingredients, tobacco, arecanut and slacked lime (calcium hydroxide), which are sealed in small, attractive, colorful and inexpensive plastic or foil pack, which appeal to young generations.[3] Other substances like spices (cardamom, coconut and saffron), flavors and colors are also added to make them more attractive.[4]

Tobacco use is one of the chief preventable causes of death in the world. A wide variety of mucosal changes have been noted in habitual users of smoked and smokeless tobacco. These changes most likely result from the many irritants, toxins, and carcinogens found naturally in cured or burned tobacco leaves, but may also arise from the mucosal drying effects, the high intraoral temperature, intraoral pH changes, local alteration of membrane barriers and immune responses, or altered resistance to fungal and viral infections.[5]

The first modern use of cytology for head and neck cancers was in 1949, when Morrison et al successfully used exfoliative smears for nasopharyngeal cancers. In 1963, the American Dental Association's House of Delegates passed resolutions that acclaimed oral cytology as an 'excellent measure in prolonging life' and endorsed training for dentists in cytology technique. In a 1967 editorial in the Journal of the American Dental Association, it was recommended that oral cytology should be a part of every oral examination in which the dentist detects even the least suspicious lesion. Given that these recommendations were published approximately 30 years ago.

AIMS AND OBJECTIVES

1. To know the patterns of clinical and pathological manifestations of oral mucosal lesions in Gutkha chewers and its potential impact on the population,
2. To assess the significance of the oral brush cytology in oral mucosa of Gutkha chewers.

MATERIALS AND METHODS

A total number of 2396 patients with oral mucosal lesions were screened taken at Department of Oral Medicine and Radiology, Government Dental College, Hyderabad. Patients with chronic oral mucosal lesions were taken as controls (no. 2246) to compare the clinical and socioeconomic status of the patients and those with clinically diagnosed oral mucosal lesions (no. 150) having Gutkha chewing habit undergone oral brush cytology (PAP) and their smears were compared with histopathologic findings.

1. The selected patients included both males and females of all age groups and socioeconomic status.
2. The distributions for age, sex and socioeconomical conditions were examined for cases and controls.

   The following data were also recorded for each patient.

1. Complete examination of the oral mucosa.
2. Measurement of interincisal/interarch distance (IID)/(IAD): The distance between upper and lower central incisors when the patient opens his mouth to the maximum extent and is measured by a Vernier calipers and recorded.[6]

Oral brush cytology was performed for all the 150 cases. It is important to brush the edges of an ulcer as well as the floor, in order to obtain diagnostic material (Fig. 1). The process was repeated from addition areas if necessary. Smears were stained with PAP stain.

Brush cytology results were divided in to three categories[7]:

1. *Negative brush biopsy (normal or inflammatory smear):* No epithelial abnormality was detected. If the patient reports resolving of the lesion (Fig. 2); no treatment was referred.
2. *Positive brush biopsy (dysplasia positive smear):* Indicates that definitive cellular evidence of epithelial dysplasia or carcinoma may be present (Fig. 3). Referred for biopsy

(excisional or incisional; scalpel, punch or needle; do not repeat brush cytology) and histology to grade and stage the lesion.

3. *Atypical brush biopsy (suspicious smear):* Indicates abnormal epithelial changes are present (these abnormal cells originate most often from a precancerous or cancerous lesion, although they may also develop in a benign inflammatory lesion, such as lichen planus) (Fig. 4). Referred for biopsy (excisional or incisional; scalpel, punch or needle) and histopathological examination to grade and stage the lesion or rule out cancer.

RESULTS

A total number of 2396 patients with oral mucosal lesions were screened. In that the number of controls were 2246 [1281 (57%) were males and 965 (43%) were females]. The 150 cases of our study were having the lesions, out of which 120 (80%) were males and 30 (20%) were females (Fig. 5).

Overall picture showed male predominance in both the distributions (Fig. 6).

Majority (69/150) of the cases are below 30 years (Fig. 5) age group compare to the least number 18 cases were above 50 years age group, which indicates that the younger generation consuming more Gutkha than the older generation. The similar interpretation was expressed by other authors too.[8]
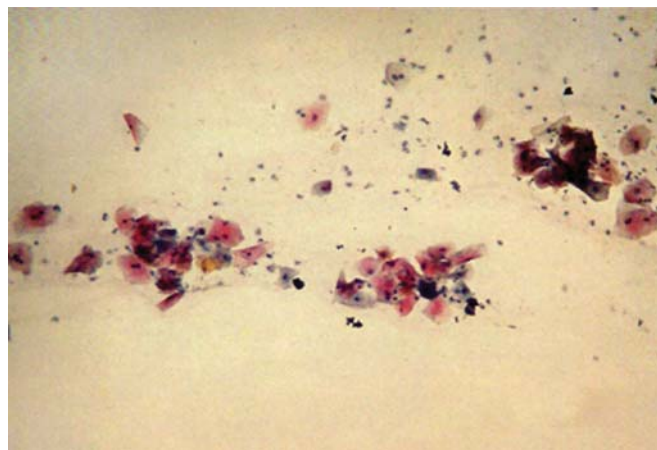

Fig. 2: Inflammatory buccal smear of OSMF case
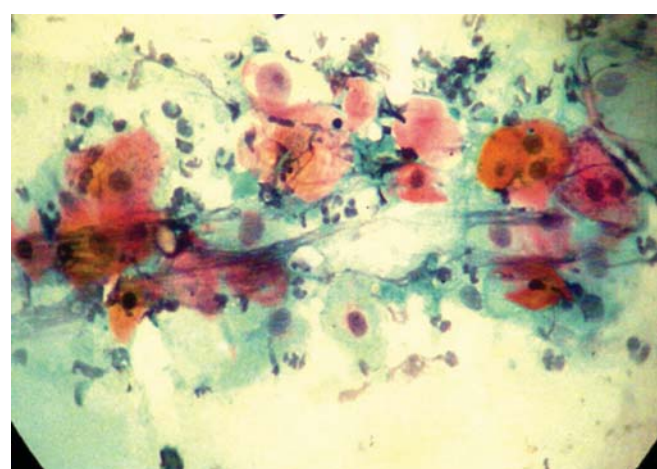

Fig. 1: Oral brush cytology procedure

Fig. 3: Dysplasia

In socioeconomic status, a higher percentage of cases were in the lower income groups than the controls, with 54.6% of cases and 44.7% of controls in the lower income group. Around 37.3% and 34.4% are under middle income group and 08 and 20.8% belonging to higher income group respectively (Fig. 7). The youngest individual in our study is 16-year-old male. Income is inversely associated with precancer and cancerous conditions in Gutkha chewers.[8]
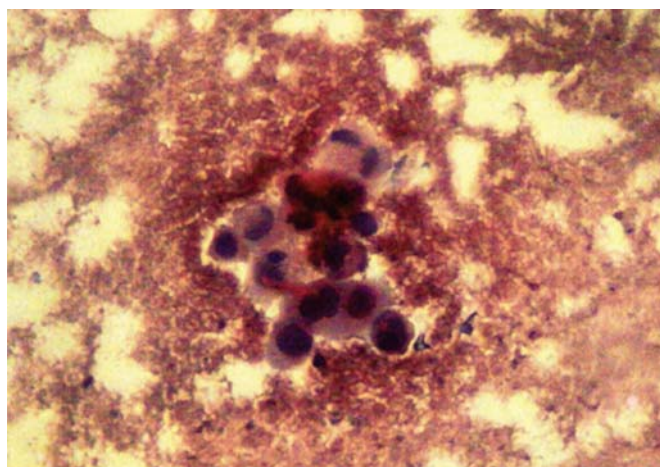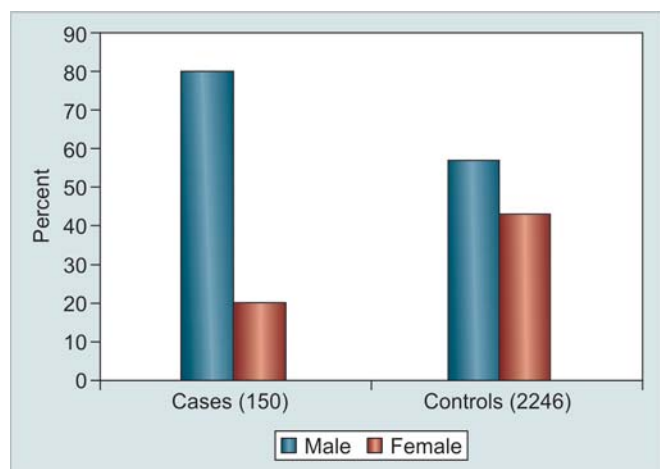

Fig. 4: Malignant smear

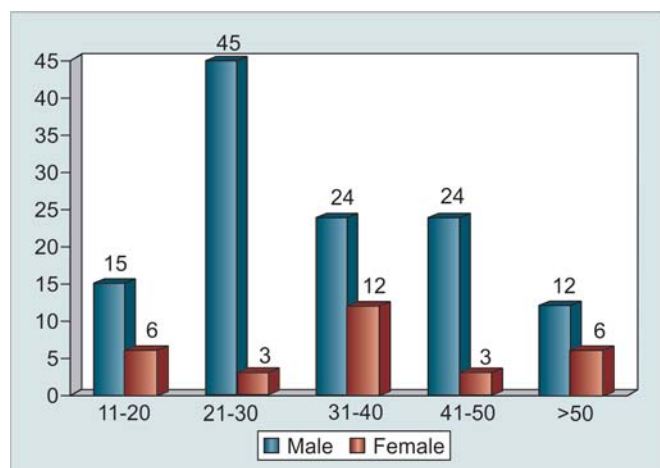**Fig. 5:** Sex-wise distribution of cases and controls

Fig. 6: Age-sex distribution of cases

A total of 93 OSMF cases were performed brush cytology, out of which 88 cases were normal/inflammatory and five were inconclusive.

Out of 30 clinically diagnosed carcinoma cases brush cytology was performed, four were normal/inflammatory, 25-dysplasia positive and one was inconclusive.

In nine cases of leukoplakia, six were normal/inflammatory and three cases were expressed suspicious on brush cytology.

In six cases of oral lichen planus, four were normal/inflammatory and two were inconclusive.

A total of 12 cases of nonspecific ulcers were performed oral brush cytology, four were normal/inflammatory and one was suspicious. All the brush cytology diagnosed lesions were proven on histopathology.

Out of 96 clinically diagnosed oral submucous fibrosis (OSMF) cases, only 93 proved on histopathological examination, in remaining three OSMF cases, two were diagnosed as leukoplakia and one was diagnosed as moderate dysplasia on histopathology.

In our study, 93 (62%) oral submucous cases out of 150 cases of Gutkha chewers, compared to 42 (02%) in controls (p-value 0.0005), which strongly supports the role of Gutkha etiology in OSMF.

Next common lesion was carcinoma with 30 (20%) cases and 22 (1%) in controls (p-value, 0.00005).

Leukoplakia occupied nine (6%), lichen planus, nonspecific ulcers and moderate-severe dysplasia cases are six each.

In cases, 69 (46%) individuals were below 30 years age group, 51 (54%) OSMF cases were below 30 years of age group (p-value 0.005), eight individuals of oral cancer were below 30 years with (p-value 0.0175) and three lichen planus (3/9) cases were below 20 years (Fig. 8).

DISCUSSION

Gutkha chewing is the most common and popular form of ST (smokeless tobacco) use in India. Extensive investigations in several cross-sectional and prospective epidemiological studies showed a strong association between many forms of ST use, oral cancer, etc.[9] Of the several ST forms, Gutkha and pan masala are of comparatively recent origin, but there is an upswing in their use.
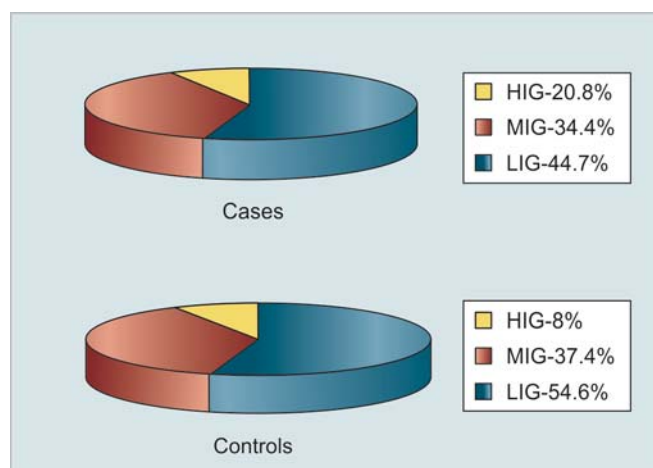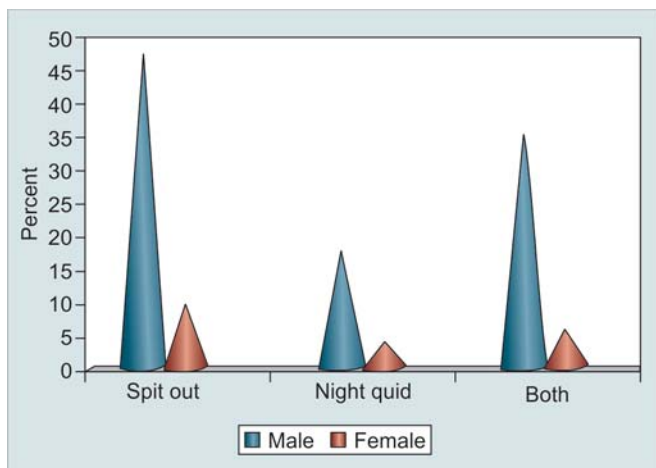

Fig. 7: Income groups

Fig. 8: Chewing methods

Habitual chewing of pan masala, Gutkha is associated with earlier presentation of oral submucous fibrosis than betel quid use. Factors that may be responsible for these differences are the tobacco content, the absence of the betel leaf and its carotenes and the much higher dry weight of pan masala, Gutkha.[10]

The prevalence of dysplasia in our study was 4%. Some of histopathologic studies showed the prevalence of epithelial dysplasia in tobacco chewers ranging from 2 to 18%.

The conventional approach of using epithelial dysplasia as a marker has been very helpful. In this aspect, oral brush cytology can be used to detect such precancer and cancerous conditions in advance. False negative reports are possible with the oral brush cytology technique. Persistent lesions should undergo tissue biopsy for definitive diagnosis.[11]

In case of oral brush biopsy system, the sensitivity of detection of oral epithelial dysplasia or squamous cell carcinoma was 77 to 86.5% while the specificity was 89.6 to 100%.[12] The positive predictive value of an abnormal brush biopsy result (positive or atypical) was 44.1%, while the negative predictive value was 60%.[13]

High-income group, education and income were associated with decreased risk of oral premalignant lesions in our study. Despite the small number of negative cases, oral cytology can improve the accuracy of histology, and may be a useful screening tool for the diagnosis of oral neoplasia/dysplasia. Most false negatives have been associated with leukoplakia (hyperkeratotic) lesions. Therefore, in a persistent oral lesion, even though a cytologic scraping may not be suspicious or characteristic of malignancy, a biopsy should still be strongly considered.

Gutkha is legally banned in Andhra Pradesh from August 1st 2002 under prevention of Food Adulteration Act, Section 7(4), GO No. 494.[14] The act having so many loopholes, those were raised in Andhra Pradesh Assembly on 20-07-2004. The Supreme Court lifted the ban on Gutkha on 02-08-2004.

SUMMARY AND CONCLUSION

Our study supports the hypothesis that Gutkha chewing elevates the risk of oral submucous fibrosis, leukoplakia, cancer and oral precancers.

Oral brush cytology has been found to be very helpful to detect precancer and cancerous conditions.

In comparison to the cervical Pap, oral brush cytology system had a sensitivity of 85% and specificity of 89.6 to 100% in identifying precancer lesions.

Despite the fact that false negative reports are possible, it is the best and most useful screening tool for the diagnosis of oral neoplasia/dysplasia.

Cervical Pap smear is used as screening tool for diagnosing cervical malignancy early oral brush cytology should be used for early diagnosis of oral neoplasms and dysplasia. Our study strongly recommends the use of oral brush cytology as a screening tool in all suspicious intraoral lesions for rapid diagnosis.

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