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EFFICACY OF ORAL BRUSH CYTOLOGY IN THE EARLY DIAGNOSIS OF ORAL POTENTIALLY MALIGNANT LESIONS A CROSS SECTIONAL STUDY

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ABSTRACT:
Background: Incidence of oral cancers and oral premalignant lesions is very high in this current technological world and also transformation into oral malignant carcinoma is erratic in patients with potentially pre - malignant lesions of the oral cavity. Tissue biopsies are needed for the current management in order to characterize the histology, grade dysplasia, and focus intervention for "high risk" lesions; however, there are few evidence-based guidelines and diagnostics available in which some non invasive techniques plays major role in early diagnosis of oral potentially malignant lesions.
Aim and objectives: Evaluating the efficacy of brush biopsy in early diagnosis of potentially malignant lesions by using brush border biopsy.
Methods: 30 individuals with deleterious habits were instituted for Oral brush samples using smear brushes from all participants after the detailed clinical history taken. Cytology smear were prepared for all samples and assessed for dysplastic features.
Results: A significant association was observed between the cytological assessments of oral brush cytology samples and the histopathological diagnosis. In addition, there was a significant inverse correlation between the grade of oral epithelial dysplasia. The diagnostic accuracy of this approach was outstanding between the presence or absence of oral epithelial dysplasia and other malignant atypia.
Conclusion: This approach presents a minimally invasive, highly accurate and non-technically demanding method for the surveillance of oral potentially malignant disorders.

INTRODUCTION:

The incidence of oral Pre malignant lesions developing into malignant cancer is on the rise, and this is a worry for global health.

Oral and oropharyngeal cancer is a global health challenge with an estimated incidence of over 300,000 newly diagnosed cases during the year 2012. Delayed diagnosis accounts for the high morbidity and mortality, since nearly half of oral cancer cases are staged III or IV at the time of initial diagnosis which results in poor quality of life. Recent studies shows that, oral cancer is second most common cancer in India. In which oral squamous cell carcinoma is about 80 to 90% in oral cavity. Early detection of oral cancer improves morbidity accompanying its treatment, and survival rates can reach up to 82% if localized oral cancer is detected, however this can decrease to 32% if metastasis has occurred. Cancerous lesions are mostly preceded by well recognized oral potentially malignant disorders.(1,2)

Premalignant lesions are morphologically atypical tissue which appear abnormal when viewed under the microscope, and which are more likely to progress to cancer than normal tissue. Several oral lesions like leukoplakia, erythroplakia, lichen planus and actinic keratosis are considered to be premalignant lesions for oral squamouscell carcinoma, since an increased risk of malignant transformation is associated with them(1)

Malignant transformation rates for premalignant lesions vary worldwide, with evidence based ranges varying between 0.1% and 40% and an overall mean of 12%,have highlighted that up to 12% of pre malignant lesions may already harbour invasive squomous cell carcinoma on initial presentation.(1)

Some lesions are relatively common affecting between 1 and 5% of the population with premalignant lesion and may resemble benign and prevalent mucosal disease. These lesions pose a risk for malignancy that is independent of tobacco or alcohol, with a wide range of transformation rates between 13% and 70% into metastatic carcinoma transformation.

The main etiology of oral cancer exposure to tobacco, radiation, malnutrition, alcohol consumption, genetic susceptibility, viruses, syphilis and traumatic irritation. The high incidence of oral cancer in India has emphasized the relationship between tobacco chewing, smoking habits and oral cancer.

The possibility of preventing oral cancer through the early diagnosis of cellular atypia and epithelial dysplasia is very large. Morbidity and death rates can be lowered by early identification of oral cancer, particularly in cases where there are probable malignant lesions.

So in order to avoid the transformation of premalignant lesion into malignant disorder, it is better to diagnose as earlier as possible. There is invasive and non – invasive method to diagnose pre malignant lesions.

It was suggested that non-invasive supplementary diagnostic techniques might help in the early detection of cancerous changes in the oral mucosa. These comprise brush biopsy cytology, optical imaging, and vital staining.(3)

In brush biopsy, the transepithelial cells from the oral lesion are obtained by scraping the surface mucosa. Brush biopsy has higher sensitivity and specificity of around 90% in comparison to other biopsy techniques. Like that, Exfoliative cytology is based on epithelial physiology and is a simple and non-invasive diagnostic technique for early detection of oral malignancy.(5)

MATERIALS AND METHOD:

The cross control study was done in department of oral and maxillofacial surgery between the year 2022 July to 2022 October and the sample comprised of total 30 patients, out of 30 patients, 22 patients were male and 8 were female and the age range from 20 to 70 with mean age of 45 and 18

with deleterious habit with lesion and 6 with traumatic sites and 6 with co morbidity patients. The result was entered in excel and statistical analysis was done in SPSS 22.0 Software. The descriptive analysis was done between age, gender, and variables and then Pearson Chi square test was used to find the association of variable outcomes in this study.

Patient with Oral potentially malignant lesions like leukoplakia, erythroplakia, palatal erythema, actinic cheilosis and erosive lichen planus. Patient with oral deleterious habits like tobacco chewing and smoking, betel quid chewing, tobacco pouching. Immuno compromised patient like Diabetes mellitus. Reccurent Traumatic region are included and Patient with chronic non healing ulcers. Previous history of surgery for carcinoma excision and reccurence of oral cancer are excluded.

Procedure done here was, Using brush, scrapping over mucosa by brush repeatedly rotated in all cases about 5 times. Lesions on buccal mucosa, tongue, palate and gingiva require more rotations and firmer pressure since these sites are keratinized. All the lesion and with habits, specimen were taken buccal mucosa. In Repeated traumatic site, buccal mucosa and tongue were used to take specimen. Specimen from Palate were taken for immune compromised patient. The surface of the brush used to sample the lesion rotated on the glass slide from one end to another. A thin film of material representing the biopsy specimen should be observed on the glass slide if it is held up to the light. Then transfer is completed, the glass slide is then flooded with fixative that is supplied in individual packets with each kit. The glass slide is kept aside for dry about 15 or 20 minutes.

Result:
In this cross sectional study, Out of 30 patients, the table shows the age, gender, affected site and adverse habits and co morbidity state and traumatic site.

Consequently, a total of 30 patients were included in this study. A total of 100% of the study population 26% were women (n = 8) and 73.3% were men (n = 22). The final diagnoses in the study were Deleterious habits along with lesion 60.0% (n=18) and 20.0% (n = 6) with traumatic sites and 20.0%(n = 6) with co morbidity patients (table.1).

The age of patients ranged from 20 to 80 years, with the majority of patients being in the 40 to 60 years age group. The statistics state that malignant transformation is common in males. Age group of 40 to 65 years or older is at higher risk.

Out of 30 patients, 53.3% (n = 16) patients shows presence of dysplastic features which includes 93.75% (n=15) of the patients with deleterious habits and 6.25% (n=1) with traumatic injury(table.3).

Then 46.7% (n = 14) patients shows absence of dysplastic features which includes 21.42% (n=3) of the patient with deleterious habits and 42.85% (n=6) of the patient with co-morbidities and 35.71% (n=5) of the patient with traumatic injuries(table.4).

Buccal mucosa was the most frequently involved site 90% (n=27), followed by tongue 6.7% (n=2) and palate 3.3 % (n=1) (table.2). In this study, it was found that buccal mucosa and tongue were the most frequently involved sites(table.5).

We took specimen from buccal mucosa most of the patient which shows presence of dysplastic features in higher rate of about 53.3% (n=16) out of sample site 90.0%(n=27).

Interestingly, it was found that habits with lesion have more potential of malignant transformation than other.

DISCUSSION:

Incidence of oral cancers and oral premalignant lesions is very high in India as compared with western population. Though scalpel biopsy followed by histopathology is considered as gold standard in diagnosing these lesions, it may not be feasible to do scalpel biopsy in all suspected cases (the patient maybe medically compromised or may refuse to undergo scalpel biopsy). In such cases, brush cytology may offer an attractive alternative.

In our study, males were predominantly affected with the large number of oral cancers developing in the fourth and fifth decades of life. We found that 73.3% were males and 26.7% were females (M:F=3:1).

In this study patient with deleterious habits with lesion was the most common with 60% patients, 20% gave a history of exposure to more than trauma due to sharp teeth, while 20 % patients with co morbidities and , buccal mucosa was the most frequently involved site 90%, followed by tongue 6.7% and palate 3.3 %. In this study, found that buccal mucosa and tongue were the most frequently involved sites.

Out of 30 patients, n=16 (53.3%) patients shows presence of dysplastic feature and n=14 (46.7%) patients shows absence of dysplastic features.

In our study we used oral brush biopsy to diagnose malignant transformation of pre-malignant lesion into cancer as early as possible.

Oral brush biopsy utilizes a brush to obtain a complete transepithelial biopsy specimen with cellular representation from each of the three layers of the lesion- The basal, intermediate, and superficial layers, unlike cytology instruments, which collect only exfoliated superficial cells.

Upon malignancy indicated through Oral exfoliative cytology, the incisional biopsy is performed. In this type of biopsy, a representative sample of the tissue is carefully chosen for selective diagnosis. The incisional biopsy is relatively accurate as it does not apply to the entire lesion. Using microscopic techniques, the experts differentiate the various types of cancer cells based on structural modifications.(6)

Goodson ML et al., study reveals, the Smear brush appears a useful adjunctive diagnostic technique: readily available in clinic, easy to use, minimally invasive and efficient in cell collection. From a clinician perspective, the brush has an optimal design facilitating application to oral sites. Patients report a preference for brush in contrast to conventional techniques requiring local anaesthetic, scalpel or punch instrumentation and suturing. The brush provides transepithelial sampling of basal, parabasal and superficial cell layers important for cytology grading, especially relevant in thickened keratin layers characteristic of leukoplakia, the commonest Pre malignant lesions.(6,7)

Driemel et al.,which evaluated the performance of oral brush biopsies using standard morphological analysis and HE staining for detecting oral squamous-cell carcinomas and their respective precursor lesions, a sensitivity and specificity of 79% and 93%, respectively, and positive predictive value of 88% which were comparable with our results but the negative predictive value was 88% was observed.(8)

Remmerbach et al., which reported the diagnostic accuracy of conventional oral brush cytology in suspicious oral lesions, sensitivity was 94.6%, specificity was 99.5%, positive predictive value was 98.1% and negative predictive value was 98.5%.(15). Brush cytology has a low interobserver variability for the benign and malignant grades, suggesting that in the hands of an experienced cytopathologists, it can be relied on with confidence.(9)

Scheifele et al. suggested that the main reason for the use of oral brush cytology is not to find a substitute for scalpel biopsy, but rather to take advantage of a first-level test that is able to identify dysplastic cells or molecular alterations which would be an indication for histological control, even in clinically apparent benign oral lesions. The importance of the brush cytology for evaluating benign-looking lesions has been emphasised in a multicentre study where nearly 5% of clinically benign-appearing mucosal lesions were sampled and later confirmed by scalpel biopsy to represent dysplastic epithelial changes or invasive cancer.(10)

Brush cytology is also useful in those situations when a patient refuses to have a biopsy performed or when medically compromised patients would be exposed to unnecessary surgical risks. In addition, anxious patients can be reassured quickly about the nature of oral mucosal changes, especially when a fear of cancer or a family history of cancer accounts for their apprehension.

In our study, the accuracy of brush cytology in detecting dysplasia and oral malignant transformation were 70%. Moreover, when comparing the scalpel biopsy used histopathology in previous literature study and brush cytology, the brush cytology showed good correlation with insignificant P value.

Conclusion:

Brush biopsy presents a minimally invasive and non – technically demanding for the survillence of oral potentially malignant disorder. Even though invasive method like scalplebased biopsy considered as gold standard procedure, on viewing our study, brush biopsy stands in near superior to scalpel based biopsy.

Table 1: Clinical data with variables.

S:NO	VARIABLES	PRESENT %(n)
1	HABITS WITH LESION	n=18(60.0)
2	CO-MORBIDITIES	n=6 (20.0)
3	TRAUMATIC SITE	n=6 (20.0)

Table 2: Cross -tabulation for presence and absence of dysplastic features.

S:NO	VARIABLE	RESULT	
		DYSPLASTIC FEATURE PRESENT n(%)	DYSPLASTIC FEATURE ABSENT n(%)
1	HABITS WITH LESION	n=15(50.0)	n=3(10.0)
2	CO-MORBIDITIES	0	n=6(20.0)
3	TRAUMATIC SITE	n=1(3.3)	n=5(16.7)

Table 3: Cross -tabulation of the variables and presence of dysplastic features.

S:NO	VARIABLE	RESULT	
		NUMBER OF PATIENTS n(%) N=30(100)	DYSPLASTIC FEATURE PRESENT n(%)n=16(100)
1	HABITS WITH LESION	n=18(60.0)	n=15(93.75)
2	CO-MORBIDITIES	n=6(20.0)	n=0
3	TRAUMATIC SITE	n=6(20.0)	n=1(6.75)

Table 4: Cross -tabulation of the variables and presence of dysplastic features.

S:NO	VARIABLE	RESULT	
		NUMBER OF PATIENTS n(%) N=30(100)	DYSPLASTIC FEATURE ABSENT n(%) n=14(100)
1	HABITS WITH LESION	n=18(60.0)	n=3(21.42)
2	CO-MORBIDITIES	n=6(20.0)	n=6(42.85)
3	TRAUMATIC SITE	n=6(20.0)	n=5(35.71)

Table 5: Analysis of clinico -pathological factors influencing further disease status

S:NO	VARIABLE	RESULT N(%)
1	BUCCAL MUCOSA	n=27 (90.0)
2	TONGUE	n=2 (3.3)
3	PALATE	n=1 (6.7%)

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