



## Review Article

## Exfoliative cytology application in dentistry- a review

Shaik Ali Hassan<sup>1,\*</sup>, Sumit Bhateja<sup>2</sup>, Geetika Arora<sup>3</sup>, Francis Prathyusha<sup>1</sup><sup>1</sup>Dr. Francisco Maxillofacial and Dental Clinic, India<sup>2</sup>Manav Rachna Dental College, Faridabad, Haryana, India<sup>3</sup>Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh, India

## ARTICLE INFO

## Article history:

Received 29-05-2020

Accepted 01-06-2020

Available online 11-06-2020

## Keywords:

Exfoliative cytology

Pap smear

Oral malignancy

Nuclear stain

Haematoxylin

## ABSTRACT

Oral mucosa experiences ceaseless peeling of epithelial cells which can be assessed for the determination of specific illnesses. Exfoliative cytology is the infinitesimal assessment of shed or desquamated cells from the epithelial surface generally the mucous film. A few recoloring methodologies have been utilized for investigation of smears however PAP stain despite everything stays as the stain of decision. Since exfoliative cytology is an easy, bloodless, and insignificantly intrusive methodology, it is all around acknowledged by the patients and has different applications. In this review, we will see how it can be used for the purpose related to dentistry.

© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

## 1. Introduction

Early recognition of a premalignant or malignant oral injury vows to improve the endurance and the horribleness of patients experiencing these conditions. Cytological investigation of oral cells is a non-forceful method that is very much acknowledged by the patient and is in this way an alluring alternative for the early finding of oral malignant growth, including epithelial atypia and squamous cell carcinoma. Any way its use has been restricted so far because of poor affectability and particularity in diagnosing oral malignancies. In 1967, publication in the diary of ADA clarifies that oral exfoliative cytology must be a piece of each oral assessment wherein dental specialists identifies even least dubious sore. 9.2% of dental specialists in practice have ever done an oral exfoliative cytology smear given the absence of information and absence of foundation.

60% of oral malignant growths are very much progressed when of conclusion and 80% of passing's could be forestalled by before recognition.<sup>1</sup>

\* Corresponding author.

E-mail address: [alishaikhassan@gmail.com](mailto:alishaikhassan@gmail.com) (S. A. Hassan).

Oral cavity mirrors the different occasions happening in the body and this is reflected by varieties in the cytomorphology of the shed cells.<sup>2</sup> Exfoliative cytology is the method of minuscule assessment of shed or desquamated cells from the epithelial surface normally the mucous layer. It additionally incorporates the investigation of cells that have been gathered by scratching the tissue surface or gathered from body liquids, for example, sputum, spit, and so forth. Regularly as a piece of physiological turnover there is constant shedding of the shallow cells. Be that as it may, in the instances of threat, the more profound cells which are emphatically followed in ordinary conditions likewise become free and shed alongside the shallow cells.<sup>3</sup>

## 1.1. Mechanism of exfoliative cytology

The justification of exfoliative cytology lies in the epithelial physiology. Because of physiological turnover, the ordinary epithelium experiences peeling of its shallow cells. The cells of the more profound layer are followers to one another regularly. When there is any neurotic condition, the cells

may lose their cohesiveness and the cells in the more profound layer may likewise shed alongside the shallow cells. These peeled cells just as cells that are removed off by methods for explicit instruments, can be concentrated quantitatively or subjectively.<sup>4</sup>

### 1.2. Technique of exfoliative cytology

The necessities for oral cytology are 1- 2 glass slide, swab stick/frozen yogurt stick/metal spatula or cytobrush, and Spray cyte or liquor as a fixative. Before beginning the method, clarify the motivation behind a strategy to the patient. The patient's name, date, and anatomic area of the smear must be named on one side of the glass slide with a sticker or precious stone marker. overabundance salivation in the region that will be spread must be cleared off with a gauze piece. Enthusiastically scratch and pivot the cytobrush or swab stick. Spread it onto the glass slide white film-like layer on the glass slide ought to be seen. Splash the outside of the glass slide with splash cyte which goes about as a fixative. Liquor (95%) can likewise be utilized as a fixative. Obsession or safeguarding is one of the most significant strides in the technique. Drying of the cells before obsession will normally result in antiquities, for example, atomic twisting and vacuolization. Send the fixed smear to the pathologist's research facility for understanding.<sup>5</sup>

### 1.3. Different stains

-Nuclear stain, hematoxylin, is utilized to recolor cell cores. The unmordanted haematein might be responsible for the yellow color.

- First OG-6 counterstain (- 6 signifies the pre-owned centralization of phosphotungstic corrosive; different variations are OG-5 and OG8). Orange G is utilized to recolor keratin. Its unique job was to recolor the little cells of keratinizing squamous cell carcinoma present in sputum.<sup>6-8</sup>

- Second EA (Eosin Azure) counterstain, involving three colors; the number signifies the extent of the colors, for example, EA-36, EA-50, EA-65.

-Eosin Y stain the shallow epithelial squamous cells, nucleoli, cilia, and red platelets.<sup>9,10</sup>

-Light Green SF yellowish stains the cytoplasm of different cells, including non-keratinized squamous cells. This color is presently very costly and hard to acquire, accordingly, a few producers are changing to Fast Green FCF, and anyway, it delivers outwardly various outcomes and isn't viewed as good by a few. When performed appropriately, the recolored example should show tints from the whole range: red, orange, yellow, green, blue, and violet. The chromatin designs are well noticeable, the cells from marginal injuries are simpler to decipher and the photomicrographs are better.<sup>11</sup> The recoloring brings about straightforward cells, so much thicker examples with

covering cells can be deciphered. On a solid and steady example, the cell cores are fresh blue to dark. Cells with high substance of keratin are yellow, glycogen stains yellow too. Shallow cells are orange to pink, and halfway and parabasal cells are turquoise green to blue. Metaplastic cells regularly stain both green and pink without a moment's delay.<sup>12</sup>

### 1.4. Advantages<sup>13,14</sup>

1. Painless, Bloodless, Noninvasive,
2. Speedy, Economical, Feasible and Requires least armamentarium
3. Simple chairside method for dental specialists
4. Suitable in patients with fundamental infection who are contraindicated for Biopsy
5. Guards against bogus negative Biopsy
6. Post biopsy confusions can be wiped out
7. Useful for mass screening
8. Has potential for early recognition of harmful injuries
9. Useful for rehashed follow up assessment to demonstrate proper site for biopsy of diffuse sore.

### 1.5. Disadvantages<sup>15</sup>

1. Relatively less data than histological slides
2. Positive outcomes are solid however negative are most certainly not
3. Suitable just for epithelial cells
4. Seldom utilized for assessment of C T scan
5. It is just an assistant and extra guide however, not a substitute for biopsy
6. Interpretation requires gifted and experienced cytopathologist
7. Tumor reviewing can't be surveyed

### 1.6. Indications<sup>16</sup>

1. Mucosal injuries that show up clinically harmless and, in any case, would not be biopsied.
2. Evaluation of broad mucosal injury when it is beyond the realm of imagination to expect to do what's necessary incisional biopsies for satisfactory testing.
3. Follow up for patients with the earlier analysis of either a harmful or premalignant mucosal injury.
4. If the patient's clinical status is unreasonably delicate for a biopsy or if the patients cannot.
5. Contraindications<sup>17</sup>
6. Most of benign lesion don't let themselves to cytologic smears
7. Lesions having a flawless surface like fibroma can never be biopsied
8. Leukoplakia doesn't fit cytologic determination due to lack of surface cells in the smear

## 2. Latest Advancements

Exfoliative cytology was likewise concentrated in patients with titanium inserts. Metal-like particles were seen inside and outside epithelial cells and macrophages in cytological smears of peri-embed mucosa of the two patients with and without periimplantitis. The convergence of titanium was higher in the peri-implantitis bunch when contrasted with the gathering without periimplantitis.<sup>18</sup>

An investigation was done to evaluate keratin profiles from smears of dangerous and contralateral ordinary oral mucosa as a feature of the advancement of a screening method for oral malignancy dependent on exfoliative cytology. Smears were taken from oral malignancies (affirmed by biopsy) and from the contralateral site of 20 patients. Utilizing a board of antikeratin antibodies, the keratins communicated by these cells were recognized utilizing a standard immunocytochemical strategy (Vectastain) and surveyed on a 3 point scale. Singular keratins can be distinguished in spreads from oral malignant growths. The recognizable proof of straightforward epithelial keratins appears to be the best keratin markers related to the threat. Their discovery inside smears from oral injuries could be important in the early analysis of oral malignant growth.<sup>19</sup>

In another examination to assess the convenience of exfoliative cytology as asymptomatic device for patients with clinical side effects of desquamative gum disease was completed. The cytologic discoveries indicated diffuse or aggregate Tzanck cells. Accordingly by utilizing the cytologic strategy may once in a while be of some incentive as a negligibly intrusive screening instrument.<sup>20</sup>

An examination uncovered that oral mucosa of consuming mouth disorder patients displayed critical histomorphometric changes in the oral epithelial cells. These progressions likely are related to epithelial decay, what's more, a deregulated development process that may add to the oral side effects of agony and uneasiness in BMS. While the great oral cytologic assessment is work concentrated and requires a high level of ability for distinguishing and assessing cells with dubious morphology the investigation of sub-atomic changes is objective and attempts to distinguish explicit hereditary irregularities. The chance of removing RNA from cells acquired by scratching has as of late been exhibited stressing its convenience in the early conclusion of oral premalignant also, dangerous injuries.<sup>21</sup>

## 3. Conclusion

Oral exfoliative cytology is an extremely basic chairside test requiring the least of armamentarium. Even though it's anything but a substitute to biopsy yet it tends to be utilized as an excellent adjunct. With the approach of late advances like cytomorphometry, its incentive as a diagnostic and predictive guide has surely expanded.

## 4. Source of Funding

None.

## 5. Conflict of Interest

None.

## References

- Banoczy J. Exfoliative cytologic examinations in the early diagnosis of oral cancer. *Int Dent J*. 1976;26:398–404.
- Perez-Sayans M, Somoza-Martin JM, Barrosanguiera F, Reboiras-Lopez MD, Gandara-Vila P, Gándara-Rey JM, et al. Exfoliative cytology for diagnosing oral cancer. *Biotech Histochem*. 2009;25:1–11.
- Sivapathasundharam B, Kalasagar M. Yet another article on exfoliative cytology. *JOMFP*. 2004;8(2):54–7.
- Shafer WG, Hine NK, Levy BM. A text book of oral Pathology. New Delhi: Elsevier; 2009.
- Saxena S, Kaur M, Samantha YP, Chawla G, Yadav G. Usefulness of Oral Exfoliative Cytology in Dental Practice. *Journal of Oral Health and Community Dentistry*. 2013;7(3):161–165. Available from: <https://dx.doi.org/10.5005/johcd-7-3-161>. doi:10.5005/johcd-7-3-161.
- Papanicolaou GN. Atlas of Exfoliative Cytology. Cambridge: Harvard University Press; 1954.
- Cowpe JG, Longmore RB, Green MW. Quantitative Exfoliative Cytology of Abnormal Oral Mucosal Smears. *J Royal Soc Med*. 1988;81(9):509–13.
- Bernstein ML, Miller RL. Oral exfoliative cytology. *J Am Dent Ass*. 1978;96(4):625–9.
- Walse WH. Anatomy, Physiology, Pathology and Treatment of Cancer. Ticknor; Boston; 1844.
- Ogden GR, Cowpe JG, Green M. Cytobrush and wooden spatula for oral exfoliative cytology: A comparison. *Acta Cytol*. 1992;36:706–10.
- Comprehensive cytopathology. Bibbo; 1997.
- Carson FL, Hladik C, Histotechnology. Histotechnology: A Self-Instructional Text. American Society for Clinical Pathology Press; 2009.
- Mehrotra R, Gupta A, Singh M. Brush biopsy in the early diagnosis of oral soft tissue lesions. In: AK V, editor. Tobacco Counters Health. vol. III; 2004. p. 216–19.
- Frist S. The oral brush biopsy: separating fact from fiction. *Oral Surg Oral Med Oral Radiol Endod*. 2003;96:654–6.
- Dudgeon LS, Wrigley CH. On demonstration of particles of malignant growth in sputum by means of wet-film method. *J Laryng Otol*. 1935;50:752–63.
- Orellana-Bustos AI, Espinoza-Santander IL, Franco-Martínez ME, Lobos-James, Ortega-Pinto N, V A. Evaluation of keratinization and AgNORs count in exfoliative cytology of normal oral mucosa from smokers and non-smokers. *Med Oral*. 2004;9:197–203.
- Rosin MP, Cheng X, Poh C, Lam WL, Huang Y, Lovas J, et al. Use of allelic loss to predict malignant risk for low-grade oral epithelial dysplasia. *Clin Cancer Res*. 2000;6(2):357–62.
- Olmedo GDG, Nalli S, Verdú, María L, Paparella, Rómulo L, et al. Exfoliative Cytology and Titanium Dental Implants: A Pilot Study. *J Periodontol*. 2013;84(1):78–83.
- Ogden GR, McQueen S, Chisholm DM, Lane EB. Keratin profiles of normal and malignant oral mucosa using exfoliative cytology. *J Clin Pathol*. 1993;46(4):352–6.
- Endo H, Rees TD, Kuyama K, Matsue M, Yamamoto H. Use of oral exfoliative cytology to diagnose desquamative gingivitis: a pilot study. *Quintessence Int*. 2008;39(4):152–61.
- El-Naggar AK, Mao L, Staerckel G, Coombes MM, Tucker SL, Luna MA, et al. Genetic Heterogeneity in Saliva from Patients with Oral Squamous Carcinomas. *J Mol Diagn*. 2001;3(4):164–70.

**Author biography**

**Francis Prathyusha** BDS, MDS

**Shaik Ali Hassan** Dental Surgeon

**Sumit Bhateja** HOD

**Geetika Arora** Reader

**Cite this article:** Hassan SA, Bhateja S, Arora G, Prathyusha F. Exfoliative cytology application in dentistry- a review. *IP Arch Cytol Histopathology Res* 2020;5(2):116-119.