

Research Article

Role of Mast Cells in Oral Epithelial Dysplasias - A Pilot Study

Yasoda Vankayala^{1*}, A. Sandhya Rani², Bhavani N. Sangala³, Pavani Vidhyadhari⁴¹Oral pathologist, Yashoda Dental Clinic, Tadipatri, Anathapur, Andhra Pradesh, India²Senior lecturer, Department of Oral and Maxillofacial Pathology, New Horizon Dental College and Research Institute, Bilaspur, Chhattisgarh, India³Reader, Department of Oral Pathology and Microbiology, Bharati Vidyapeeth Dental College and Hospital, Navi Mumbai, Maharashtra, India⁴Senior lecturer, Department of Oral and Maxillofacial Pathology, G. Pulla Reddy Dental College, Kurnool, Andhra Pradesh, India

*Corresponding Author

Yasoda Vankayala

Abstract: *Introduction:* Mast cells are mobile granule-containing secretory cells that are distributed preferentially about the microvascular endothelium in oral mucosa. Mast cell synthesis and release of mediators exerts potent immunoregulatory effects on other cell types, while several T-lymphocyte-derived cytokines influence mast cell migration and mediator release in oral leukoplakia which is a well known potentially malignant disorder. *Aim:* To enumerate role played by mast cells and the status of mast cell (Intact or Degranulated) density in mild, moderate and severe cases of epithelial dysplasias which are clinically diagnosed as leukoplakia compared to normal tissue. *Materials and Methods:* 30 formalin-fixed -paraffin-embedded tissue specimens of epithelial dysplasias (10-mild, 10-moderate, 10-severe cases), distilled water, 1% Toluidine blue, absolute alcohol and Xylene. Mast cells were counted in 4 random high power fields (40x) using eye-piece (10x) fitted with 1cm² graticule. *Results:* A significant difference in the average number of Mast cells / 1 HPF at p<=0.005 was observed when compared the averages of Normal, Mild, Moderate and Severe cases. *Conclusion:* There is an increase in the number of mast cells gradually from mild, moderate to severe dysplasias but there is no significance when we compared mild with moderate dysplasias.

Keywords: Mast cells, Epithelial dysplasia, Oral leukoplakia, toluidine blue.

INTRODUCTION

Mast cells are mobile granule-containing secretory cells that are distributed preferentially about the microvascular endothelium in oral mucosa. Mast cell synthesis and release of mediators exerts potent immunoregulatory effects on other cell types, while several T-lymphocyte-derived cytokines influence mast cell migration and mediator release¹. Mast cells, with their regulatory role on angiogenesis and inflammation, brought about by the release of their mediators, play an important role in the tumor progression, facilitating the transformation of oral precancerous lesions into invasive carcinoma².

AIMS AND OBJECTIVES

To enumerate role played by mast cells and the status of mast cell (Intact or Degranulated) density in mild, moderate and severe cases of epithelial dysplasias which are clinically diagnosed as leukoplakia compared to normal tissue.

MATERIALS AND METHOD:

30 formalin-fixed -paraffin-embedded tissue specimens of epithelial dysplasias (10-mild, 10-moderate, 10-severe cases), distilled water, 1% Toluidine blue, absolute alcohol and Xylene. Mast cells were counted in 4 random high power fields (40x) using eye-piece (10x) fitted with 1cm² graticule. To rule out the subjective bias 2 observers independently evaluated all the slides. The results thus obtained were subjected to statistical analysis using ANOVA method.

RESULTS

In the present study mast cells were present in all grades of epithelial dysplasia. Granulated mast cells were seen in more number in severe dysplasia (figure 3) when compared to mild and moderate cases. The findings obtained by two observers were subjected to paired t test and statistical analysis. When compared the averages of Normal, Mild, Moderate and Severe cases, it was observed that there is a significant difference in the average number of Mast cells / 1 HPF at p<=0.005(table3).

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Table-1

SUMMARY				
Groups	Count	Sum	Average	Variance
Normal	5	28.48	5.696	0.50383
Mild	10	107.66	10.766	16.5234
Moderate	10	117.57	11.757	7.712379
Severe	10	169.4	16.94	12.84711

Table-2

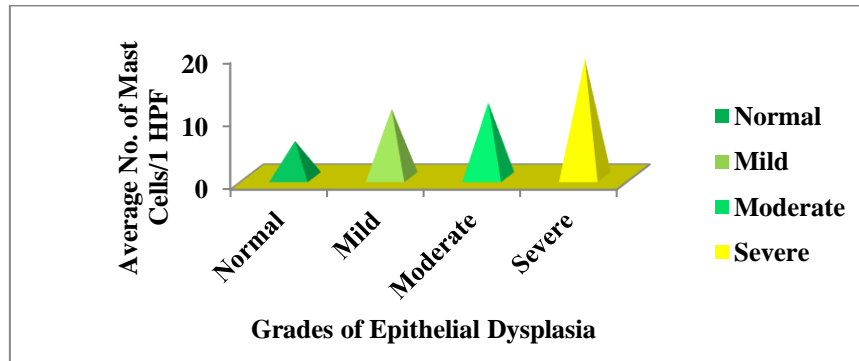


Table-3

Normal Vs Mild	Insignificant
Normal Vs Moderate	Significant
Normal Vs Severe	Significant
Mild Vs Moderate	Insignificant
Mild Vs Severe	Significant
Moderate Vs severe	Significant

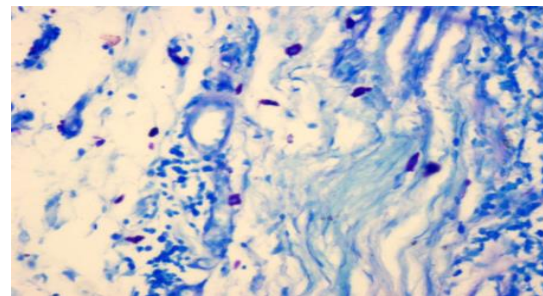


Figure 3: Severe

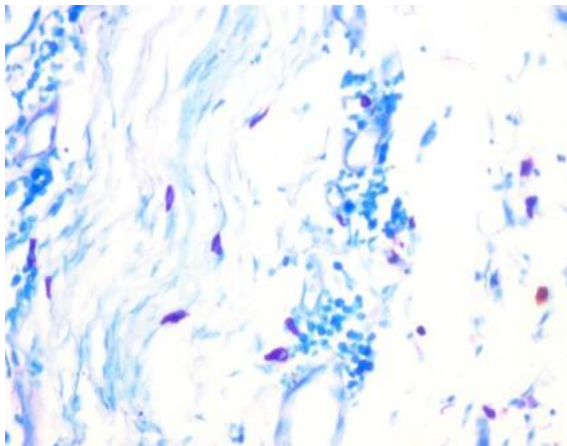


Figure1: Mild

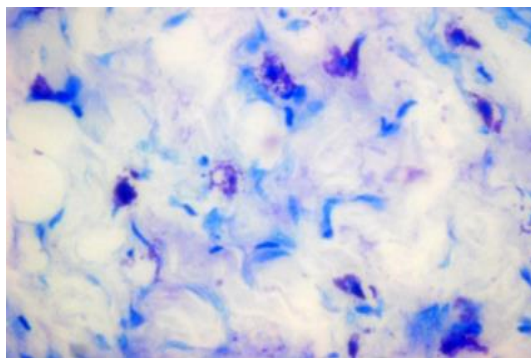


Figure2: Moderate

DISCUSSION:

Mast cells are mobile cells which migrate within tissues and obscure in routine H&E sections & hence their number is often under estimated. However they are better visualized with TB staining due to the characteristic metachromasia exhibited by their cytoplasmic granules⁵ (figure2). Many investigators tried to highlight the role of mast cells in oral health & disease conditions. They are known to exert their influence on tissues by releasing many potent mediators through degranulation which play an important role in both physiologic & pathologic conditions. They exhibit phenotypic plasticity i.e, there is variation in the mast cell mediators with the change in tissue micro-environment³. In oral lichen planus they have been thought to be instrumental in recruiting T cells to the sub-epithelial zone while IL-1 from the mast cells is thought to cause increases fibroblastic response in oral submucous fibrosis. Oral leukoplakia (OLK) is a more common potentially malignant disorder with malignant transformation rate ranging from 4.4-7.5%. The release of potent proangiogenic and angiogenic factors by mast cell degranulation may favour the progression of OLK to SCC. In order to analyze their role in varying grades of epithelial dysplasias, the present study was

undertaken. On comparison, there was a statistically significant increase in total mast cell count in OLK than normal mucosal CT which was in accordance with Reddy DS *et al*⁸. Further in our study, significant differences in the mast cell counts were observed on comparison between A) normal & moderately dysplastic epithelium, B) normal & severely dysplastic epithelium and C) moderate & severely dysplastic epithelium(table-2). This is suggestive of not only an increase in mast cell count as there is progression of disease from moderate to severe but probably they may also play a significant role in transformation of normal epithelium to dysplastic epithelium and may also help in progression of the disease(table-3) which is in accordance with E.Z. Michailidou *et al*⁴. The key mediator that influences mast cell migration is mast cell growth factor (MGF), which is synthesized by endothelial cells and epidermal keratinocytes. Tryptase is the most abundant serine proteinase stored in mast cells which promotes inflammation, degranulation, tissue remodeling and important angiogenic factor. Mast cells have been demonstrated in normal oral connective tissues including the gingiva, tongue, lining mucosa, periodontal ligament and pulp in very low densities⁷.

The pharmacologically active agents in mast cell granules probably contribute to the inflammation seen in OLK. The mast cell degranulation releases IL-1 which can cause increased epithelial proliferation and also histamine that may be responsible for increased mucosal permeability thereby facilitating increased access of the antigen to the connective tissue. Degranulation of mast cells probably activates endothelium through the TNF- α released from their granules and this may be critical to elicitate phase of inflammation.

CONCLUSION

The above results showed that mast cells play a prominent role in the pathogenesis, progression of OLK and probably its transformation into cancerous lesions. Though there is an increase in the number of mast cells gradually from mild, moderate to severe

dysplasias there is no significance when we compared mild with moderate dysplasias. However, as we were planning to continue the study further and as sample size increases, more accurate results may be expected. Further studies need to be initiated to analyze the correlation between mast cell count and vasculature in OLK and SCC cases

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