# MAST CELLS IN ORAL LICHEN PLANUS

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**ABSTRACT:**

Oral lichen planus is a chronic mucosal disease of unknown etiology that appear clinically as a persistent red, white or a mixed lesion. Though the precise pathogenesis is unidentified, evidences available at present strongly suggest that cell mediated immunity plays a major role in the initiation and evolution of this disease. The mast cell, the major immuno effector cell of the connective tissue is thought to be mediating this synchronized cellular orchestra, the symphony of which results in the various clinical manifestations of oral lichen planus.

**Aim:** This study is done to evaluate mast cell density in oral lichen planus and to compare it with mast cell density in normal mucosa.

**Materials & Methods:** Sections from thirty cases of oral lichen planus and ten normal oral mucosa were studied for mast cells using toluidine blue stain. Two sample T test was used to compare the mean values of the density of cells in the lesional area to that of control. The mean of the type and distribution of mast cells were compared using F test-One way ANOVA.

**Result:** An increase in mast cell density was noted in lichen planus when compared to normal buccal mucosa. Distribution of mast cells was significantly increased below the inflammatory band and mast cell degranulation was prominent here.

**Conclusion:** The increased density of mast cells and their distribution suggest their definite role in different phases of evolution of Oral Lichen Planus.

Key Words: Mast cells, Oral lichen planus, Pathogenesis.

## INTRODUCTION

OLP is a T-cell mediated autoimmune disease with an unknown etiology[1]. It affects copious number of people world wide exhibiting considerable variations in its incidence, etiology and manifestation among different population. Though various clinical subtypes have been described by WHO[2], the sub epithelial band of chronic inflammatory infiltrate is a consistent microscopic finding in all the cases. The inflammatory cellular components and its complimentary essentials which make up the sub epithelial band in oral lichen planus acts against a self antigen, present in the epithelium as a self motivated synchronized orchestra. While there is sizeable literature on the T cell population[3, 4] in the oral lichen planus, other immunocompetant cells have attracted less attention. Hence a histochemical study using toluidine blue stain was conducted to assess the density, morphological characteristics and distribution of mast cells, the major immunoeffector cells of the connective tissue, in thirty cases of oral lichen planus.

## MATERIAL AND METHODS:

The material used for this study consisted of lesional group and control group. The lesional group comprised of thirty cases of oral lichen planus reported to the out patient department of Mahatma Gandhi Post Graduate Institute of Dental Sciences, Puducherry and the control group consisted of 10 specimens taken from normal buccal mucosa for comparative analysis with the diseased tissue. Specimens from these cases were subjected for histopathological study under H&E, to read the histological changes and toluidine blue stain to analyze the mast cells.

The working solution of toluidine blue was prepared as given below[5].

Stock solution:

Toluidine Blue O – 1.0 gm

70% Alcohol - 100ml

1% Sodium Chloride

Sodium chloride -0.5gms

Distilled water -50ml

Working solution:

Toluidine Blue, stock-50ml

1%Sodium Chloride- 45ml

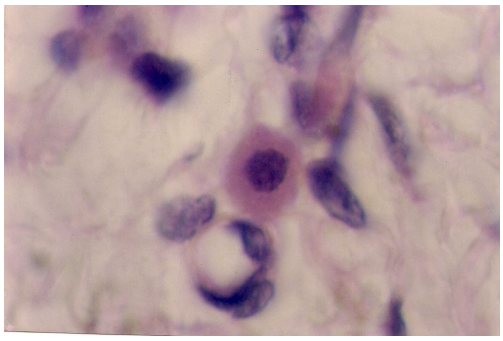
**RESULTS:**

In H & E sections mast cells were noticed in all cases of Lichen planus. Mast cells appeared as large eosinophilic cells with well defined cell borders and a centrally placed nucleus (Fig.1). Toluidine blue stain revealed more number of mast cells and distinct features of mast cells could be well appreciated using toluidine blue stain.

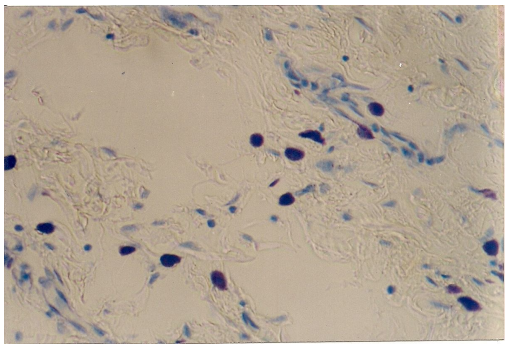
Our observations based on thirty cases studied, showed that there is definite increase in mast cell density in OLP when compared to the normal control group. Out of 30 cases, eleven cases showed severe increase, eleven cases showed moderate increase and eight cases showed mild increase in mast cell density.

When distribution of mast cells was studied, more concentration of mast cells was found immediately below the inflammatory infiltrate. Nine cases showed intense density of mast cells below the infiltrate whereas seventeen cases showed moderate distribution and four cases showed mild distribution.

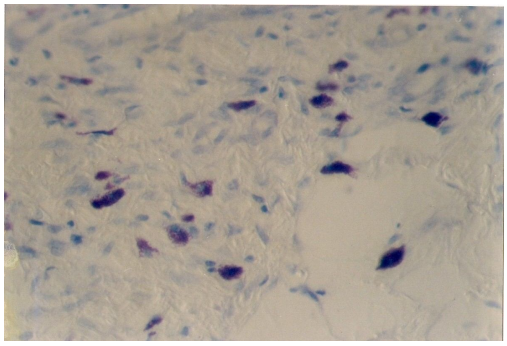
Differences were noticed in the colour and morphology of mast cells distributed within the infiltrate and in the deeper connective tissue and three types of mast cells could be identified. The cells in the deeper connective tissue (except those seen in relation to the blood vessels) were found to be round/oval in shape and dark purple in colour. The cell borders were well defined and nucleus was not visible. These fully granulated cells with granules masking the nucleus were named as **intact cells** (Fig.2**)**. In the superficial connective tissue, immediately below the infiltrate and near the blood vessels, the mast cells appeared flattened or irregular and cytoplasm appeared granular. Many cells showed spreading granules and in some cases granules were found dispersed in the connective tissue. The cell borders were not defined and the nucleus was only partially appreciable. They formed the **spreading cells** (Fig.3 & Fig.4). In addition to the types mentioned above, a third type named as **degranulated cells** (Fig 5) was found within the infiltrate. These cells appeared paler as the staining had changed from metachromatic violet to light pink; the nucleus was blue in colour and well defined. When the mean value of the cell types were statistically analysed it was found that spreading cells were significantly increased in number when compared to other cell types.



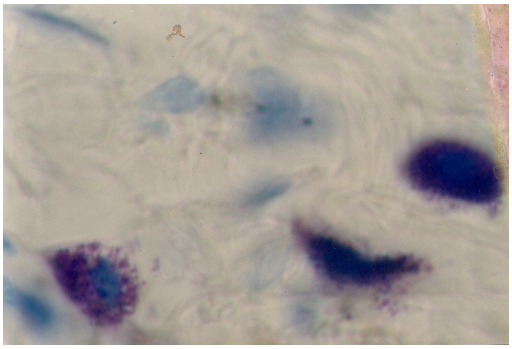
*A mast cell with large eosinophilic cytoplasm and centrally placed nucleus seen in close association with a blood vessel.(H & E, 20x)*



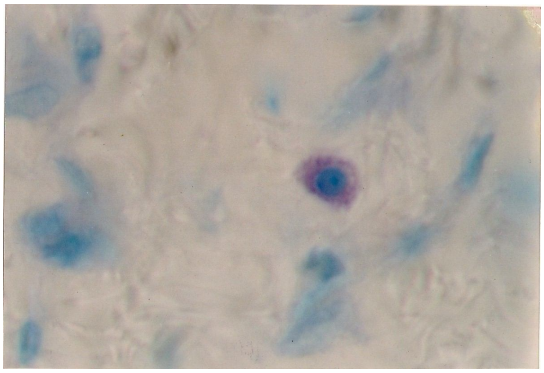
*Intact mast cells packed with granules. (Toluidine Blue,10x)*



*Spreading mast cells. Granular cells with indistinct cell border seen immediately below the inflammatory band.(Toluidine Blue,10 x)*



*Spreading mast cells. Note the granules dispersed in the adjacent connective tissue(Toluidine Blue,40 x)*



*Degranulated mast cells with pale pink cytoplasm and well defined blue nucleus.(Toluidine Blue, 20x)*

## DISCUSSION:

Increased density of mast cells found in our study was consistent with the previous studies reported. Walter B Hall[6] et al found a significant increase in the number of mast cells in oral lichen planus and he noted that the mast cells lined up along the basement membrane. But, in our study only ten out of the thirty cases examined, showed lining up of mast cells near the basement membrane. In these ten cases only few cells (<10 cells) were

seen in relation to the basement membrane. Though consistency regarding the increase in mast cell density was noticed no confirmity seems to exist regarding their distribution. Abbey et al[7] noted the distribution of mast cells through out the sub epithelial inflammatory infiltrate whereas Heyden G et al[8] reported the distribution of mast cells in the non inflammatory part of lamina propria. Similar distribution of mast cells was noticed in our study also. Jontell M[9] et al found an increased distribution of granulated mast cells below the infiltrate and noticed that those cells within the infiltrate lost their metachromatic property and appeared pale pink suggesting degranulation of the cells. Our study supported these findings. In our study we noted an increased accumulation of degranulating/spreading mast cells immediately below the inflammatory band, though the significance of infiltrate below the infiltrate is not known. The mast cell accumulation in the connective tissue along the borders of inflammatory infiltrate especially at the inflammatory infiltrate - connective tissue interface was noticed in recurrent aphthous ulcer by Natah S S et al[10] and they suggested that mast cell degranulation at these interface may contribute to localized extra cellular degradation by mast cell proteinases, which is an essential step for inflammatory cell movement and migration through extra cellular tissue. ZZ.Zhao etal[11] found increased number of mast cell in close apposition to the nerve fibers especially in the superficial layer and they suggested that mast cell nervous system axis may contribute to the pathogenesis of OLP.

Mast cell degranulation releases a range of pro-inflammatory mediators such as Histamines, TNF α, Chymase and Tryptase, and each of these mediators have specific function in OLP. Histamine causes vasodilatation and increases the vascular permeability where as TNF may up regulate endothelial cell adhesion molecule expression that is required for lymphocyte adhesion to the luminal surfaces of blood vessels and subsequent extravasation. Kabashima et al [12] found close association of substance P-immunoreactive nerve and mast cells in periapical granuloma and suggested that the synthesis of TNF α from mast cells is stimulated by substance P released by noxious stimulants. Similar non immunogenic mast cell degranulation could also occur in OLP. Tryptase can facilitates recruitment of T lymphocytes

whereas Chymase, can cause the degradation of basement membrane either directly or indirectly via the activation of T-cell secreted MMP-9 thereby paving way for the $CD^{8}$+ lymphocytes to enter the epithelium.

The distribution of mast cells at different levels may suggest the role of mast cells at different phases of oral lichen planus.The initial phase may be involving the blood vessel to dilate and extravasate the lymphocytes. Subsequently these lymphocytes are attracted towards the sub epithelial zone. The mast cells may also release some cytokines that causes the destruction of extracellular matrix and attract the targeting lymphocytes towards the basement membrane.

## CONCLUSION:

Our study points out that the mast cells which were so far considered as minor component of the cellular infiltrate in oral lichen planus has got a definite role in the pathogenesis of oral lichen planus. Hence due importance should be given for further study to understand the disease process as well as to evolve a successful treatment.

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**Sorce of Support:** Nil **,**

**Conflict of Interest:** None declared