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REVIEW ARTICLE

MAST CELL IN ORAL LESIONS – A SHORT REVIEW

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ABSTRACT

Mast cells play a crucial role in the inflammation phenomenon in oral mucosa. The mast cells show presence of cytoplasmic granules which comprises of heparin, histamine and chondroitin sulphate. Mast cells can be demonstrated by using some special stains like toluidine blue and modified astra blue technique. They perform various functions and also play a major role in various oral diseases.

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INTRODUCTION

Mast cells were first discovered by Friedrich von Recklinghausen in 1863 and Paul Ehrlich named them in 1878 (Pang, 1996). "Mastzellen" term was used by Paul Ehrlich to describe mast cells. He also co- relate the association between mast cells and inflammation and blood vessels (Okayama, 1995). Mast cells are known for playing the role in anaphylaxis as well as allergy along with healing of wound (Walsh, 1995). In inflamed tissue, the amount of mast cells is regulated by various factors such as migration, proliferation as well as survival. In healthy persons, the quantity of mast cells is steady but this quantity is altered in various pathophysiologic conditions such as in allergic asthma and allergic rhinitis (Viegas, 1987 and Gibson, 1993). Histologically mast cells are either spherical shaped, spindle shaped or stellate shaped. These cells contain round nuclei and cytoplasmic granules which shows acidic proteoglycans. These granules constitute various biologically active substances which includes histamine, heparin, proteolytic enzymes and chondroitin sulphate (Abul, 2000 and Cross, 1993).

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The mast cells can be seen in different tissues such as mucosal epithelial tissue, submucosa, and connective tissue of various organs and skin (Kumar, 2006).

Staining properties

The granules in mast cells are not demonstrated by routine haematoxylin and eosin stains. So some special stains are used for demonstrating these granules. Staining with the toluidine blue at a ph of 4 will demonstrate the mast cells. Also for selective staining, Bismarck brown and modified astra blue technique can be used. The mast cell granules are metachromatic in nature and thus can be stained by fuelgen and methyl green or fuelgen and Bismarck brown technique (Abul, 1993).

Function of Mast Cell: Mast cells in conjunction with basophils results in type 1 hypersensitivity reaction. Mast cells also engage in maintaining vascular homeostasis as well as stability of normal tissue. Release of primary and secondary mediators also carried out by degranulation of mast cells (Kumar, 2006; everson pearse, 2004).

Role of mast cells in various oral diseases

Gingivitis and Periodontitis: The mast cell plays an important role in gingival inflammation. As inflammation of gingiva increases, there is increase in degranulated mast cells

within gingival connective tissue (Nisengard, 2006). According to Gunhan *et al*. (Gunhan, 1991) number of mast cells increases in inflamed and healing gingiva. Cindric *et al*. (1991) observed that there is rise in mast cells number in inflamed gingiva in those patients having gingival index of 1-2. According to the observation of Batista *et al*. (2005) healthy gingiva shows an average of 35.73 ± 37.77 mast cells/mm^2, while in gingivitis value increases to 44.54 ± 30.31 cells/mm^2, whereas highest density was seen in localized chronic periodontitis (71.38 ± 59.15 cells/mm^2).

Oral Lichen Planus

Lichen planus is defined as mucocutaneous disorder that affects oral as well as genital mucous membranes, nails, skin and scalp (Canto am, 2010). The term lichen planus is derived from Greek word "lichen" meaning tree and "planus" from Latin word means flat. Oral lichen planus is a complement of cutaneous lichen planus (Gupta, 2013; Lavanya, 2011). Oral lichen planus happens because of chronic cell mediated mucocutaneous inflammatory condition that occur in response to antigenic change. Mast cells play a crucial role in the pathogenesis of oral lichen planus (Zha, 2002). According to Walter B hall (Walter, 1969), there is significant rise of mast cells in oral lichen planus. Zz zhao (Zha, 1998), observed significant rise in the number of mast cells in their study in case of oral lichen planus. Jontell *et al* (Jontell, 1986) also found significant rise in population of mast cell in oral lichen planus.

Oral Cyst

Mast cells are widely distributed in the walls of connective tissue of all cyst types (Shear, 2007). As per study done by Patidar *et al* (2012), they concluded that extreme number of mast cells are seen in radicular cysts while the lesser number was found in the odontogenic keratocyst. Netto *et al* (De noronha santos netto, 2012) observed that in case of inflamed dentigerous cyst, excess number of mast cells is seen. In their study, Fonseca –Silva *et al* (2012) found the presence of mast cells in radicular cyst as well as periapical granuloma. Also in a study conducted by Sca *et al* (2011) and Seifi *et al* (2012), they observed the presence of mast cells in cases of periapical cysts.

Salivary Gland pathology

According to study conducted by Katopodi *et al* (2004), mast cell count is higher in pleomorphic adenoma when compared with canalicular adenoma. Vidal *et al*. (2013) observed that mast cells density was higher in case of mucoepidermoid carcinoma.

Lymphomas

Molin (2002) stated that in case of classical Hodgkin's lymphoma, greater number of mast cells is found which is associated with nodular sclerosis. According to the study conducted by Taskinen *et al.* (Taskinen, 2008 and Taskinen, 2010), they found that in follicular lymphoma presence of mast cells are in harmony with unfavorable prognosis. Also vascularity of tumor is associated with mast cells.

Hemangioma

Hemangioma is benign vascular tumor which is frequently found in head and neck region. The hemangioma shows their presence within first weeks of life.

Rapid growth of hemangioma is found to occur in the first year of life (Enjolras, 1997). According to Mulliken *et al* (Mulliken, 2000), hemangioma is divided into 3 types namely proliferating, involuting and involuted stage. A study has been conducted by Tan *et al*. (2004) to observed the presence of mast cells in biopsy samples of hemangioma. The number of mast cells was found in all types of hemangioma. However, increased number of mast cells was found in involuting stage as compared to involuted and proliferative stage.

Odontogenic Tumor

Tahir *et al* (2014) shows significant rise of mast cells in granular cell ameloblastoma. Mast cell was found in solid ameloblastoma, unicystic ameloblastoma, Adenomatoid odontogenic tumor, odontogenic myxoma, calcifying cystic odontogenic tumor. Mast cells in solid ameloblastoma were found in tumor stroma. Few number of mast cells was seen in odontogenic myxoma and were exclusively observed in extracellular matrix (De assis caldas pereira f, 2012).

Oral Squamous Cell Carcinoma

As per study done by Telagi *et al* (Telagi, 2015), they found in oral squamous cell carcinoma there is increased amount of mast cells proliferation when compared with potentially malignant disorders. In their study, Zaidi *et al*. (2014) noticed the statistically significant mast cell expression in oral squamous cell carcinoma. In the year 2012, Vineet *et al* (2012) conducted a study in which they observed that density of mast cell increases in case of well differentiated squamous cell carcinoma.

Leukoplakia

Biviji *et al*. (1973) in their study observed that there is rise in quantity of mast cells/unite microscopic field in case of oral leukoplakia.

Oral Submucous Fibrosis

Ankle *et al*. (2008) in their study observed that there is rise in mast cell count in oral submucous fibrosis cases (48.25/sq.mm). According to Gomes *et al* (2008), oral submucous fibrosis as well as actinic cheilitis shows increased mast cell density_Another study conducted by Pujari *et al*. (2013) showed that mast cell density was increased in all stages of Oral Submucous Fibrosis.

Giant Cell Granuloma

As per study conducted by Farhadi *et al*. (?), they found increased concentrations of mast cells in central giant cell granuloma when compare with peripheral giant cell granuloma.

Oral Reactive Lesions

In the study done by Reddy and Bhagwath (2014), they found increased mast cell count in peripheral ossifying fibroma followed by fibrous hyperplasia, pyogenic granuloma as well as peripheral giant cell granuloma.

Conclusion

Mast cells play a vital role in the development of inflammation in oral mucosa. Presence of mast cells in various pathologies like oral cyst and tumor, carcinomas, potentially malignant

diseases suggests the importance of mast cells in the human body and the amount of important roles it plays in numerous pathologies.

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