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Research Article

MAST CELLS IN PROGRESSION OF ORAL SQUAMOUS CELL CARCINOMA

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A R T I C L E I N F O

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A B S T R A C T

Introduction: Mast cells are multifunctional and intricate cells, playing a significant role in innate and acquired immunity. Apart from their role in maintaining homeostasis and inflammation, they are also associated with tumor angiogenesis. Angiogenesis is a multifarious process regulated by growth factors where mast cells act by releasing angiogenic factors and promoting tumor growth and metastasis**. Aim:** To histologically evaluate the number of mast cells in oral squamous cell carcinoma (OSCC). **Material and method:** 30 cases stained with 1% toluidine blue (each of 15 OSCC and 15 normal mucosa) were included in study and were evaluated using light microscope. **Result:** Increase in the mast cell count was observed in OSCC. Conclusion: A significant increase in mast cell count in OSCC was noted compared to normal mucosa signifying their contribution in tumor growth and progression.

INTRODUCTION

The most common oral cancer is OSCC corresponding to 95% of all oral malignant lesions. The biological behavior of OSCC is diverse. The 5-year survival rate of OSCC patients have improved only slightly regardless of the developments in the treatment modalities.

Mast cells are the secretory granular cells having diameter of 12µm, round to ovoid in shape with 50-100 granules with life span of weeks to months. These mast cells release secretory mediators like histamine, heparin, leukotrienes and interleukins. The extensive biological function and omnipresent distribution near nerves and blood vessels, inflamed tissues and even tumor foci enable mast cells to play a vital role in physiologic as well as pathologic process. An effort has been made to estimate the number of mast cells in OSCC and to suggest their role in tumor growth and progression.

MATERIAL AND METHOD

20 paraffin embedded sections (10 OSCC and 10 normal mucosa) were retrieved from the archives of the department of oral pathology. Among the 10 OSCC cases, 5 were well differentiated and 5 were moderately differentiated. The 10 normal tissue biopsies were from normal adult patient undergoing extraction for orthodontic reasons.

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Serial sections of 5µm thickness were cut using semiautomatic microtome from paraffin embedded tissue blocks. The sections were stained using 1% toluidine blue for mast cell identification.

Criteria for mast cell identification

Granules of mast cells are purplish red and the nuclei are sky blue in color. The mast cell granules stain metachromatically with toluidine blue due to reaction with sulfated mucopolysaccharides.

RESULT

Total number of mast cells was significantly increased in OSCC compared to normal cases. A threefold increase in the usual number of mast cells/slide was observed in OSCC when compared to controls. All these changes were statistically significant ($P < 0.001$). [Table 1, figure 1]

Table 1 Comparison of the average mast cell count in between OSCC and control group using ANOVA test.

Group	Sample size	Average no. of mast cells/slide	P value
Normal oral mucosa	10	24.32	0.001
OSCC	10	110.41	0.001

DISCUSSION

Mast cells are the local residents of connective tissue and are released in response to inflammation and injury. In 1877, Paul Ehrlich discovered a granular cell of loose connective tissue which was named Mastzellen meaning a well fed cell. They are multifunctional playing a role in innate and acquired

immunity. They originate from CD34 precursor in bone marrow, circulating in peripheral blood and migrate into tissues assuming their granular morphology. They have been studied in normal gingiva, desquamative gingivitis, inflammatory gingivitis, lichen planus, oral submucous fibrosis and OSCC. Mast cells demonstrate phenotypic plasticity. There is distinction in the mast cell mediators as the microenvironment changes, making the study of this cell appealing.

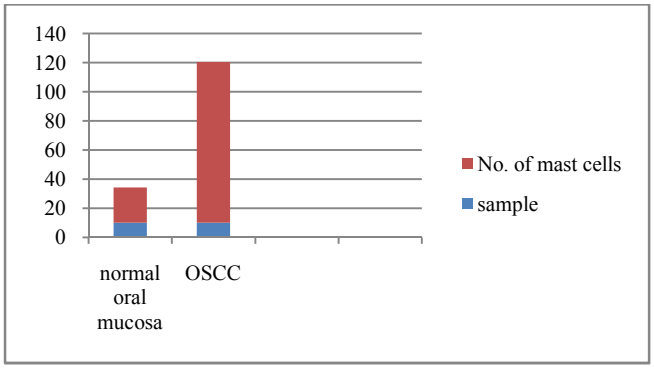

Figure 1 Bar graph showing increase of mast cell count in OSCC when compared to controls.

Tumor genesis is a diverse process in which interaction between malignant and non malignant cells play a vital role. During premalignancy, infiltrating mast cells degranulate releasing the components like heparin and histamine which cause proliferation and migration of endothelial cells and increase tumor angiogenesis and metastasis. These mast cells are a source of proteases which degrade extracellular matrix and facilitate invasion by matrix remodeling. Hence, mast cells have an impact on primary tumor development, progression and metastasis.

As the cancer progresses further, gene expression is upregulated in cancer cells with tumor cells directly scheming their angiogenic phenotype and not with the help of inflammatory cells which lead to neovascularization. This implies that mast cells have significantly increased role in the early stages of cancer progression, as the stage progresses the mast cells decrease as tumor cells are not dependent for neovascularization effect. This could possibly explain increased number of mast cells in moderate compared to well-differentiated OSCC in our study. The study needs to be performed in larger number of cases. The tissue level and the type of mediators should be evaluated in the different diseases considered.

CONCLUSION

As mast cells have a function in chronicity of inflammation which ultimately cause OSCC, therapeutic intrusion to control the mast cell secretion should be contemplated at early precancerous stage. In depth understanding of mast cell activation, immunomodulatory ability and proangiogenic prospective will open new perceptions on the advancement of future therapeutic strategies focused at these multifunctional cells.

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