ROLE OF VARYING DEGREE OF INFLAMMATORY MAST CELL POPULATION IN SALIVARY GLAND DISEASES

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ABSTRACT

Objectives: *To determine the association between inflammatory mast cells and various diseases of the salivary glands.*

Materials and Methods: *An experimental lab based descriptive study was done at the institute of pathology at diagnostic medicine, Khyber medical university, Peshawar. Non probability, convenient sampling comprising of n=71was done and tissue biopsies of salivary gland diseases were collected from April, 2022 to Sept. 2022. Gross examination, followed by tissue processing and routine Hematoxylin and Eosin staining was done. Giemsa stain was done to visualize the inflammatory mast cell population, microscopically. Mast cell count at the invasive site of the tumor within the underlying connective tissue/ lamina propria as well as intra-tumoral stromal tissue was calculated and recorded in peri- and intra-tumor stromal fields.*

Results: *It was found that out of all the 71 included cases 24% were non-neoplastic and 76% were neoplastic lesions. The mean age of affected patients is around 47.5 years while the male to female ratio is 1.4:1. Mucocele was the most prevalent non neoplastic lesion while adenoid cystic carcinoma was found to be the most commonly encountered malignancy. Mast Cell count was almost the same for peri-tumoral and intra-lesional areas of benign salivary gland tumours. It was significantly high in malignant tumours such as mucoepidermoid carcinoma.*

Conclusion: *Mast cell may serve as a potential cause for varying degree of inflammatory response in case of neoplastic salivary gland lesions.*

Key words: *Salivary Gland Tumours, Mast Cell Count, Chronic Inflammation*

INTRODUCTION

The salivary glands are complex exocrine tubule-acinar glands formed by the collection of many secretory units. These units have acini where secretion is produced; a ductal system carries these secretions to the oral cavity and maintains the concentration of water and electrolytes[1]. Mast cells are inflammatory cells of hematopoietic origin, which are categorized by their significant cytoplasmic granules[2]. Nearly, all human tissues (except bone and cartilage) comprise of mast cells. They are also present in connective tissue structures[3]. MCs have a multi-functional part in cell-mediated immune responses and allergic reactions. The mast cell is an important component of body's innate immune system. After binding of foreign substance with membrane-bound IgE and 2 Fc receptors interlink, the MC instantaneously give off huge amount of factors into the extra-cellular environment by de-granulation[4]. Histamine is the most essential cytokines released from the cytoplasmic granules of mast cells[5]. There are some other mediators as well released from the granules that may cause stimulation of fibroblasts i.e chymase, TNF-alpha, tryptase, vascular endothelial growth factor (VEGF), fibroblast growth factor-2 (FGF-2) and transforming growth factor-β (TGF-β). Fibrosis and angiogenesis may also be caused by these factors[6]. The constituents of secretory gran-

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ules, mast cells are divided into two major types; one is MC (T) cells with mostly tryptase. The most of MC (T) cells are present close to mucosal tissue i.e. the lining of gastrointestinal tract or respiratory epithelium. These cellular components are involved in the immunity. The second major type is MC (TC) which contains tryptase and carboxypeptidase as well as chymase in the cytoplasmic granules. These cells are present in the connective tissues such as, skin and sub-mucosa. Such types of cells are involved in tissue repair[7].

MATERIALS AND METHODS

A total number of n=71 biopsies of salivary gland diseased tissues were collected from Polyclinic Institute of Medical Sciences, Islamabad and Rahman Medical Institute, Peshawar. Histopathological diagnosis and reporting was done at the histopathology laboratory of Institute of Pathology and Diagnostic Medicine, Khyber Medical University Peshawar Ethical clearance was obtained from the ethical committee and Institutional Advanced Studies Research Board (AS & RB) and Informed consent was obtained in written and verbal form. Clinical history Performa was filled regarding patient's demographic profile, site of lesion and duration of the lesion. Per-op biopsy samples were collected in sterile jars containing 10% formalin. The samples were taken to histopathology lab, IPDM, Khyber Medical University. Gross examination of the samples, followed by tissue processing and routine Hematoxylin and Eosin staining was done. Giemsa stain was done to visualize the inflammatory mast cell population, microscopically. Microscopy was done using low power (4X) and high power (40X) under the microscope and three histopathologists including myself carefully observed and reported the histopathological findings alongwith the degree of inflammation. Mild, moderate and severe qualitative grading was done for inflammation and mast cells were observed on Giemsa stained slides.

MCs count was done randomly in ten fields of the microscope (at 40X power) at the invasive site of the tumor within the underlying connective tissue/ lamina propria (5 fields) as well as intra-tumoral stromal tissue (5 fields). The mean value of MCC was calculated and recorded in peri- and intra-tumor stromal fields.

Table 1: MCC in peri- and intra-tumoral stroma

	Peri-tumor Stromal Area (mean ± SD)	Intra-tumor Stroma (mean ± SD)
Inflammatory SG lesions (n=17)	5.8±9.3	5.1±3.5
PA (n=34)	14.7±7.8	7.1±7.1
MEC(n=4)	13.6±7.1	5.3±3.5
AdCC (n=9)	14.1±10.8	4.7±4.4
Warthin's Tumor (n=5)	2.3±2.4	2.4±2.1

RESULT

A total of n= 71 samples were included in this study .Out of these, n=17 (24%) were non-neoplastic and n=54 (76%) were neoplastic lesions. Out of n=17 non-neoplastic lesions, n=6 cases (35%) were of inflammatory origin and n=10(59%) were mucous retention cysts and n=1 (5%) was autoimmune mediated Sjogren's syndrome. Out of n=6 inflammatory lesions, chronic sialadenitis was the most prevalent lesion.

Site specificity indicated submandibular gland to be mostly affected. For mucoceles, lower lip was the most common site. Of the n=53 neoplastic lesions, a total of n=39 (73.5%) were benign n= 15 cases (28.3%) were malignant. Pleomorphic adenoma was found to be the common salivary glands benign tumour, n=34 (87%) followed by warthin's tumour n=5 (12.8%). Parotid gland was mostly affected in case of pleomorphic adenomas. In n=15 malignant tumours, among malignancies, n=9 cases (60%) of Adenoid cystic carcinoma was found, n=4 cases (26.6%) were of mucoepidermoid carcinoma and n=2 (13.3%) were secondary, metastatic ex-pleo-

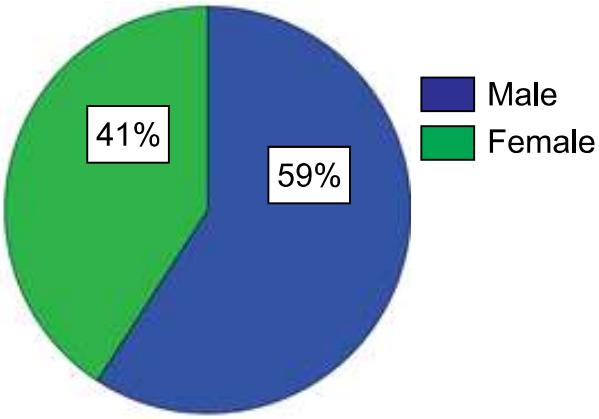

Fig 1: Pie chart shows the gender distribution of salivary Gland Diseases

morphic carcinomas.

The salivary gland diseases are more common among the males in contrast to females. The male to female ratio is 1.4:1 (Fig. 1)

The salivary gland diseases have been diagnosed on the basis of biopsy findings and it has been found that mucocele was reported as the commonly occurring reactive lesion followed by benign pleomorphic adenoma. On the other hand, adenoid cystic carcinoma was found to be the most prevalent salivary gland malignant pathology followed by muco-epidermoid carcinoma.

In case of non-neoplastic lesions the MCC count almost the same for peritumoral and intra-lesional areas, for MEC the means of MCC were 13.6 ± 7.1 and 5.3 ± 3.5 in peri- and intra-tumoral stroma, respectively, with significant differences (P=0.006). Similar trend was observed in case of adenoid cystic carcinoma. In case of wartin's tumour the MCC count almost the same for peritumoral and intra-lesional areas while there is difference between the MCC in the peri-tumoral and peri-lesional areas for PA.

DISCUSSION

Thus according to cancer research UK, the diagnosis of Salivary Gland Tumours is a challenge for the histopathologists8. The present study show the incidence of neoplastic salivary gland tumors was higher at around 4th decade of life and the incidence is low at 2nd decade and below age groups. Gatta et al., 2020 have also reported similar findings in which the risk of neoplastic salivary gland disease increases as the age progresses9. The gender distribution is almost the same in case of benign and malignant salivary gland lesions Hussain et al., 2016 in a similar study done on the population of Pakistan also reported similar results. In the present study there is male predilection as compared to female their ratio being, 1.4: 1 this slight difference may be due to the number of samples collected owing to the duration of the present study10. The most common site for the occurrence of mucocele is lower lip, followed by palatal mucosa this finding is Ata-Ali et al., 2010 also reported similar site predilections for such chronic inflammatory salivary gland lesions11. Pleomorphic adenoma was found to predominantly occur over the pre-auricular area, check, nasal cavity and parotid gland another similar study done by Bradley PJ in 2011 reported similar findings12 . The present study reported malignant salivary gland tumours such as adenoid cystic carcinomas and mucoepidermoid carcinoma to have shown no particular site predilection and their diagnosis is purely based upon the characteristic histopathological features. Sur et al., in 1997 reported similar findings with respect to the site specificity of malignant salivary gland neoplasms13 .

Mast cells (MC) are specialized cells that may induce allergic response by release of inflammatory cytokines. Their derangement is related to many salivary gland diseases. Mostly MC infilterate is present in the perivascular areas, in stromal tissue and within the parenchyma of the salivary gland tumours as reported by Vidal et al., 2016 in Brazil14. In our study it is found that non-neoplastic lesions of salivary gland pathology reports the MC count almost the same for peri-tumoral and intra-lesional areas, for Mucoepidermoid carcinoma, the mean count of MCC was 13.6 ± 7.1 and 5.3 ± 3.5 in peri- and intra-tumoral stroma, respectively, with significant differences (P=0.006). Similar trend was observed in case of adenoid cystic carcinoma. In case of wartin's tumour the MC count is almost the same for peritumoral and intra-lesional areas while there is difference between the MCC in the peri-tumoral and peri-lesional areas for PA. These findings are consistent with the results found by Jaafari-Ashkavandi Z and Ashraf MJ in their study done in 2014 in the population of Azerbaijan who reported no significant changes in values between MEC and AdCC in MCC, in both peri- and intra-stromal foci 15. Current study investigated mast cells through, Giemsa solution; many other scientific researchers have employed various other types of histo-stains such as tolonium chloride, thiazine dyes and Alcian blue14. Some have also used Imunohistochemistry for detection and quantification of MC's such as Jaafari et al., in Irani population, 2010 15.

CONCLUSION

Mast cell may serve as a potential cause for varying degree of inflammatory response in case of neoplastic salivary gland lesions.

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