Cytopathologic Patterns of Salivary Gland Mass in Jimma University Medical Centre, Jimma, Southwest Ethiopia: A 3 Year Retrospective Study

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ABSTRACT

Background: Salivary gland tumors are a morphologically and clinically diverse group of neoplasms, which may present significant diagnostic and management challenges. Malignant salivary gland neoplasms account for more than 0.5% of all malignancies and approximately 3-5% of all head and neck cancers. Despite its occurrence and posing diagnostic challenges cytopathologic patterns of salivary gland mass is not studied adequately in Ethiopia.**Objective:** To identify cytopathologic patterns of salivary gland mass on fine needle aspiration cytologyin JimmaUniversity Medical Center from September 2015 to August 2018.**Methods:** A retrospective cross-sectional study design wasapplied to records of patients seen at JUMC pathology department with salivary gland masses from September 2015 to August 2018.Data was collected using structured check lists manually by cytopathology technicians working in the department. Data was entered into Epi data v.3.1., cleared and exported to SPSS V.20 for analysis.**Result** : There were 191 cases of salivary gland mass. The age of the patients ranged from 1 to 80 years with an average age of 33.5 years. Ninety nine (51.8%) patients were males and 92(48.2%) were females with male to female ratio of 1.1:1.The cytological diagnoses included malignancy 39(20.4%), suspicious 5(2.6%), benign neoplastic 68(35.6%), non-neoplastic 77(40.3%) cases and 2(1%) were non diagnostic. Chronic sialadenitis found in 37(48.1%) case is the most common non neoplastic cases. Among the 68 benign neoplasms, pleomorphic adenoma was the most common lesion (54out of 68 cases; 79.4%) followed by Warthin's tumor (6 cases; 8.8%). Among the malignant neoplasm mucoepidermoid carcinoma was the most common (18 out of 39 cases;46.2%) followed by acinic cell carcinoma(10 out of 39 cases;25.6%). The parotid gland was the most commonly involved salivary gland 87cases(45.5%) followed by the submandibular gland 79 cases(41.4%) .

Conclusion: The most common neoplasm of salivary gland is the benign tumors, mainly the pleomorphic adenoma and the majority of them in the parotid gland in young adults. Mucoepidermoid carcinoma is the most common malignant tumor predominantly seen in parotid.Submandibular gland is the most common site for non neoplastic salivary gland mass.Key words: FNAC, Salivary gland mass, Cytopathology, Ethiopia

ACKNOWLEDGEMENT

ABBREVATION AND ACRONYMS

FNAC--------------------------Fine Needle Aspiration Cytology

JUMC--------------------------Jimma University Medical Centre

SPSS---------------------------Statistical Package for the Social Science.

ROM---------------------------Risk of malignancy

NOS----------------------------Not otherwise specified

EPI info-------------------------Epidemiological information

NHL----------------------------Non Hodgkin Lymphoma

MEC----------------------------Mucoepidermoid carcinoma

IRB---------------------------- Institutional Review Board

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CHAPTER 1: INTRODUCTION

1.1 Background

Definition and classification

Salivary glands arecompound exocrine gland that produces saliva.Salivary glands are categorized into major (parotid, submandibular, sublingual) andminor salivary glands found throughout the oral cavity and oropharynx (1).Swelling in salivary gland ranges from non-neoplastic and inflammatoryconditions to benign and malignant neoplasm. About 45 morphologic types of primary salivary gland tumors have been described(2). Morphologic classification of salivary gland mass include; Non neoplastic condition like(abscess, sialadenitis, and reactive lymphoid hyperplasia), sialolithiasis. Benign neoplasm include including pleomorphic adenoma and Warthin tumor. Malignant tumor include acinic cell carcinoma, epithelial-myoepithelial carcinoma, mucoepidermoid carcinoma, adenoid cystic carcinoma mammary analogue secretory carcinoma, carcinoma in situ ex pleomorphic adenoma not otherwise specified, and polymorphous low-grade adenocarcinoma, salivary duct carcinoma(1,2,3).

Parotid gland is the most common site of occurrence of salivary gland tumor.Most salivary gland malignancies present as an asymptomaticmass, although some patients may experience rapid enlargementof the mass, soft tissue invasion, trismus, progressive lossof nerve function, pain, paresthesia, or development of enlargedneck nodes (1,3).

Common salivary gland tumor with their cytologic features

Pleomorphic adenoma

It is the most common salivarygland tumor in both children and adults.Pleomorphic adenoma also known as benign mixed tumor, is a benign biphasicneoplasm characterized by a variable admixture of ductal epithelial cells, myoepithelialcells, and mesenchymal matrix(2,4).

Mucoepidermoid carcinoma (MEC) is the most common primary salivary gland malignancy MEC is characterized by mixed epidermoid,mucus-secreting, and intermediate cells morphologically. The proportionof the different cell types and their architecturalconfiguration (including cyst formation) vary significantly between tumors(1,2).

Acinic cell carcinoma

Acinic cell carcinoma (ACC) comprises approximately 10–15% of all salivary gland epithelial malignancies, and is the second most common malignant salivary gland tumor after mucoepidermoid carcinoma .Acinic cell carcinoma is slow growing low grade tumor, which recapitulates growth ofnormal acinar cells, and is associated with a goodprognosisgenerally(2,4).

Adenoid cystic carcinoma

The other common malignant tumor of salivary gland is adenoid cystic carcinoma which is a basaloid neoplasm having tubular, cribriform, and solid morphologic patterns. The clinical course of adenoid cystic carcinoma is usually indolentMost patients present with anasymptomatic mass, but pain or cranial neuropathies may beobserved because of the high propensity for early and frequent perineural invasion (2,3).

Diagnosis of salivary gland mass

FNAC(Fine Needle Aspiration Cytology) is used together withclinical and radiologic result in the evaluation of mass of salivary gland. Cytopathologists performing FNAC of salivary gland mass should have knowledge on the basic anatomy of the glands and its surrounding structures.The sensitivity of salivary glandFNAC in most series ranges from 86% to 100%, and the specificity ranges from 90%to 100%(4).Information on the location, size and relation between the swelling and salivary gland can be obtained from clinical examination and radiology, but its exact nature cannot be specified.FNAC is a safe, rapidand easy procedure, causing little discomfort .Sothe use of a triple test (clinical/radiologic/cytologic examination) is recommended, to decrease false-negative and false-positive cytologic results(5).FNAC is useful for the diagnosis of salivary gland swellings.Although FNAC had sampling and interpretation errors it can be used to differentiate non neoplastic lesions from

neoplasms, and benign from malignant neoplasms avoiding unnecessary surgery and decreasing hospital cost(6).

1.2 Statement of the problem

Salivary gland tumors are a morphologically andclinically diverse group of neoplasms, which present significant diagnostic and management challenges. In the western world, the estimated overall incidence is approximately 2.5-3.0 cases $per100,000per$ year. Malignant salivary glandneoplasms account for more than 0.5% of allmalignancies and approximately 3-5% of all headand neck cancers(7).According to estimates of cancer incidence in Ethiopia in 2015 the incidence rate of salivary gland cancer is 0.4 cases per100,000 per year (8).Study from Tanzania show that Salivary gland tumors occurred with a relativefrequency of 6.3% out of all other tumors and tumourlikelesions in the orofacial region(9).

The etiology of salivary gland tumors remains mostly unknown. Risk factors for salivary gland cancer include age, radiation or radioactive substance exposure, and environmental and occupational exposure to chemicals and sawdust(3).

FNAC technique has inherent limits with regard to the inability to capture histologic architecture for salivary gland mass, however improvements can be made for better objectivity of reporting. To date due to absence of standard system of terminology for reporting there is variable terminologies being used between institutions as well as by individual cytopathologists. The relatively high frequency of uncertainty in diagnosis of salivary gland mass is likely partly responsible for current confusion in the interpretation of these samples. Cytopathologic diagnosis of salivary gland neoplasms isdifficult mainly because of the diversity of histologic types, the overlappingand morphologicalheterogeneity of the lesions. Incorrect diagnosis despite cellular adequacy even in the hands of an experienced cytopathologist is not an uncommon finding in salivary gland FNAC(2).The marked heterogeneity of salivary gland neoplasms is further complicated by the lack of a standardized, tiered diagnostic framework by which salivary gland FNAC can be reported. Risk of malignancy(ROM) for a salivary gland tumor varies: 20–25% in the parotid gland, 40–50% in the submandibular gland, and 50–81% in the sublingual and minor salivary glands(4).

Even though treatment of salivary gland cancer is mainly surgical, adjuvant radiotherapy used for treatment of salivary gland cancer depending on the stage of the disease often causes xerostomia and affects quality of life in patients.A number of prognostic features indicative of poor outcomes has been identified in salivary gland cancer , including poorly differentiated, high-grade perineural invasion and extracapsular spread.One of the most predictive indicators of recurrence is neck metastasis. Elective neck dissection is indicated when risk of occult lymph node metastasis exceeds 15%. Factors increasing risk include high-grade advanced tumor stage, histological type, and poorly differentiated tumors.There is significant morbidity incurred with neural sacrifice and the resultant loss of function, in case of removal of involved nerve by the tumor(3).

Salivary gland tumors are not well characterized in Africa.There are reports suggesting a difference in the pattern of occurrence of salivary gland tumors in Africans compared with westerncountries. Compared to westerns warthin tumor is rare in Africa .The mean age of patientswith salivary gland tumors from Africa has been reportedto be lower compared to that reported in western countries. Similarly, regarding malignant salivary gland tumors, reports from westerns show themucoepidermoid carcinoma to be the commonest, African and Asian studies have reportedadenoid cystic carcinoma to be commonest(9).

Even though salivary gland mass has diagnostic and management challenges as well as epidemiological variation across countries in the world no study, so far, has been carried out on the patterns of salivary gland tumors in south west part of Ethiopia. Therefore, the aim of the present study is to identify the cytopathologic patterns of salivary gland tumors in South West Ethiopia; JUMC and to compare the findings with those available from elsewhere.

1.3 Significance of the study

Although salivary gland masses specifically tumors are encountered in all age groups affecting both sexes ,studies are very scares so that conducting research on salivary gland mass in southwest Ethiopia,JUMC can provide baseline information on the cytopathologic patterns of salivary gland mass in this part of the country. By describing cytopathologic patterns of salivary gland mass and associated sociodemographic factors the study will benefit policy makers and health institution to increase quality of service given for patient with salivary gland mass. The study will help health care professional to gain knowledge on the cytopathologic patterns of salivary gland mass in south west Ethiopia. The final result of this paper will serve as a basis of reference for further research on the area for interested individuals.

CHAPTER 2:LITERATURE REVIEW

2.1 presentation and work-up

Salivary gland malignancies mostly present as an asymptomatic mass. In some patient there is rapid growth of the mass, soft tissue invasion, progressive loss of nerve function, pain and metastasis to nearby lymph node.Patients may complain of a palpable mass with or without pain in the head and neck region,or in some cases, partial paralysis or paresthesia most commonly involving the facial nerve. Alternatively, the mass may have been palpated by a clinician or found on imaging studies.Ultrasound, contrast-enhanced computed tomography, and magnetic resonance imaging are used to supplement clinical assessment of salivary gland mass. The use of ancillary techniques such as identifying fusion genes and immunohistochemical markers, have improved diagnostic accuracy of salivary gland tumor(2, 4,7).

Salivary gland FNAC has become an accepted method of evaluating salivary gland tumors preoperatively. Despite the relative rarity of these tumors, there is a wealth of literature on the diagnostic performance of FNAC for salivary gland tumors(10).The cytologic features of salivary gland lesions in FNAC specimens have been well defined and are described in detail in the literature. Salivary gland FNAC is effective in evaluating salivary gland lesions. Studies reveals that effective managements of patients can be achieved by classifying FNAC results of salivary gland into risk based categories:unsatisfactory; non neoplastic; benign neoplastic; lesion of unknown significance; suspicious for malignancy ; and positive formalignancy (10,11).

Studies across the globe show variation of FNAC sensitivity and specificity. Study from India indicate diagnostic sensitivity and specificity of FNAC for salivary gland lesions were 63.16% and 97.62% respectively(1).Another similar study from Italy show the accuracy, the sensitivity andthe specificity were 94%, 57.2% and 100%, respectively. Positive and negative predictive values were100% and 93%, respectively(5).Another similar study from Italy indicate the overall FNAC specificityresulted 93%, sensitivity 83%, and diagnostic

accuracy 92%(12).The overall accuracy of FNAC was found to be 83.8% with 77.7%sensitivity and 86.3%, specificity in study from Pakistan (13).

2.2Salivary gland mass incidence by age

Study done in various countries across the world show that salivary gland tumor can occur across wide range of age but the common occurrence is from the 3rd decade to 5th decade.Malignant tumor tend to occur later in life when compared with benign tumor(6, 11).Study from Kuwait shows age range from 6 months to 91 years with median 37 years(6). Study from Rome and Philadelphia,showagerange from 19 to 87 years (mean age,47 years) (11).

2.3 Salivary gland mass incidence by sex

Various studies show that there is either equal sex distribution or slight female predominance in the occurrence of salivary gland neoplasm. Study from India show male to female ratio 0.9:1(1). Study from Kuwait show slight male predominance (6).

2.4 Common salivary gland mass

There is predominance of benign tumor occurrence when compared with malignant tumor in salivary gland. Study from Italy on 357 patients show 79.8% benign tumors and 9.8% malignant tumor. Pleomorphic adenoma and adenoid cystic carcinoma were the most common benign and malignant tumor respectively (12).Similar study from Pakistan on 187 patients show 49 neoplastic case from which 23 were benign and 18 were malignant in which Pleomorphic adenoma and NHL(Non Hodgkin lymphoma) were the most common benign and malignant condition respectively (13).Pleomorphic adenoma and adenoid cystic carcinoma were the most common benign and malignant neoplasm in prospective study from India (14).

Study from African countries show the predominance of benign tumor similar to the other part of world. Study from Egypt shows 48.8% benign tumor and 31.7% malignancy. Suspicious cytologic report was 12.2%. Pleomorphic adenoma was the most common benign tumor (15).Similar study from Sudan shows majority of the lesions (74.5%) were

benign tumors from which pleomorphic adenoma was the commonest (16).Retrospective study from Zambia shows similarly benign tumor (68%) outnumbering malignancy(17).

Study from Egypt shows adenocarcinoma(NOS) as the most common malignancy(15).MEC was the commonest specified carcinoma in study from sudan(16). Chronic sialadenitis is the most common non neoplastic condition in studies from Italy and India (12, 14).

2.5 Salivary gland mass incidence by site

Majority of the scientific series show that parotid gland is the most common site of occurrence salivary gland mass followed by submandibular gland. Parotid gland was involved by neoplasm in 27.1% which is more than submandibular gland in study from Kuwait.Inflammatory processes affected thesubmandibular gland region more commonly (42.0%) than the parotid (32.6%)(6). Prospective study from India show Parotid gland involvement in 60.32% and submandibular gland involvement in 32.77%,with hard palate being the most frequently involved site from minor salivary gland (14).Study from Egypt show parotid gland involvement in 68.3% and submandibular gland was affected in 28% (15).

In a study from Turkey 285 patients were included. Among them, (58.2%) were males and (41.8%) were females.The mean age of the patients was 53.9 with age range 9 to 90 year.The FNACresults show: (77.2%) benign, (8.8%) malignant, (5.2%) suspicious, and (8.8%) non-diagnostic.The most common FNAC result was pleomorphic adenoma (135 patients, 47.3%), followed by Warthin's tumor (42 patients, 14.7%)(18).

A similar study from Egypt shows mean age of (48 years).There were slight male predominance.Parotid (68 %)was the most commonly aspirated followed by submandibular. Neoplastic condition accounted for 57.6% from which benign case predominate when compared with malignancy. The overall accuracy of FNAC was 94.4% with 99.3% specificity. This result revealed the diagnostic role of FNAC in salivary gland lesions with high specificity(19).

A cytologic study from Malaysia shows total of 101cases; (75.3%) were neoplastic (58.4% benign, 16.8% malignant) and (24.7%) were no neoplastic. Pleomorphic adenoma was the most frequent benign neoplasm while adenoid cysticcarcinoma was the most frequent malignant neoplasm. The parotid gland was the most commonlyinvolved salivary gland (77 cases, 76.2%)followed by the submandibular gland (23,22.8%). FNAC had a sensitivity of 80% and aspecificity of 98.8% for overall benign and malignant diagnoses(20).

Study from Brazil shows most of patients were female (53.8%), with an average age of 48.9 years. The most common site was the parotid gland (94/72.3%), followed by submandibular gland (32/24.6%) and minor salivary glands (4/3.1%).FNAC classification included 87 (90.6%) benign and 9 (9.4%) malignant diagnosis.The most common benign tumor was pleomorphic adenoma with 63 cases (46.5%), followed by Warthin Tumor (10 cases) and chronic sialodenitis (9 cases).Among malignant neoplasm, squamous cell carcinoma was the most prevalent with 11 cases (8.5%), followed by mucoepidermoid carcinoma (8 cases)(21).

CHAPTER 3.OBJECTIVE

3.1 General objective

To describe the cytopathologicpatterns of salivary gland mass on FNAC in Jimma University Medical Centerfrom September 2015 to August 2018.

3.2 Specific objectives

To describethe relationship of age and cytopathologic patterns of salivary gland mass

To identify the relationship of sex and cytopathologic patterns of salivary gland mass

To describethe relationship of residency and cytopathologic patterns of salivary gland mass

To assesscytopathologic patterns of salivary gland mass with respect to anatomic site

CHAPTER 4: METHODS

4.1. Study Area and period

Study was conducted in Jimma University Medical Center, pathologydepartment, located in Jimma town, south western part of Ethiopia, and 345km from the capital cityEthiopia, Addis Ababa from September 2015 to August 2018. JUMC serves a total population of around 15 million populations annually. The pathology department of JUMC has five pathology seniors, 15 residents, and one histopathology technician and 7 assistant technicians. Services given by the pathology department of JUMC include FNAC, histopathology and Hematopathology.The study was conducted from May 2019 to August 2019.

4.2. Study Design

Facility baseddescriptive retrospective cross-sectional study design was applied.

4.3. Population

4.3.1 Target population
Population of southwest Ethiopia

4.3.2. Source population

All patients with salivary gland mass for whom cytological diagnoses were made between September 2015and August 2018 in JUMC.

4.3.3. Study population

All patients with salivary gland mass who were subjected to cytological diagnosis from September 2015 to August 2018 in JUMC fulfilling inclusion and exclusion criteria.

4.4. Inclusionand Exclusion criteria

4.4.1. Inclusion criteria

All FNAC reports records on salivary gland mass having; Age,Sex,address, site anddiagnosis.

4.4.2. Exclusion criteria

Records which missed at least one of the variables: - age, sex, site and with no diagnosis wasexcluded from the study.

4.5. Sampling technique

Conveniently, all FNAC records with salivary gland mass filled on FNAC request form from September 2015 toAugust 2018 was identified. Case fulfilling the inclusion criteria and exclusion criteria was reviewed.

4.6. Data collection procedures

Data was collected using structured check lists developed by principal investigator from the patients FNAC report record in pathology department manually by cytopathology technicians working in the department. Age of the patient ,sex of the patient , location of the mass and diagnosis was collected from patients FNAC report records.Onesupervisor from junior pathology residents and three data collectors from cytopathology technician was enrolled.

4.7. Study variables

Age

Sex

Address

Anatomic site

Cytopathologic diagnosis

4.8. Data processing and Analysis

Data wasentered into Epi data v.3.1. ,cleared and exported to SPSS V.20 for analysisand descriptive statistics such as frequency, percentage, mean and median wasused to describe

the data.Tabulation was done to measure degree of association between variables.Result was presented using narration, tables and figures.

4.9. Data quality management

Data was collected by trained cytopathology technicians and completeness, accuracy and clarity of collected data was checked carefully by the principal investigator and supervisor on daily basis. Training was given for data collectors and supervisor for two days on objective of the study, data collection tools and procedures.

4.10. Ethical consideration

Before the study begins ethical clearance was obtained from the Institutional Review Board (IRB) of JUMC. Before conduct of the study permission was obtained from pathology department.Name of patient was excluded on all information obtained from patients and confidentiality was ensured.

4.11. Dissemination plan

The results of this study will be disseminated or communicated to the Jimma University, the Regional Health Bureau, and other concerned bodies. Publication on reputable journal will also be done.

4.12 Operational definition

Non diagnostic- A non-diagnostic salivary gland aspirate is one that for qualitative and/or quantitative reasons provides insufficient diagnostic material to provide an informative interpretation.

Non neoplastic - is used for specimens that show benign non neoplastic changes, including those associated with acute or chronic reactive responses to inflammation, structural alterations, and infection.

Benign neoplastic- Reserved for benign neoplasms diagnosed based on established cytologic criteria. This category will include classic cases of pleomorphic adenoma, Warthin tumor etc.

Suspicious for Malignancy-A salivary gland FNAC is classified as suspicious for malignancy when some, but not all the criteria for a specific diagnosis of malignancy are present, and yet the overall cytologic features are suggestive of malignancy

Malignant-This category is for FNAC specimens that are diagnostic of malignancy

CHAPTER 5.RESULT

A total of 191 cases of salivary gland masses were included in the present study. There is increasement in the number of salivary gland masses FNAC done at JUMC from September 2015 to August 2018(Figure 1).
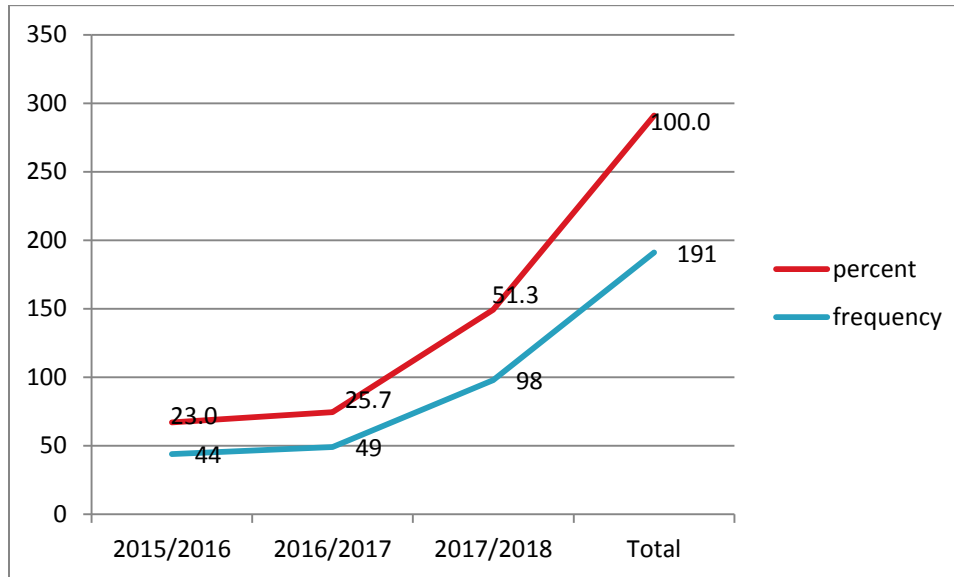
Figure 1:Distribution of salivary gland mass by year in JUMC ,jimma, Ethiopia from Sep 2015 to Aug 2018; N=191

Out of 191 cases ninety nine(51.8%)patients were males and 92(48.2%) were females with male to female ratio of 1.1:1.There were two non diagnostic cases.The most common lesions in both female(38 cases) and male(39 cases) were non-neoplastic category.The age of the patients ranged from 1 to 80 years with mean age of 33.5 years(SD±16.78).The most affected age group by salivary gland mass is the third decade(25.1% of total case).Salivary gland masses weremost observed in the fourth decade in female and third decade in male.(Table 1 and figure 2)

Table 1 :Distribution of diagnostic category of salivary gland masses by age group in JUMC,Jimma,Ethiopia from Sep 2015 to Aug 2018; N=191

Age category	**Diagnostic category**				
	non neoplastic	benign neoplastic	suspicious	malignant	Total
0-10	10	1	2	2	15
11-20	20	8	0	3	33
21-30	18	20	1	9	48
31-40	13	16	1	9	39
41-50	9	9	1	9	28
51-60	3	12	0	3	18
61-70	2	2	0	3	7
≥70	2	0	0	1	3
Total	77	68	5	39	191
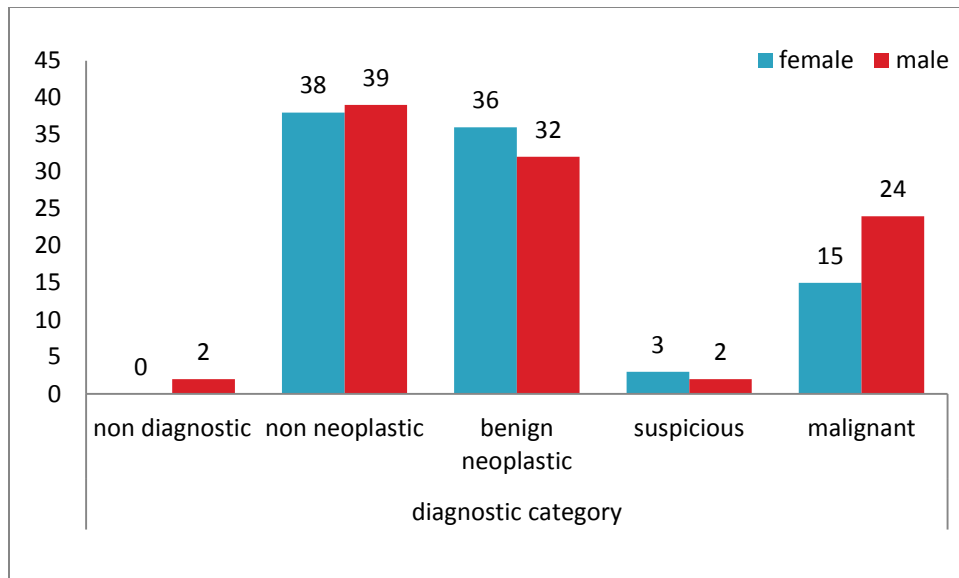
Figure 2:Diagnostic category of salivary gland masses by sex distribution in JUMC ,Jimma, Ethiopia from Sep 2015 to Aug 2018;N=191

Residence

The collected data over the three years showed 124(64.9%) patients were from rural ,41(21.5%) patients from urban areas and in 26 cases residence was not recorded.

Anatomic site distribution

Parotid gland was the most commonly involved site 87(45.5%) followed by the submandibular gland 79 (41.4%) and (13.1%) of cases were from minor salivary gland.A significantly higher proportion of cases (63.3%) from the submandibular gland region were non neoplastic in nature compared to the parotid (31%, p =.000). On the other hand 29.9% of cases from parotid were malignant cases as compared to submandibular (10.1%,p=.000) (Figure 3).

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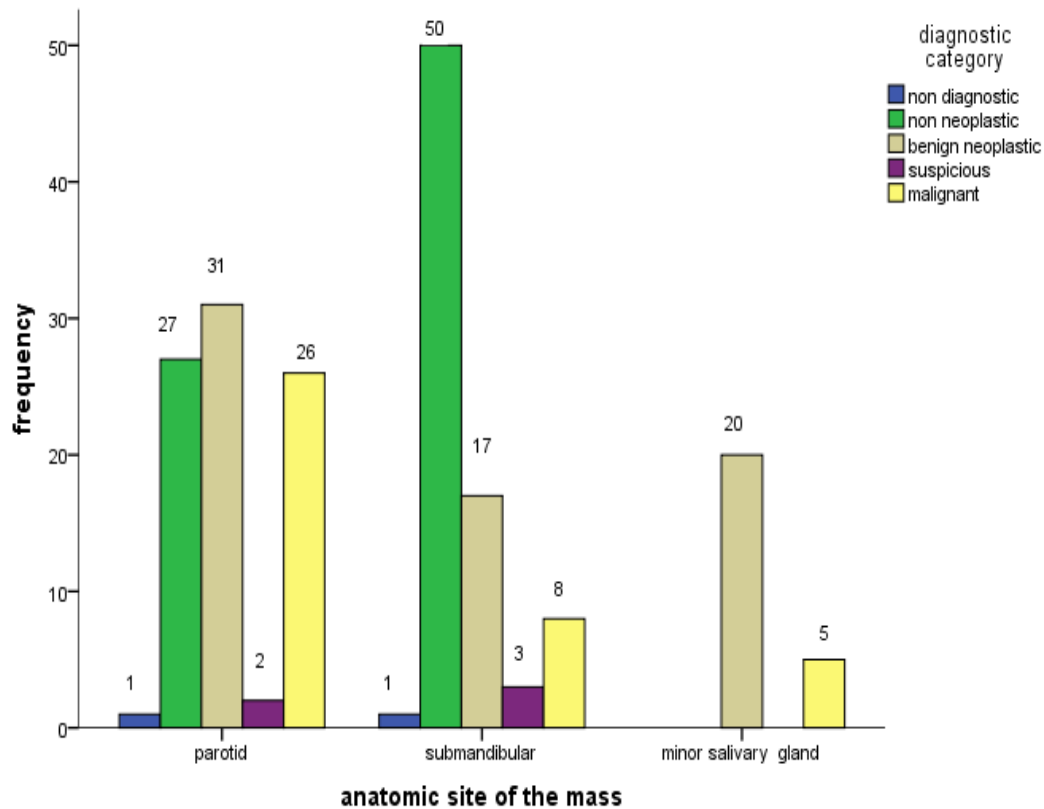Figure 3 : Distribution of diagnostic category of salivary gland massby anatomic site ;in JUMC ,Jimma, Ethiopia from Sep 2015-Aug 2018;N=191

.Cytopathologic pattern distribution

The cytological diagnoses included malignancy 39(20.4%), suspicious 5(2.6%), benign neoplastic 68(35.6%), non-neoplastic 77(40.3%)cases and 2(1%) were non diagnostic(Table 2)

Table 2:Distribution of salivary gland mass cytopathology by anatomic site, in JUMC ,Jimma, Ethiopia from Sep 2015-Aug 2018;N=191

Diagnosis	anatomic site of the mass			Total
	parotid	submandibular	minor salivary gland	
Benign	31(16.23%)	17(8.9%)	20(10.47%)	68(35.6%)
pleomorphic adenoma	24(12.56%)	12(6.28%)	18(9.42%)	54(28.27%)
warthin tumor	4(2.09%)	2(1.04%)	0	6(3.14%)
oncocytoma	1(0.52%)	1(0.52%)	1(0.52%)	3(1.57%)
Benign neoplasm not specified	2(1.04%)	2(1.04%)	1(0.52%)	5(2.61%)
Non neoplastic	27(14.13%)	50(26.17%)	0	77(40.31%)
chronic sialadenitis	8(4.18%)	29(15.18%)	0	37(19.37%)
acute sialadenitis	3(1.57%)	8(4.18%)	0	11(5.75%)
sialadenosis	1(0.52%)	3(1.57%)	0	4(2.09%)
benign cyst	9(4.71%)	4(2.09%)	0	13(6.80%)
lymphoepithelial lesion	2(1.04%)	1(0.52%)	0	3(1.57%)
Granulomatous inflammation	1(0.52%)	1(0.52%)	0	2(1.04%)
other	3(1.57%)	4(2.09%)	0	7(3.66%)
Malignant	26(13.61%)	8(4.18%)	5(2.61%)	39(20.41%)
mucoepidermoid carcinoma	11(5.75%)	6(3.14%)	1(0.52%)	18(9.42%)
acinic cell carcinoma	7(3.66%)	0	3(1.57%)	10(5.23%)
adenoid cystic carcinoma	3(1.57%)	1(0.52%)	1(0.52%)	5(2.61%)
carcinoma not specified	3(1.57%)	1(0.52%)	0	4(2.09%)
NHL	2(1.04%)	0	0	2(1.04%)
Suspicious	2(1.04%)	3(1.57%)	0	5(2.61%)
Non diagnostic	1(0.52%)	1(0.52%)	0	2(1.04%)
Total	87(45.54%)	79(41.36%)	25(13.08%)	191(100%)

Table 3 :Cross tabulation for benign and malignant neoplasm with sex, site and age categoryn JUMC ,Jimma, Ethiopia from Sep 2015-Aug 2018;N=107

		Benign neoplasm	Malignant neoplasm	Total	Chi-square
Sex	male	32	24	56	X^2=2.08
	female	36	15	51	P value=0.149
Site	parotid	31	26	57	
	submandibular	17	8	25	X^2=5.20
	Minor salivary gland	20	5	25	p value=0.074
Age category	0-20	9	5	14	
	21-40	36	18	54	
	41-60	21	12	33	X^2=2.59 p value=0.458
	≥60	2	4	6	

The result of contingency table x^2 statistical analysis shows no significant association whether case is benign or malignant with sex and age category(Table 3)

Table 4:Cross tabulation for neoplastic and non neoplastic cases with site in JUMC ,Jimma, Ethiopia from Sep 2015-Aug 2018;N=189

Site	Neoplastic cases	Non neoplastic cases	total	Chi-square
parotid	59	27	86	X^2=37.9
submandibular	28	50	78	
Minor salivary gland	25	0	25	P value=0.000

There is significant association between anatomic site of salivary gland mass and whether case is neoplastic or non neoplastic (p value =0.000)(Table 4)

Among the non-neoplastic lesions, inflammatory lesions were predominant, most common being chronic sialadenitis found in 37(48.1%)of non-neoplastic cases , acute sialdenitis in 11 cases, cystic lesions in 13 cases,7 other cases including reactive ,normal salivary gland aspirate and hyperplastic changes. Twenty cases of chronic sialadenitis were seen in female and 29 out of 37 cases(78.4%) cases of chronic sialdeintis were seen in in submandibular gland. Chronic sialadenitis commonly occurred through second to fourth decade. (Figure 4)
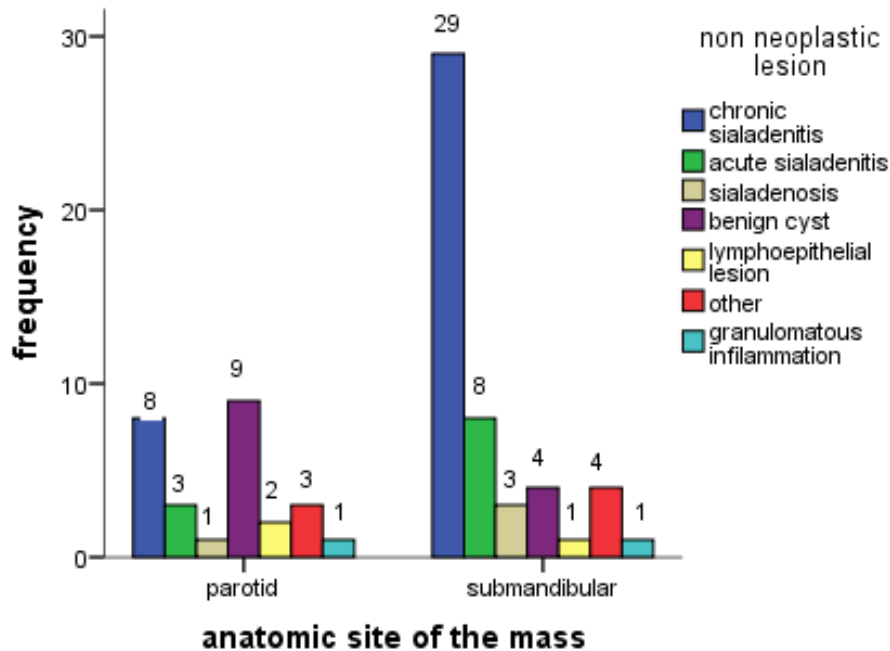

Figure 4: Distribution of non neoplastic salivary gland masses by site in JUMC ,Jimma, Ethiopia from Sep 2015 to Aug 2018;N=77

Among the 68 benign neoplasms, pleomorphicadenoma was the most common lesion 54 (79.4%) followed by Warthin'stumour (6 cases; 8.8%). Twenty four (44.4%) of the 54 pleomorphic adenomas occurredin the parotid gland.Thirty-one cases of pleomorphic

adenoma was seen in male and 23 casesin female. The most common age range for pleomorphic adenoma was third decade for male and fourth decade for female.The youngest and oldest age for pleomorphic adenoma is 6years and 70 years respectively. Equal number of warthin tumor cases(3 cases in female ,3 cases in male)were seen and 4cases (66.7%) of warthin tumor occurred in parotid gland. There were3 cases of oncocytoma and 5 of the the remaining cases were not specified into specific benign categories and seen 2 in parotid , 2 in submandibular and the remaining one in minor salivary gland.Both warthin tumor and oncocytoma mainly occurred in the third and fourth decade.(Table 5)

Table 5 : Distribution of Top three benign salivary gland neoplasm according to site in JUMC ,Jimma, Ethiopia from Sep 2015 to Aug 2018

	anatomic site of the mass				Chi square
Benign neoplasm	parotid	submandibular	minor salivary gland	Total	
pleomorphic adenoma	24	12	18	54	X^2=3.8
warthin tumor	4	2	0	6	P value =.702
oncocytoma	1	1	1	3	
Total	29	15	19	63	

Among the 39 malignant neoplasm cases mucoepidermoid carcinoma was the most common 18(46.2%) followed by acinic cell carcinoma10(25.6%).The were 5 cases (12.8 %) of

adenoid cystic carcinoma and in 4 cases the carcinoma diagnosis was not specified into specific diagnosis three of them in parotid and the other one in submandibular.There were two case of NHL both see in parotid gland.The most common site for mucoepidermoid carcinoma was parotid (11 out of 18 cases)and it was seen in the third decade mostly. Ten cases (55.6%) of mucoepidermoid carcinoma occurred in male. Five out of 10(50%) of acinic cell carcinoma was seen in the fourth decade. The mean age of acinic cell carcinoma in this study is 41 years.The youngest age and the oldest age of patient with acinic cell carcinoma in our study is 5 and 80 years respectively. Six cases of acinic cell carcinoma was seen in male and 7 (70%) of the cases was seen in parotid. Three out of 5 cases of adenoid cystic carcinoma was seen in parotid and 4 cases(80%) of the case was seen in male. Three out of 5 cases adenoid cystic carcinoma was seen in fourth decade.(Table 6)

Table 6: Top three Malignant salivary gland neoplasm distribution by anatomic site in JUMC ,Jimma, Ethiopia from Sep 2015 to Aug 2018;N=33

Malignant neoplasm	parotid	submandibular	minor salivary gland	Total	Chi square
mucoepidermoid carcinoma	11(61.1%)	6(33.3%)	1(5.6%	18(100.0%)	X^2=8.5
acinic cell carcinoma	7(70.0%)	0	3(30.0%)	10(100.0%)	P value=0.389
adenoid cystic carcinoma	3(60.0%)	1(20.0%)	1(20.0%)	5(100.0%)	
Total	21(63.6%)	7(21.1%)	5(15.2%)	33(100.0%)	

CHAPTER 6. DISCUSSION

Malignant salivary gland neoplasms account for approximately 3-5% of all head and neck cancers(7). Fine-needle aspiration cytology has become widely accepted as an efficient first linediagnostic test in the management of salivary gland lesions(4). FNAC is a safe, rapid and easy procedure, causing little discomfort to patient(5).

The current study contain 5 diagnostic category which correlate with that of Milan System for reporting salivary gland cytopathology except that there was no atypia of undetermined significance.

In this study the youngest age was one year and the oldest patient with salivary gland mass was eighty years showing salivary gland tumor occurrence in wide range of age in agreement with other study conducted in Kuwait and Turkey (6,18).The mean age of occurrence of salivary gland tumors seen in this study (33.5 years) was comparatively lower than reported by other studies done in India,Italy and Malaysia with mean of 45.5years ,55.3 years and 48 years respectively(1,5,20).In this study females with age group between 31 to 40 years are mostly affected by salivary gland mass. This is a comparable finding with study from Brazil which shows the common age for female patients with salivary gland mass as the fourth decade(21).In this study the common age for male with salivary gland tumor is the third decade which is in disagreement with study from Brazil showing seventh decade as the common age for salivary gland tumor occurrence in male(21).These findings suggest a possible variation in the presentation of salivary gland tumours in different populations.

In the current study there were slight male predominance with (M:F:1.1:1) which is a comparable finding with study from Kuwait ,Sweden and Egypt (6,7,15).However serious of literatures show that there is slightfemale predominance in salivary gland mass. Study from Brazil shows female (53.8%) predominance(21).

Various literatures shows parotid as the most common site for salivary gland mass.Study from India(60.32%) and Brazil(72.3% shows parotid glandas the most common site among the involved salivary glands (14,21). Likewise this study shows parotid gland as the most common site(45.5%) however this figure is quantitatively lower when compared with other studies showing higher percentage of parotid gland involvement in salivary gland mass. The reason for this variation may be due to the geographic variation. In this study chronic sialadenitis was primarily a condition involving the submandibular glands. It was most common in middle-aged adults with a slightly increased incidence infemale; this is in accordance with study from Kuwait which shows higher number of inflammatory lesion in submandibular gland(6).

Highlighting the established finding thatthe majority of salivary gland lesions are benign when compared with malignancyin this study benign neoplasm was seen in (35.6%).Likewise study from Pakistan,Italy and Sudan shows (34.2%), (79.8%) ,(74.5%benign neoplasm respectively(13,12,16). In this study malignancies existed in (20.4%) cases which is higher when compared with rate of malignancy reported in a study from Malaysia which shows 12.8% malignant neoplasm (20).Malignancy occurred more in the middle age and slightly higher in male.There were (2.6%)suspicious category in this study which is lower when compared to suspicious category (10%) in study from Pakistan(13).This difference may be due to skill variation on how to categorize cases into suspicious and malignancy.

In our study there were two non-diagnostic cases both in male in the second decade. The non-diagnostic category constitute only 1.05% in this study which is lower than 5.8% non-diagnostic category in study from Italy(11).Another study from Italy shows 4.8% non-diagnostic category which is higher than in our study(5).Likewise study from Egypt report 7.3% which is higher when compared to ours(15).Similarly study from Brazil shows a much higher 34(26.1%) non diagnostic cases(21).The overall non-diagnostic category in this study was lower which may be explained by the immediate re-aspiration if the first FNAC is

inadequate to avoid appointing patients coming from remote area in our case and by the fact that pathologist do aspiration and check for adequacy at site.

In accordance with various literatures; in this study pleomorphic adenoma was the most common salivary gland mass 79.4% of benign neoplasm.Study conducted in Malaysia shows pleomorphic adenoma as the most common neoplasm(43 out of 61 benign neoplasm cases;70.5%)(20).Likewise study from Brazil shows the predominance of pleomorphic adenoma (46.5%) in salivary gland neoplasm(21). Likewise study from Sweden and Turkey shows pleomorphic adenoma as the most common benign salivary gland neoplasm(7,18).Pleomorphic adenoma was common in middle aged male in the this study. Various studies shows parotid as the most common site for pleomorphic adenoma(6,19,20) Similarly in this study parotid gland was the most site for pleomorphic adenoma containing(44.4%) of the case.This study shows warthin tumor(8.8%) as the second common benign neoplasm.However this figure is lower when compared with other literatures fromSweden, Italy and India(7,12,14) .This may be due to the low prevalence of smoking in our society which is associated with warthin tumor.

Serious of literature show that mucoepidermoid carcinoma is the most common malignant salivary gland neoplasm(1,2,4,6,18).Likewise in thisstudy mucoepidermoid carcinoma(46.2%) was the most common malignant salivary gland neoplasm. In contrary to our findings study from India shows adenoid cystic carcinoma(44.5%) as the most common salivary gland malignant neoplasm (14).Study from Malaysia also shows adenoid cystic carcinoma(31.3%) as the most malignant salivary gland neoplasm(20).Study from Egypt also disagree with our finding showing only 4 cases of mucoepidermoid carcinoma out of 22 malignant tumor(15). These findings show a variation in the prevalence of the cytopathologic patterns of salivary gland mass across countries which may be attributed to the type of predisposing etiological factors in the different geographic zones.

Parotid gland containing 11 cases of mucoepidermoid carcinoma was the the most affected gland and mucoepidermoid carcinoma was more common in young male. This finding is comparable to the Milan System for reporting salivary gland cytopathology which put peak

age of mucoepidermoid carcinoma as the second decade and the most common site as parotid(4).Acinic cell carcinoma is the second most common salivary gland carcinoma in this study which is a similar finding with study from Pakistan(13).Most of acinic cell carcinoma(70%) was seen in parotid and the common age for acinic cell carcinoma was from 31 to 40 years which is older than that of mucoepidermoid carcinoma. The Milan System for reporting salivary gland cytopathology puts the mean age of patient with acinic cell carcinoma as 50 years slightly older than our case and the most common site as parotid (4).

There was a raise of the number of salivary gland mass subjected to FNAC between 2015 and 2018.This may be due to awareness increasing for health care ,better access to pathology diagnosis and to a better sensitization of the health personnel on cancer and the importance of pathologic diagnosis on the other hand.

 Limitations of the study

Since the study was done on secondary data it was not possible to include more parameters such as size since they are not filled completely.

Immunocytochemistryand molecular analysis was not done.

CHAPTER 7.CONCLUSION

The most common neoplasm of salivary gland is the benign tumors, mainly the pleomorphic adenoma and the majority of them in the parotid gland in young adults. Mucoepidermoid carcinoma is the most common malignant salivary gland neoplasm predominantly seen in parotid and in the third decade with slightly higher number in male.Submandibular gland is the most common site for non neoplastic salivary gland mass.

Recommendation

Further prospective study that compares cytopathology with histopathology is recommendedLarge scale study that possibly assess the etiology and risk factor for salivary gland mass is recommended.

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ANNEX

Data collection tool (Checklist) to study the cytopathologic patterns of salivary gland

Mass

No	Variables		Choice
1	FNAC No		
2	Year	A.2008 B.2009 C.2010	
3	Sex	Male(M) Female(F)	
4	Age	A.0-10 E.41-50 B.11-20 F.51-60 C. 21-30 G. 61-70 D. 31-40 I.>70	
5	Residence	1.Urban 2.Rural	
6	Anatomic site	A.Parotid B.Submandibular C.Sublingual D.Minor salivary gland	
7	Cytopathology patterns	A.Non diagnostic B.Non neoplastic C.Benign neoplastic D. Suspicious E.Malignant	

Annex: Approval

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Medical sciences in effect at the time of grant is forwarded as the result of this application.

Name of the investigator: _____

Date _____Signature_____

APPROVAL OF THE FIRST ADVISOR:

Name of the first advisor: _____

Date _____ Signature_____

APPROVAL OF THE SECOND ADVISOR:

Name of the second advisor: _____

Date _____ Signature_____