

# Pattern and Trends in the Presentation of Salivary Gland Tumours in a Tertiary Centre in Gombe, Northeast Nigeria

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## Abstract

**Background:** Salivary gland tumours (SGTs) are rare, but recent reports suggest an increasing incidence. Although there are previous Nigerian studies on the patterns of SGTs, patterns and trends of disease may change over time. The aim of this study was to describe the pattern of presentation of SGTs, and to determine the trends in occurrence of SGTs at Federal Teaching Hospital (FTH), Gombe over a period of 15 years. **Method:** This descriptive study included cases of histologically diagnosed SGTs from January 2008 to December 2022. Relevant information (age, gender, site, year of diagnosis, and histopathologic diagnosis) was extracted from the cancer registers and histopathologic records. The lesions were then categorized into benign and malignant SGTs and grouped into three groups spanning 5 years each based on the year of diagnosis. Data analysis was done using IBM SPSS version 23, and  $p \leq 0.05$  was considered statistically significant. **Results:** There were 93 (61.2%) benign and 59 (38.8%) malignant SGTs. Benign SGTs had a mean age of  $36.4 \pm 13.6$  years, and were more common in females (57.0%), and in the parotid (41.9%). Pleomorphic adenoma (94.6%) was the most common benign SGT. Malignant SGTs had a mean age of  $44.5 \pm 18.4$  years, with male predilection (54.2%) and occurrence mostly in the palate (27.6%) and parotid (22.4%). Mucoepidermoid carcinoma (39.0%) and adenoid cystic carcinoma (32.2%) were the most frequent malignant SGTs. The mean age of occurrence of malignant SGTs was significantly higher than that of benign SGTs ( $p = 0.005$ ). The trend analysis showed that there has been a steady rise in the proportion of males presenting with malignant SGTs. Similarly, there has been a steady

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increase in the frequency of benign SGTs in the parotid. The palate was the predominant site for the malignant SGTs between 2008 and 2012, but in the last five years (2018 to 2022), the parotid has become the predominant site. Over the duration of the study, the ratio of benign to malignant SGTs has remained relatively constant. **Conclusion:** While the overall pattern of presentation of SGTs in Gombe is similar to reports in the literature, this study has identified some changes in trends over the years.

## Keywords

Salivary Gland Tumour, Trend, Pattern, Pleomorphic Adenoma, Nigeria

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## 1. Introduction

In humans, there are three pairs of major salivary glands (parotid, submandibular and sublingual) and numerous minor salivary glands, which are responsible for the production and secretion of saliva [1]. The term salivary gland tumours (SGTs) refer to a diverse group of tumours originating from any of the salivary glands. They may be benign or malignant, and presently the World Health Organization (W.H.O) recognizes over thirty distinct SGTs [2] [3]. SGTs are considered to be rare entities, with an estimated incidence of about 0.3 to 13.5 cases per 100,000 persons [4] [5]. However, recent reports suggest an increasing incidence of SGTs, especially in the last few decades [6] [7].

Previous Nigerian studies on SGTs have reported a peak in the 4<sup>th</sup> and 5<sup>th</sup> decades of life, female predominance and the parotid and palate as the commonest major and minor salivary gland site respectively [4] [8] [9] [10]. Benign SGTs peaked mostly in the 3<sup>rd</sup> or 4<sup>th</sup> decade of life, with a mean age ranging between 36.5 years and 38.2 years [4] [8] [9] [11]. Pleomorphic adenoma is the most common benign salivary tumour in all the studies [4] [8] [9] [10] [12] [13] [14]. Malignant SGTs on the other hand mostly showed a peak in the 5<sup>th</sup> decade of life [4] [8] [15]. While some studies have reported adenoid cystic carcinoma as the commonest malignant SGT in Nigeria [4] [8], others have found more cases of mucoepidermoid carcinoma [10] [12] [14].

Understanding the pattern of disease presentation in a locality is important for clinical diagnosis. However, patterns of disease may change over time due to changing predisposing factors, lifestyle modification and other environmental influences [16] [17]. It is therefore important to establish current patterns of diseases, as well as studying any changes in the trend over time. Gombe is the capital city of Gombe state, in the North-East geopolitical zone of Nigeria, with an estimated population of about 2.1 million people. The Federal Teaching Hospital Gombe was established in 1996, and provides tertiary health services for the residents of Gombe state as well as the adjoining states.

There are many Nigerian studies on the pattern of salivary gland tumours [4] [8] [9] [14] [18] [19] [20]. However, only few of these have been done in the

North-East geopolitical zone of Nigeria, especially in Maiduguri [21] [22]. Two previous studies in Gombe reported SGTs as part of analysis of orofacial biopsies [23] [24]; these however covered only a few years, and may have missed out some extraoral SGTs. Furthermore, there is paucity of studies focused on the trends in SGTs over time. The aim of this study therefore was to describe the pattern of presentation of salivary gland tumours at FTH Gombe, and to determine the trend in occurrence of SGTs at FTH Gombe over a period of 15 years.

## 2. Materials and Method

This was a descriptive cross-sectional study carried out among patients presenting at the Federal Teaching Hospital, Gombe over a fifteen-year period (January 2008 to December 2022). Prior to commencement of the study, ethical approval was obtained from the institution's Ethical Review Board. The registers from the cancer registry of the hospital were examined and all those with a histopathologic diagnosis of salivary gland tumours (SGTs) were extracted. Non-neoplastic/reactive lesions like mucocele, mucous extravasation phenomenon, ranula, benign lymphoepithelial cyst, sialometaplasia and sialosis were excluded. The clinical and histopathologic records of each patient were then retrieved from the records of the Department of Histopathology. Relevant data extracted from the records included age, gender, site, year of diagnosis, and histopathologic diagnosis. The lesions were then categorized based on 1) the histopathologic diagnosis, into two types of SGTs: benign and malignant and 2) the year of diagnosis into three groups, with each spanning a duration of 5 years [group I (2008-2012), group II (2013-2017) and group III (2018-2022)].

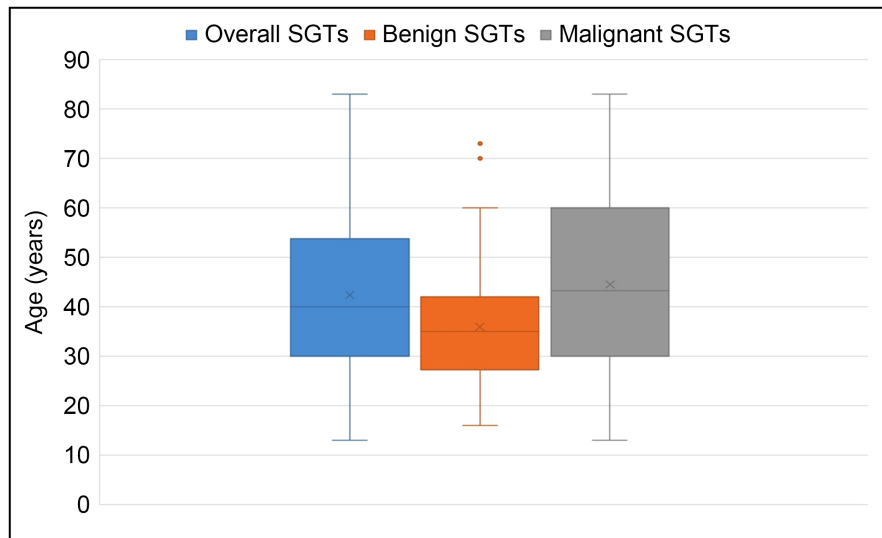
The data collected was entered into a spreadsheet and analyzed using IBM SPSS for windows version 23, Chicago, IL. Descriptive statistics was performed and results presented as frequencies and percentages, using charts and plots for data visualization. The relationship between type of SGTs and qualitative variables (gender and site) was assessed using Chi square test of association, whereas the relationship between type of SGTs and age (quantitative variable) was assessed using an independent samples t-test. A *p*-value of  $\leq 0.05$  was considered statistically significant in all cases.

## 3. Results

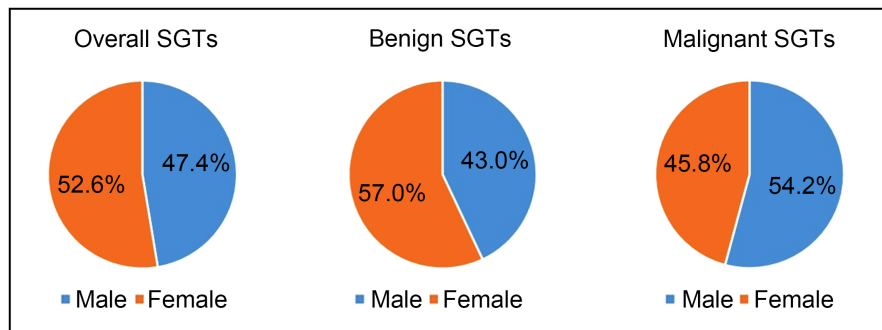
There were 152 diagnosed salivary gland tumours during the period under review, comprised of 93 (61.2%) benign and 59 (38.8%) malignant lesions. The subjects' age ranged from 13 to 83 years, with a mean age of  $39.6 \pm 16.1$  years (Figure 1). Males constituted 72 (47.4%) of the study subjects, while females accounted for 80 (52.6%), giving a male to female ratio of 1:1.1 (Figure 2). The most common sites were the parotid (34.4%), submandibular region (22.5%) and the palate (22.5%) (Figure 3).

Benign SGTs had a peak in the third (27.5%) and fourth (30.8%) decades of life, with a mean age of  $36.4 \pm 13.6$  years, and were more commonly seen in fe-

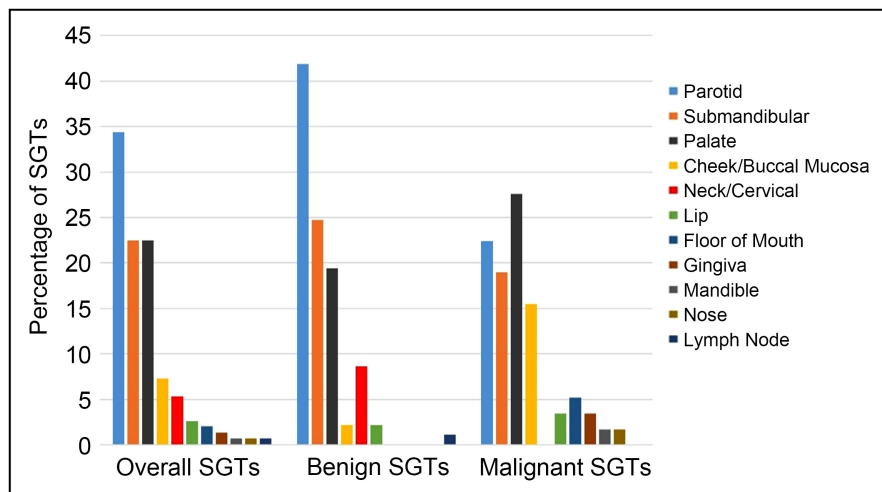
males (57.0%). The most frequent sites were the parotid region (41.9%), the submandibular region (24.7%) and the palate (19.4%). Pleomorphic adenoma (94.6%) was by far the most common benign SGT (**Figure 4**).



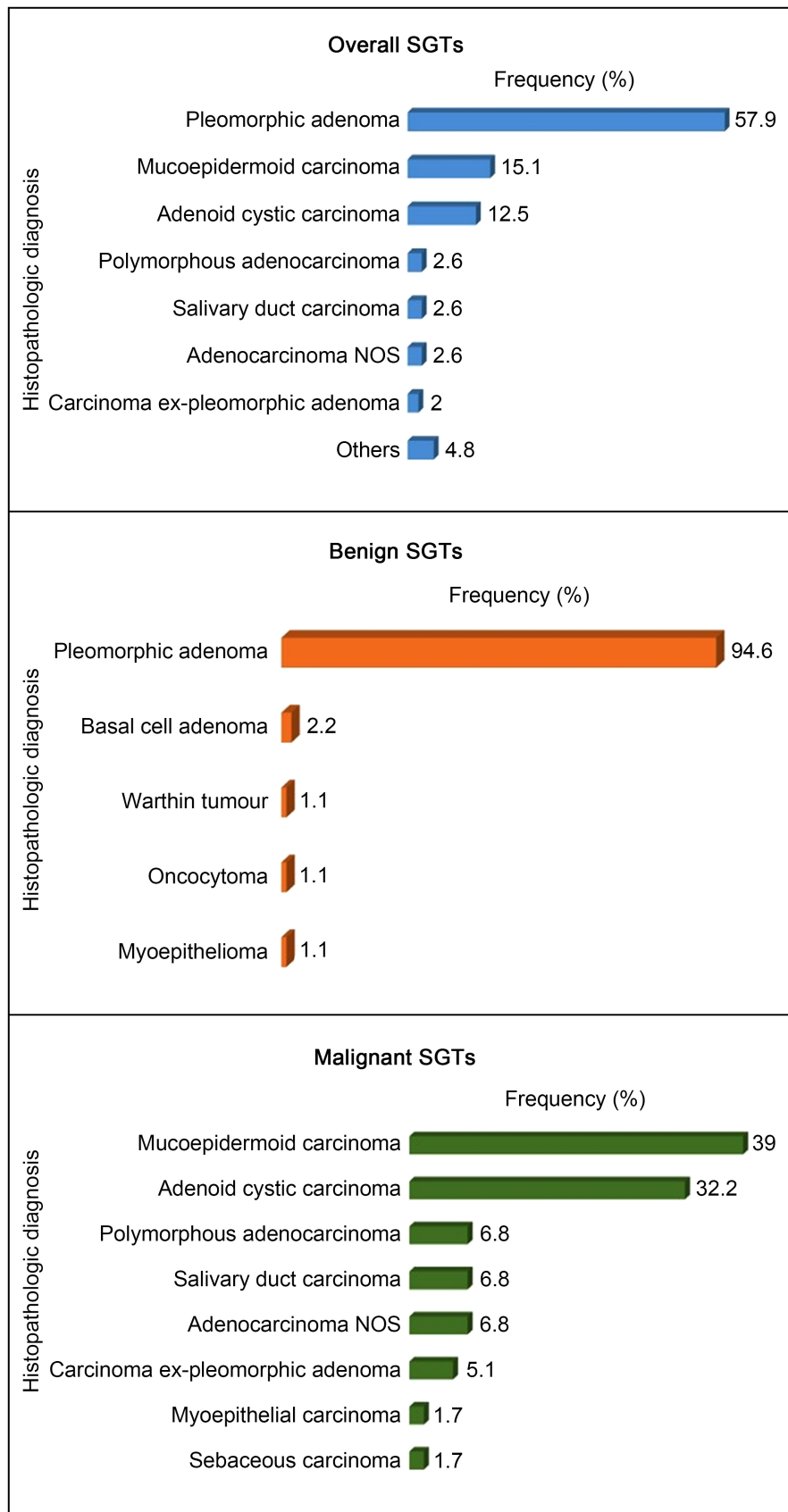
**Figure 1.** Boxplot showing the age distribution of salivary gland tumours.



**Figure 2.** Pie charts showing the gender distribution of salivary gland tumours.



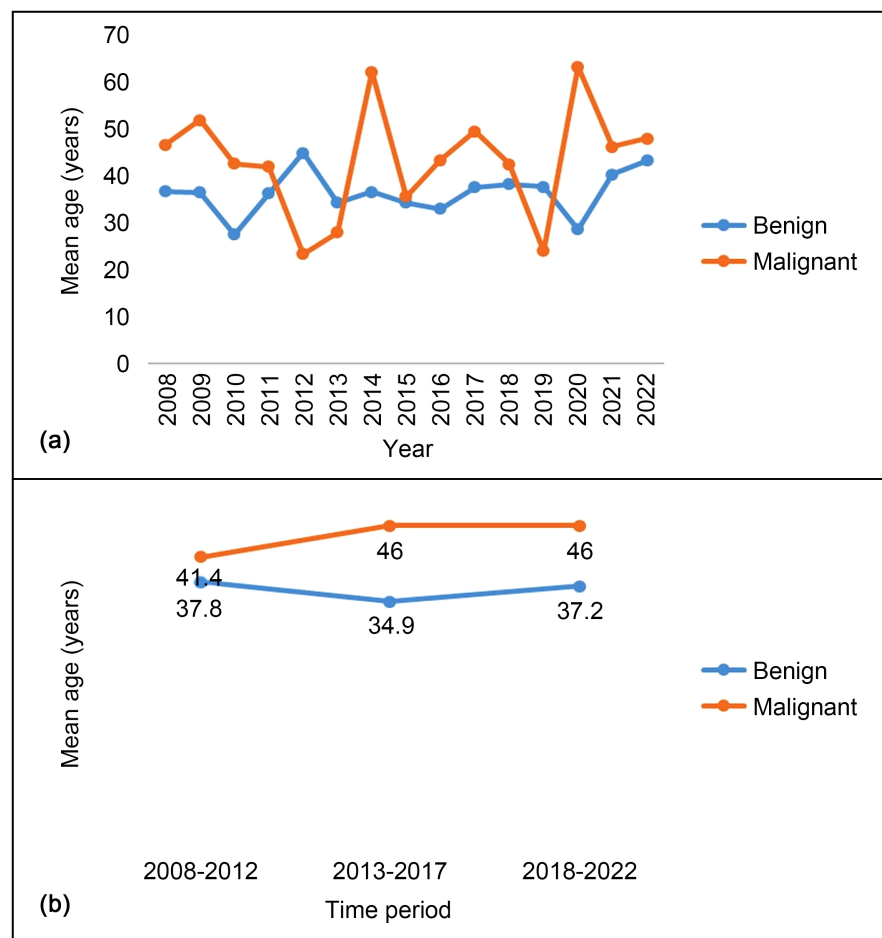
**Figure 3.** Bar charts showing the site distribution of salivary gland tumours.



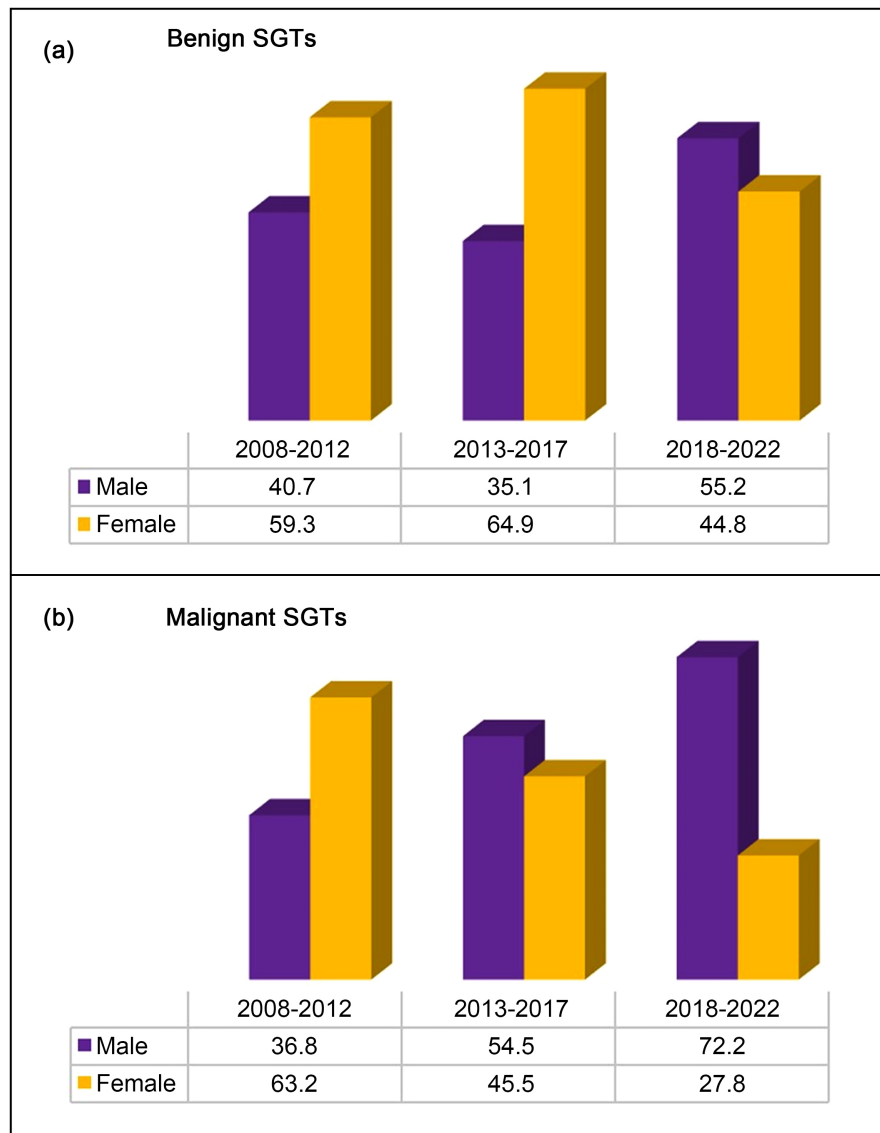
**Figure 4.** Frequency distribution of the histopathologic types of salivary gland tumours.

Malignant SGTs were almost evenly distributed from the third to seventh decades of life, with a mean age of  $44.5 \pm 18.4$  years. Males were more commonly affected (54.2%), and the most frequent sites were the palate (27.6%), the parotid region (22.4%), the submandibular region (19.0%) and the buccal mucosa (15.5%). The two most frequently diagnosed malignant SGTs were mucoepidermoid carcinoma (39.0%) and adenoid cystic carcinoma (32.2%). The mean age of occurrence of malignant SGTs was significantly higher than that of benign SGTs ( $p = 0.005$ ). However, the difference in the gender predilection between benign and malignant SGTs was not statistically significant.

The trend analysis of the mean age at diagnosis of SGTs for each of the fifteen years in the period of this study showed that while the mean age of benign SGTs has varied only a little, there has been wide fluctuations in the mean age of malignant SGTs. In fact, in three of the fifteen years, the mean age for malignant SGTs was less than that of benign SGTs. However, in each of the five-year time periods, the mean age for malignant SGTs was higher than that of benign SGTs (**Figure 5**). The trend for gender predilection showed that there has been a steady rise in the proportion of males presenting with malignant SGTs during the period under review (**Figure 6**).

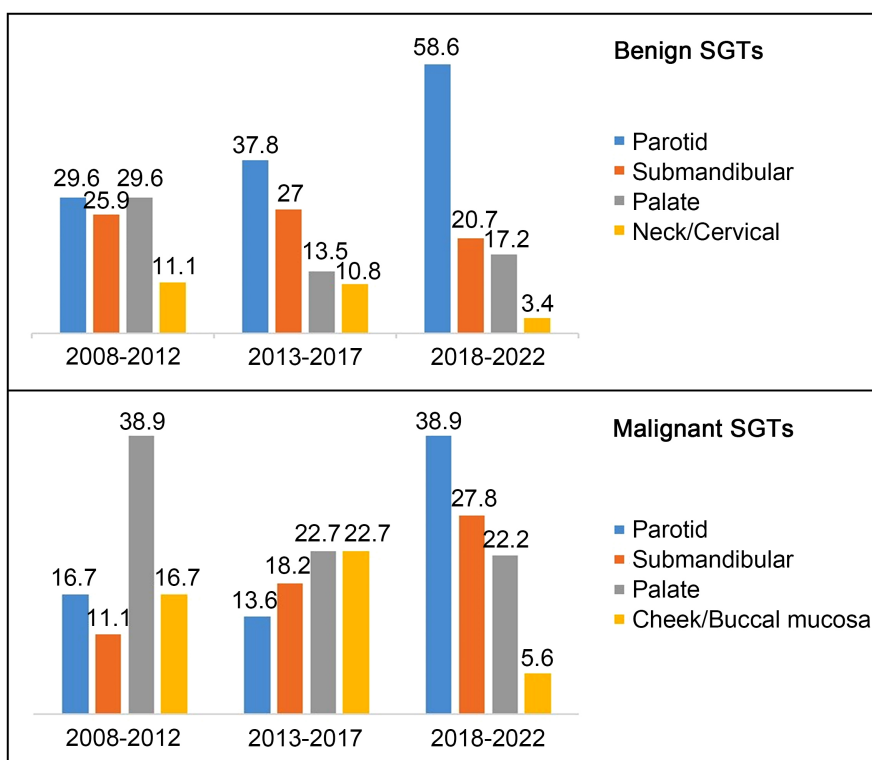


**Figure 5.** Trend in the age distribution of salivary gland tumours.

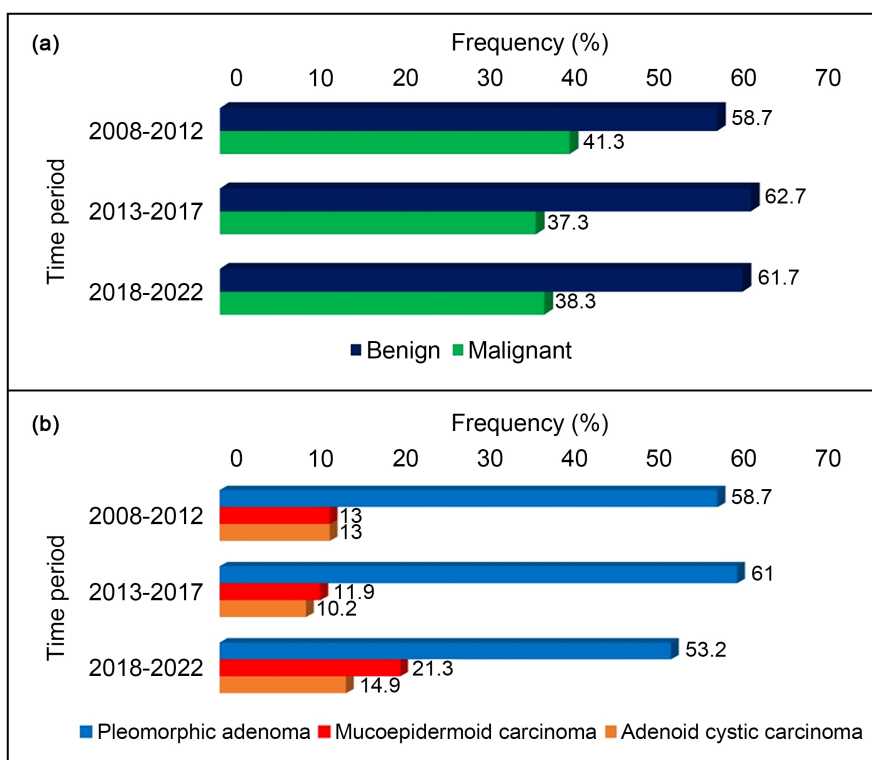


**Figure 6.** Trend in the gender distribution of salivary gland tumours.

A trend analysis of the site of occurrence of the benign SGTs showed that there has been a steady increase in the frequency of parotid tumours, whereas the frequency of submandibular tumours has remained fairly constant. For the malignant SGTs, the palate was the predominant site between 2008 and 2012. Between, 2013 and 2017, the site distribution was fairly equal for the four most common sites, while in the last five years (2018 to 2022), the parotid has become the predominant site for malignant SGTs (Figure 7). Over the duration of the study, the ratio of benign to malignant SGTs has remained relatively constant (Figure 8(a)). Similarly, over the fifteen-year duration of the study, there has not been any change in the three most common SGTs (pleomorphic adenoma, mucoepidermoid carcinoma and adenoid cystic carcinoma). However, in the last five years, there has been a slight increase in the proportion of mucoepidermoid carcinoma and adenoid cystic carcinoma (Figure 8(b)).



**Figure 7.** Trend in the frequency (%) of site distribution of salivary gland tumours (Only sites with lesions spanning all three time periods were included).



**Figure 8.** Trend in the histopathologic type of salivary gland tumours (a) Ratio of benign to malignant of salivary gland tumours (b) Frequency distribution of the three most salivary gland tumours.



## 4. Discussion

Salivary gland tumours are a heterogeneous and relatively rare group of tumours arising from the salivary glands, with recent reports suggesting an increase in incidence [3] [6]. In this study, benign SGTs peaked in the third and fourth decades of life, which is similar to previous reports from Nigeria and other parts of the world [11] [25]. The mean age of 36.4 years seen in this study is almost identical to the 36.5 years reported by Osayande *et al.*, [8] and similar to the 37.1 years and 38.2 years reported by Omitola *et al.* [4] and Lawal *et al.* [9] in previous studies. The mean age for benign SGTs (36.4 years) was significantly less than that for malignant SGTs (44.5 years). Similarly, in a recent systematic review, Galdirs *et al.* [5] reported a significant difference in the mean age of occurrence of benign and malignant SGTs. Other authors have also reported a similar finding [4]. Whereas benign SGTs were more frequent in females, malignant SGTs had a higher occurrence in males. This is in agreement with the findings of Lawal *et al.* in Nigeria, [9] Oti *et al.* in Ghana [26] and Li *et al.* in China [27]. However, other authors have reported a higher frequency of both benign and malignant SGTs in females [4] [8]. Benign SGTs were more frequent in the major salivary glands, with the parotid being the most common site for SGTs in general, and for the benign SGTs, which is similar to most reports in the literature [3] [14] [28] [29]. Malignant SGTs on the other hand were more frequent in the minor salivary glands, with a preference for the palate. Similar findings have been reported by other authors [5] [9]. Pleomorphic adenoma was by far the most common benign SGT, similar to most reports in the scientific literature, [26] [30] while mucoepidermoid carcinoma was the most frequent malignant SGTs encountered in this study, closely followed by adenoid cystic carcinoma. Many previous Nigerian reports have found more cases of adenoid cystic carcinoma among malignant SGTs, [4] [8] [15] [20] although others have reported more cases of mucoepidermoid carcinoma [10] [11] [12] [13]. A previous study in the North-Eastern part of Nigeria also found more cases of mucoepidermoid carcinoma [21]. There may be a regional variation in the frequency of malignant SGTs in this part of the country. Reports from other parts of the world have also found either mucoepidermoid carcinoma [3] [28] [30] or adenoid cystic carcinoma [26] [31] [32] as the most frequent salivary gland malignancy.

Over the three time periods (2008-2012, 2013-2017 and 2018-2022) in this study, there has been little variation in the mean age of both the benign and malignant SGTs, and in each time period, the mean age for the malignant SGTs was higher than that for the benign SGTs. This suggests that there has not been any significant change in trend with respect to the age of occurrence of SGTs. When the trend for gender was considered, it was observed that in the last five years, there has been a significant increase in the proportion of males presenting with benign SGTs. Likewise, there has been a steady rise in the proportion of males presenting with malignant SGTs over the last fifteen years. In the last five years,

both benign and malignant SGTs have shown a male predilection. This contrasts with a previous study which showed that between 2006 and 2016, there was a decrease in the occurrence of parotid gland malignancies in males, with a corresponding increase in the proportion of females affected [33]. The reason for this change in trend seen in the current study is not apparent, but may be due to greater exposure of males in Nigeria to ionizing radiation. Ionizing radiation in the form of head and neck computed tomography (CT) scans has been established as a risk factor for parotid gland tumours, [33] and in a study in Ibadan, Nigeria, 55.2% of all patients referred for a head and neck CT were males [34]. The trend analysis for site of occurrence of benign SGTs showed a steady increase in the frequency of parotid tumours throughout the period of the study. Between 2008 and 2012, the palate was the predominant site for malignant SGTs. However, in the last five years (2018 to 2022), the parotid has become the predominant site for malignant SGTs. This change in trend may be due to the effect of widespread use of mobile telephones in Nigeria since the turn of the century. In a systematic review and meta-analysis, de Siqueira and co-workers [35] found that the use of mobile phones increased the chances of developing a parotid tumour by 28%. Other authors have however reported that the use of mobile phones did not increase the incidence of parotid tumours [33]. Over the duration of the study, the ratio of benign to malignant SGTs has remained relatively constant, and there has not been any significant change in the three most common SGTs, although in the last five years, there has been a slight increase in the proportion of mucoepidermoid carcinoma and adenoid cystic carcinoma. In a previous study, Osayande *et al.* [8] reported a trend reversal in the ratio of benign to malignant between 2003 and 2015, with more cases of malignant SGTs. This seems to suggest that there may be a rise in the incidence of salivary gland malignancies.

## 5. Conclusion

While the overall pattern of presentation of SGTs in Gombe is similar to reports in the literature, this study has identified some changes in trends over the years in terms of gender and site of occurrence. Further studies examining the trends in occurrence of SGTs over extended time periods are encouraged.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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