**Salivary Gland Tumors: A retrospective study of 339 cases in an Iranian population from 1986 to 2006**

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**Abstract**

**Introduction:** Tumors of the salivary glands are relatively rare, comprising less than 3-6% of all head and neck tumors. Epidemiological data of these tumors in various parts of the world can be helpful for a better understanding of their biology and clinical characteristics. In Iran, there are few significant epidemiological studies of large series of benign and malignant salivary gland tumors.

**Aim:** The purpose of the present study is to evaluate the relative frequency and distribution of benign and malignant tumors in the archive of Department of pathology, Cancer Institute of Imam Khomeini Hospital.

**Materials and Methods:** In this retrospective study, the archive of Cancer Institute of Imam Khomeini Hospital from 1986 to 2006 was the source of the data collection. Information on type of tumors, location as well as patient age and sex were retrieved from pathological and medical reports. Data were analyzed by SPSS package.

**Results:** Among 85317 patients in the 20 years period of study, 399 were diagnosed with salivary gland tumors (46% of all reported cases). There were 217 males (54.4%) and 182 females (45.6%) with median age 44.7±18.4 years and range of 3-90 years. 54.8% of all cases were benign (n= 219) and 45.2% were malignant (n= 180). Pleomorphic adenoma was the most common type of benign tumor identified with male to female ratio 1: 1.4 whereas Adenoid Cystic Carcinoma was the most common malignant tumor with male to female ratio being 1: 0.8. The Parotid gland was the most affected site and the minor salivary glands were the second site. Most of minor salivary glands tumors occurred in the palate.

**Discussion and Conclusion:** The data presented in this study are very similar to those of other published research studies. We concluded that the incidence of salivary gland neoplasms in this study is in accordance with the incidence observed in several other studies worldwide. However, prospective studies with adequate follow up are required to a better understanding of salivary gland neoplasms.

**Key words:** Salivary gland, Neoplasm, Benign, Malignant

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**Introduction**

Salivary gland tumors comprise less than 3-6% of all head and neck tumors (1,2). It has been reported that salivary gland tumors are one of the complicated neoplasms in which tumor cells can differentiate, arrange and produce extracellular matrix (3). They may arise in major salivary glands (parotid, submandibular, and sublingual) or in minor salivary glands, which are located beneath...
the mucosal lining of the upper aero-digestive tract. These tumors occur commonly in the parotid gland but other major and minor salivary glands also may be affected \(^\text{(4)}\).

There have been many epidemiological studies of salivary gland tumors in different countries, and the frequency was reported to range from 0.4 to 13.5 cases per 100,000 inhabitants annually \(^\text{(5)}\). Relative to gender, it was verified that, generally, both benign and malignant types were more prevalent in women. Peak incidence relative to age showed variations, with concentrations at the third decade of life for benign tumors and the sixth decade for malignant tumors. \(^\text{(3)}\)

Recently, racial and geographic variations in the frequency and distribution of these neoplasms have been suggested in several studies. However, varying circumstances have made it difficult to compare the data among various studies of salivary gland tumors \(^\text{(6)}\). For example, their histological classification is comparatively difficult due to the morphological heterogeneity and low morbidity of tumors. \(^\text{(5)}\)

Therefore, the aim of this study was to carry out a survey of benign and malignant cases of major and minor salivary gland tumors in an Iranian population from 1986 to 2006.

**Patients and Methods**

Data included in this retrospective study were collected from the records of Cancer Institute, Imam Khomeiny Hospital, Iran, from 1986 to 2006. The sample consisted of major and minor salivary gland neoplasms selected among cases recorded in the files of the cancer institute (approximately a population of 86000). Tumors were classified according to Neville’s Oral & maxillofacial Pathology (2th edition, 2009). The main analysis outcome measures were 1- age and sex of the patients, 2- location of tumors, 3- clinical diagnosis and 4- histological diagnosis. These data were obtained from each patient report and clinical record. Data were analyzed by SPSS version 16. Statistical analysis was performed using t test, and the difference was considered at the 0.05 significance level.

**Results**

All 399 cases of salivary gland neoplasia corresponded to 46% of the total cases registered by this cancer institute during these 20 years.

Age of the patients ranged from 3 to 96 years, with a mean of 44.7±18.4 years. There were 217 (54.4%) male and 182 (45.6%) females (The male-to-female ratio was 1.19.), with a mean age of 47.4± 18.9 and 41.5± 17.3 years, respectively.

The overall frequency of benign tumors and malignant tumors was 54.8% and 45.2%, respectively. Pleomorphic adenoma (PA) was the most frequent tumor with 200 cases, comprising 50.3% of all tumors and 92.2% of the benign salivary gland tumors of our series. Adenoid cystic carcinoma (ACC), 37 cases, was the second most common, and the most frequent malignancy, representing 9.3% of all tumors and 21.4% of the malignant tumors. Mucopidermoid carcinoma (MEC) was the third most frequent tumor with 36 cases (9% of all tumors) and the second most common malignant tumor (20.8%of the malignant tumors).

The distribution of the individual neoplasms is shown in table1.

Among the various salivary gland sites, 70.9% (n= 283) were located in the parotid gland 17.2% (n=69) in the minor salivary gland. Among the minor salivary gland sites, the palate (n=47) was the most frequently affected site. Sublingual gland was affected in 8 cases (2%) and was less frequent. All of the tumors in sublingual gland were malignant. Five patients in our study (1.3%) had Warthin’s tumor. Warthin’s tumors affected only the parotid gland and males. The vast majority of salivary gland tumors for both benign and malignant lesions occurred in the parotid gland except malignant pleomorphic adenoma, which was most commonly located in minor salivary glands (Table 2).

The mean age was 39.46± 16.09 years old (ranging from 3 to 90) for benign and 51.61± 19.04 years old (ranging from 5 to 96 years) for malignant tumors.

The benign tumors showed a predilection for the females (53.5%), whereas the malignant tumors showed a predilection for the males (63.8%).
Table 1. Histological diagnosis and sex distribution of salivary gland neoplasms

<table>
<thead>
<tr>
<th>Types of tumor</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Numb</td>
<td>%</td>
<td>Numb</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>er</td>
<td></td>
<td>er</td>
<td></td>
</tr>
<tr>
<td><strong>Benign</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>84</td>
<td>38.8</td>
<td>116</td>
<td>63.7</td>
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<tr>
<td>Warthin tumor</td>
<td>5</td>
<td>2.3</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Other benign</td>
<td>10</td>
<td>4.6</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Malignant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malignant mixed tumor</td>
<td>2</td>
<td>0.9</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>23</td>
<td>10.6</td>
<td>13</td>
<td>7.2</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>21</td>
<td>9.7</td>
<td>16</td>
<td>8.8</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>17</td>
<td>7.8</td>
<td>7</td>
<td>3.8</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>10</td>
<td>4.6</td>
<td>7</td>
<td>3.8</td>
</tr>
<tr>
<td>Other malignant</td>
<td>42</td>
<td>19.4</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>217</td>
<td>100</td>
<td>182</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Histological diagnosis and site distribution of salivary gland neoplasms

<table>
<thead>
<tr>
<th>Types of tumor</th>
<th>Parotid</th>
<th>Submandibular</th>
<th>Sublingual</th>
<th>Minor glands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Numb</td>
<td>%</td>
<td>Numb</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>er</td>
<td></td>
<td>er</td>
<td></td>
</tr>
<tr>
<td><strong>Benign</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>152</td>
<td>53.7</td>
<td>19</td>
<td>47.7</td>
</tr>
<tr>
<td>Warthin tumor</td>
<td>5</td>
<td>1.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other benign</td>
<td>11</td>
<td>3.9</td>
<td>3</td>
<td>7.6</td>
</tr>
<tr>
<td><strong>Malignant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>23</td>
<td>8.1</td>
<td>5</td>
<td>12.8</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>17</td>
<td>6.6</td>
<td>4</td>
<td>10.2</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>16</td>
<td>5.6</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>9</td>
<td>3.2</td>
<td>2</td>
<td>5.1</td>
</tr>
<tr>
<td>Malignant pleomorphic adenoma</td>
<td>1</td>
<td>0.4</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other malignant</td>
<td>49</td>
<td>17.3</td>
<td>6</td>
<td>15.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>283</td>
<td>100</td>
<td>39</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

The present retrospective study is from the records of Cancer Institute, Imam Khomeiny Hospital, which is a referral hospital in our country, covering approximately a population of 86000 during the years 1986 to 2006. Thus, the group examined in the present study should be considered to be a representative of the Iranians population with minimal bias. In this study we reviewed 399 major and minor salivary gland tumors showing the majority of tumors in the present series were benign, corresponding to the results of most studies showing a predominance of benign over malignant tumors (2, 4, 6-12). In contrast, some studies have shown a predominance of malignant over benign tumors (13-17).

We found a higher prevalence of benign salivary gland tumors in females than in males, ratio 1.5: 1. Nagler et al (18) found this ratio 1.2: 1. Poomsawat et al (19) observed female to male ratio of benign intraoral salivary tumors 1.4: 1. For malignant tumors in our study higher prevalence was in males than females, ratio 1.8: 1. Chung sun et al (19) and Ito et al (10) also found predominance of malignant tumors in males. In contrast, AL-Khateeb et al (20) reported a major prevalence of benign salivary gland tumors in males and malignant tumors in females. Kamulegeya
et al (21) have shown predominance of both malignant and benign tumors in females. Sex predilection for salivary gland tumors has been reported to be related to ethnic variations (6).

The majority of salivary gland tumors in this study were located in the parotid gland. This finding coincides with large series of salivary gland tumors shown that the parotid gland was the most common site of salivary gland (4,10,20,22,29). However, some studies shown the palate as a common site of tumor occurs (1,2,6,15-17,30).

The most frequent benign tumors in this study were pleomorphic adenoma. This agrees with all published literature from all over the world. The most frequent malignant tumors in this study were adenoid cystic carcinoma. This is in agreement with findings of some investigation (2,5,19,26,27,29), but is in contrast to other studies that show mucoepidermoid carcinoma to be the most common malignant salivary tumors (1,4,6,10,15,17,22,23,24,25).

Kamulegeya et al (21) analyzing 142 salivary gland tumors in an Ugandan population found adenocarcinoma as the most common malignant tumors. In the present study, sublingual gland was the least common site of tumor involvement. Otoh et al (23) found two tumors in this location. Others have not located any tumors in the sublingual gland (10). But, Satko et al (31) reported sublingual tumors in 33 out of 1021 salivary gland tumors.

The mean ages were 41.5± 17.3 years and 47.4± 18.9 years for female and male, respectively. There is no statically difference between this study and those given in Ansary (6) in Hamedan- Iran and in Jaber et al (10) in Leybia. However, the percentage of malignant tumors in our results was 45.2% while these percentages were 61.3% in Leybia and 68.4% in Hamedan- Iran.

Warthin’s tumors were only found in the parotid gland approving that the presence of this tumor outside the parotid was unusual and scarce (32) but Jasser et al (33) reported one case occurring in the submandibular gland and one in the minor salivary gland. In conclusion, the majority of the tumors were benign, found in the parotid gland. Pleomorphic adenoma was the most frequent histological type, followed by adenoid cystic carcinoma and mucoepidermoid carcinoma. Epidemiological data of these tumors in the various parts of the world can be helpful for a better understanding of their biology and clinical characteristics. We hope it can contribute to early diagnosis and effective treatment of salivary glands tumors.

References
12- de Oliveira FA, Duarte EC, Taveira CT, Maximo AA, de Aquino EC, Alencar Rde C, Vencio EF. Salivary Gland Tumor: A Review