1	Original Research Article
2	Title: Histopathological Patterns of Larynx Biopsies In Usmanu Danfodiyo University
3	Teaching Hospital (UDUTH) Sokoto, North- Western Nigeria From 2002-2012.
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5	ABSIKAUI
6	BACKGROUND: This is a retrospective study on the histopathological patterns of larynx.
7	Laryngeal cancer is the most common cancer of the aerodigestive track and it accounts for 20%
8	of all head and neck cancers. The incidence of laryngeal cancer world-wide varies and a number
9	of areas of relative high incidence(>10/100,000) can be identified in Brazil(Sao Paulo), the black
10	populations in parts of the USA, Hong Kong, India (Bombay, Poona), France (Bas Rhins,
11	Doubs), Italy (Varesa),
12	OBJECTIVES: The objectives of thi study are to determine the prevalent, age, pattern of presentation
13	and histopathology types of laryngeal disorders using the larynx biopsies
14	METHOD: A total number of forty three (43) paraffin embedded tissue block were used for the
15	study. The blocks were retrieved from the archive and the patients' bio data and the
16	histopathological pattern from the biopsies record book. The sections were cut from the tissue
17	blocks using rotary microtome. They were stained with heamatoxylin and eosin staining
18	technique and the photomicrographs, bio data and histopathological pattern were analyzed and
19	the results were presented in tables as percentages.
20	RESULT: A total of forty three larynx biopsies were received from January 2002 to December
21	2012, which was about 0.5% of all the biopsies received over the period. The mean age of the
22	patients with larynx disorders was about 35.6 years, median age 35 years, age range was 1 year to
23	82years and the modal age was 1year. About 8 (19%) of patients were female and 35 (81%) were
24	male. Out of the forty three larynx biopsies 17 (39.5%) were benign tumours and about 26
25	(60.5%) were malignant tumours. Benign to malignant ratio was 1: 2. The age range for benign
26	tumours were 1to 60 years, mean age 13.4 years and modal age 1 year. Of the benign tumours 4
27	(23.5%) were female while 13 (76.5%) were male and Juvenille papilloma was the commonest

benign tumour with frequency of 58.8% followed by Squamous cell papilloma (23%). The age

range for malignant tumours were 6years to 82years, mean age 50.1years, modal age 40years and prevalent age 35years to 70years. Of the malignant tumours 22(84.6%) were males while 4 (15.4%) were females, male to female ratio 5.5 : 1 and Squamous cell carcinoma has the highest frequency of 92.3% while non Hodgkins lymphoma and Hybrid carcinoma have frequency of 3.8% respectively.

CONCLUSION There were more malignant (60.5%) laryngeal tumours in Sokoto than benign
(39.5%) tumours with male preponderance. The mean age for malignant lesions was 50.1 years,
which signifies a younger population while that of benign was 13.4%.

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38 1.0 INTRODUCTION

Epidemiology: Laryngeal cancer is the most common cancer of the aero digestive track and it 39 accounts for 20% of all head and neck cancers. The incidence of laryngeal cancer world-wide 40 varies and a number of areas of relative high incidence(>10/100,000) can be identified in 41 Brazil(Sao Paulo), the black populations in parts of the USA, Hong Kong, India (Bombay, 42 Poona), France (Bas Rhins, Doubs), Italy (Varesa), Poland (Katowice), Spain and Switzerland 43 (Geneva) [1] while low incidence areas (<2/100,000) include Japan, Norway, Sweden, New 44 Guinea and Senegal (Dakar) [1]. About 11,300 new cases of laryngeal cancer were to be 45 diagnosed in the year 2007 in the United States which account for about 1% of new cancer 46 diagnosed and approximately one third (3,660) of these patients would die of the disease [2,3].In 47 the United Kingdom the incidence of laryngeal cancer is approximately four per 100,000 48 (Intermediate to low incidence) with 70% occurring in men (3-4:1) and the peak incidence 49 between 55 and 65 years [1,2]. 50

In Nigeria laryngeal cancer has been reported as the second commonest otolaryngological cancer in Usmanu Danfodiyo University Teaching Hospital located in north western Nigeria and Lagos university teaching hospital southwestern Nigeria but the third commonest cancer in the

54 otolaryngological clinic in university college Hospital Ibadan but sixth commonest cancer in Ibadan [4, 5, 6]. Laryngeal cancer is the third commonest cancer in the ENT clinic of University 55 of Maiduguri teaching hospital located in North eastern, Nigeria, second commonest ear nose 56 and throat cancer and fifth commonest Head and neck cancer in Jos university teaching hospital 57 located in north central Nigeria [7, 8, 9]. Laryngeal cancer has also been reported as the third 58 commonest cause of hoarseness among adult Nigerians in Lagos and also Enugu in South eastern 59 Nigeria [10]. Carcinoma of the larynx accounts worldwide for about 1.7% of all new cancer 60 diagnosis [11]. 61

The incidence shows wide geographical variation and marked male dominance is a universal finding. In france, Italy, Poland and Spain, incidence is as high as 15-18 cases per 100,000 men per year have been registered while the lowest male incidence of 0.7/100,000 has been reported from Qidong city, china [11]. In females the figures vary between 0.1/100,000 and 2.9/100,000 [11]. The age-adjusted global incidence estimate for the year 1990 is 5.7/100,000 person-years in men and 0.7 in women [11]. Rising incidence trends have been reported from several areas and mostly in both sexes [12].

Globally the male to female sex ratio for laryngeal cancer is accepted to be 10:1 despite regional variations [2]. One characteristic of laryngeal cancer is its greater predominance in men compared with women. In the USA, the male to female ratio is 4:1, in Canada (Mannitoba), 6:1, and in Italy (Varesa) 32:1where the maximum male to female ratio has been recorded [1]. [5] in their 15 year study of cases of RRP (Recurrent Respiratory Papillomatosis) in university college hospital Ibadan, reported a male to female ratio of 1.9:1 and a mean age of 8.7 years [5]

Laryngeal carcinoma occurs in increasing age with the peak incidence being in the 5th decade.
Somefun *et al* in Lagos South western Nigeria reported a mean age of 55 years, peak age range of
50-59 years and age range of 30-75 years [10].

Etiological Factors: The incidence of Laryngeal tumours is closely correlated with smoking 78 cigarettes, as head and neck tumours occur 6(six) times more often among cigarettes smokers 79 than among non smokers. [13] in Enugu South eastern Nigeria pointed out in his report that 80 majority of patients with cancer of the larynx in Nigeria are non-smokers while [10] recorded a 81 positve history of alcohol and smoking in 13.9% of the patients in Lagos south western Nigeria. 82 More than 90% of patients with laryngeal cancer have a history of heavy tobacco and alcohol use 83 [14] Cigarette smoking and alcohol use, especially dark spirits have a more than additive 84 carcinogenic effect on the larynx [14]. The risk of laryngeal cancer increases up to 30 times for 85 86 smokers. The heavier the person smokes, the higher the risk. Second-hand smoke is also considered a hazard. Heavy drinkers more than double their risk for this type of cancer, and 87 combining smoking with alcohol can increase the risks even more than either drinking or 88 smoking alone. 89

Other risk factors identified include: (a) laryngeal infection with the human papilloma virus 90 (HPV) causing a benign condition called laryngeal papillomatosis which may sometimes 91 degenerate to squamous cell carcinoma (SCC) if subtypes 16 and 18 are involved. Mothers may 92 pass the virus on to their children when they're born. It settles in the larynx, developing into 93 growths called *laryngeal papillomas* later on in life, these growths may develop into cancer. (b) 94 Gastroesophageal reflux; in GERD, the stomach acid backs up into the esophagus, causing a 95 burning pain. Although not definitively proven, researchers have found that irritation from 96 97 longstanding GERD is related to higher chances of laryngeal cancer. (c) Exposure to or toxic

98 inhalations of asbestos; these risk factors include being exposed to wood dust, asbestos, or many types of chemicals (formaldehyde and mustard gas) that can increase the chances of cancer. (d) 99 Nutritional deficiencies; Many people who abuse alcohol also have poor nutritional habits, but 100 101 some research also suggests that not getting enough vitamins might be a risk factor. (e) Race; laryngeal cancer is found twice as often among people of African descent than among 102 Caucasians. (f) Age; this type of cancer is usually detected in people between 50 and 75 years 103 old. (g) Weakened immune system; people with weak immune systems (due to diseases such as 104 AIDS or medications that lower immunity to viruses) are more susceptible to laryngeal cancer. 105 (h) Gender; More men than women are diagnosed with cancer of the larynx. (I) Voice overuse; 106 People who use their voices a lot, such as singers, may develop *polyps* (lumps of tissue) that can 107 become cancerous if not removed. And previous neck irradiations are important risk factors [14]. 108

The Larynx: Larynx commonly called the voice box, is an organ in the neck of amphibians, 109 110 reptiles, and mammals involved in breathing, sound production, and protecting the trachea against food aspiration. It manipulates pitch and volume [1]. The larvnx houses the vocal folds 111 (vocal cords), which are essential for phonation. The vocal folds are situated just below where 112 the tract of the pharynx splits into the trachea and the esophagus [1]. Grossly the larynx extends 113 from the superior border of the epiglottis to the inferior border of the cricoid cartilage. 114 Anteriorly, it is related to the lingual epiglottis, the thyrohyoid membrane, the anterior 115 commissure, thyroid cartilage, cricothyroid membrane and the anterior arch of the cricoid 116 cartilage. The posterior relations are the posterior commissure the arytenoids, and the 117 118 interarytenoid Space [1]. Histologically, the larynx is composed of cartilages which are bound together by ligaments and muscles and is covered by mucous membrane. The cartilages of the 119 larynx are 2 types; unpaired and paired. The larynx as well as the trachea is lined by respiratory 120

epithelium, except over the true vocal cords and epiglottis, which are lined by stratified squamous epithelium [15]. Larynx is the most common site for primary malignant tumours in head and neck region [16]. Larynx biopsy is the removal of tissue from the larynx for microscopic examination.

125 Functions of the Larynx

126 The larynx performs the following important functions;

127 1. Protection of lower air	ways
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128 2. phonation

- 129 3. respiration and
- 130 4. fixation of the chest

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Disorders of the Larynx: There are several things that can cause a larynx to not function properly. [17] Some symptoms are hoarseness, loss of voice, pain in the throat or ears, and breathing difficulties. Larynx transplant is a rare procedure. The world's first successful operation took place in 1998 at the Cleveland Clinic [18] and the second took place in October 2010 at the University of California Medical Center in Sacrament [19].

137 1. Acute laryngitis.

138 2. Presbylarynx.

139 3. Ulcers.

140 4. Polyps and nodules.

141 5. Two related types of cancer of the larynx, namely squamous cell carcinoma and verrucous142 carcinoma.

143 6. Vocal cord paresis

- 144 7. Idiopathic laryngeal spasm.
- 145 8. Laryngopharyngeal reflux. Laryngomalacia

146 9. Laryngeal perichondritis.

[17, 20] **Histopathology Types:** Both benign and malignant tumours occur in the larvnx 147 148 [21]. Squamous cell carcinoma (SCC) of the larvnx is the commonest head and neck 149 cancer in the western world and accounts for over 85% of malignant laryngeal tumours and Laryngeal cancer is the most common cancer of the upper respiratory tract [1, 2]. 150 Verrucous carcinoma is a distinct variant of well differentiated Squamous cell carcinoma. 151 (Ackerman's tumour). Other malignant tumour types include adenocarcinoma, adenoid 152 cystic carcinoma, fibrosarcoma, Chondrosarcoma and lymphomas. Spread and growth 153 depends on the site of origin of the primary tumour. Benign laryngeal tumours constitute 154 5% or less of all laryngeal tumours with papillomas (>85%) being the commonest benign 155 laryngeal neoplasm[1, 2]. Other commonly encountered benign laryngeal tumours are 156 chondroma, granular cell myoblastomas, lipomas, haemangiomas and neurofibromas 157 [22]. True papillomas can be divided into two types: juvenile pailloma also known as 158 159 recurrent respiratory papillomatosis constitutes about 75% of the cases is multiple and 160 usually regresses after puberty and adult papilloma constituting 25% is usually single and does not undergo spontaneous resolution with puberty [22]. 161

162 Larvngeal tumours may be benign or malignant presenting with progressive voice hoarseness and upper airway obstruction which may be misunderstood until severe respiratory distress is 163 evident. Hoarseness is the main symptom of larynx disorders, dyspnoea and stridor are late 164 symptoms and usually indicate an advanced tumour. Pain in the throat is an uncommon 165 symptom. Dysphagia indicates pharyngeal invasion, Neck swelling indicate extra laryngeal 166 extension or lymph nodes involvement. Palpable lymph nodes are important in determining 167 prognosis. Regional metastases to the cervical lymph nodes are the most important prognostic 168 factor of laryngeal carcinoma [23]. Symptoms of anorexia, cachexia and fetor imply advanced 169 disease. 170

Diagnosis of Larynx Disorders: Diagnostic methods include: (a). Radiography; Computerized 171 tomography scan(CT-Scan) which include contrast enhanced helical CT scanning that has a high 172 sensitivity of 91% and high negative predictive values of 95% in detecting cartilage invasion of 173 174 CA [24], Magnetic resonance imaging(MRI) has been found to have a high detection of neoplastic invasion and Positron emission tomography (PET) which is critical in detection of 175 metastasis and for follow-up of patients, but sadly such services is nonexistent in most 176 177 developing nations, physical examination, tissue biopsy and Neck x-ray and fluoroscopy (which uses real-time x-rays to show movement of a body part). Laryngeal cancer is confirmed by 178 biopsy of the tumour through direct Laryngoscopy under general anaesthesia. 179

Treatment of Larynx Disorders: The most important goal for treatment is cure with laryngeal preservation, optimal voice quality and minimal risk of serious complications[25]. The standard treatment of laryngeal carcinoma is surgery and radiotherapy in varying combinations. Surgery involves partial or total removal of the larynx to achieve cure, radiotherapy have been found to

184 be effective in early laryngeal cancers (T1 and T2) with local control ranging from 70-100%. In advance laryngeal cancers (T3 and T4) post operative chemoradiation can achieve loco-regional 185 control [26]. Generally, treatments depend on the disease, they include: Acute laryngitis – resting 186 187 the voice, pain-killing medications and steam inhalation. Chronic laryngitis – speech therapy, resting the voice, steam inhalation and, if necessary, antibiotics to clear up any infection. Croup 188 - fluids- paracetamol, rest and possibly steam inhalation are usually all that is required. When 189 190 there is breathing difficulty, a short course of corticosteroid may be used. In severe cases of breathing difficulty, the child may need to be hospitalised, given nebulised adrenaline and 191 sometimes intubated (a tube is placed in the airway to overcome the blockage), Inhaled foreign 192 bodies - usually removed by bronchoscopy in hospital, under general anaesthetic. Ulcers -193 resting the voice for at least six weeks, and learning to treat the vocal cords with respect to avoid 194 195 recurrence, Polyps, nodules and growths – the lumps and bumps are surgically removed. Nodules in children can sometimes be treated solely with voice therapy, which teaches them how to use 196 their voice without unnecessary strain, Cancer – radiation therapy and surgery, including the 197 198 partial or complete removal of the larynx (laryngectomy). In order to speak after undergoing a laryngectomy, the person can either learn to swallow and exhale air through their oesophagus, or 199 use an electro-larynx device held against the throat. Laryngoscopy (using a piece of equipment 200 called a laryngoscope to view the throat) and Biopsy (taking a sample of tissue for testing). 201 Despite multiple modalities of treatment such as surgery, radiation and chemotherapy, advanced 202 laryngeal cancer continues to score one of the lowest 5-year survival rates [27]. Tentative 203 treatment depends on the stage of the tumour. 204

Carcinoma of the larynx, like other head and neck cancers, is among the most debilitating tumorsin which early diagnosis remains the best predictor of survival [28]. In developing countries like

207 ours, late presentation is a major problem in the management of larynx cancers. Effort is being 208 made to find a useful marker to enhance early detection of this disease .The larynx is divided into 209 3 anatomical sites; the supraglottic, glottic and subglottic. Most laryngeal cancers are glottis and 210 glottis cancers have the highest cure rate followed by supraglottic tumours [29]. The site of 211 laryngeal carcinoma is an important initial prognostic factor because it comprises the possible 212 way of expansion of primary tumour and the modality of metastasizing [30]. Tumours of the 213 larynx could be benign or malignant.

This was a 11-year retrospective study carried out at histopathology department, Usmanu Danfodiyo University Teaching Hospital Sokoto. The study aimed to determine the prevalent age, pattern of presentation and histopathology type of laryngeal carcinoma in our environment.

217 **2.0 MATERIALS AND METHODS**

Study Area: Sokoto State was the study area selected for this research. It is located in the 218 extreme north-western part of Nigeria near to the confluence of the Sokoto River and the Rima 219 River. As of 2005, it has an estimated population of more than 4.2 million (NPC, 2006). Sokoto 220 City is the modern day capital of Sokoto State. The total land area is about 32,000_{sq},km. Sokoto 221 State is in the dry Sahel, surrounded by sandy savannah and isolated hills. With an annual 222 average temperature of 28.3°C (82.9°F), Sokoto is, on the whole, a very hot area. However, 223 maximum daytime temperatures are for most of the year generally under 40°C (104.0°F) and the 224 dryness makes the heat bearable. The warmest months are February to April when daytime 225 226 temperatures can exceed 45°C (113.0°F). The rainy season is from June to October. The showers rarely last long and are a far cry from the regular torrential rain known in wet tropical regions. 227 From late October to February, during the cold season, the climate is dominated by the 228

Harmattan wind blowing Sahara dust over the land. The dust dims the sunlight thereby loweringtemperatures significantly and also leading to the inconvenience of dust everywhere in houses.

Type of Study: This is a retrospective analysis of all larynx biopsies carried out between
January 2002 to December 2012 in a tertiary health facility, Usmanu Danfodiyo University
teaching hospital Sokoto, northwestern Nigeria.

Scope of the Study: The age, sex and histopathological diagnosis were retrieved from Clinical records and request forms of all patients that underwent larynx biopsy at the study period and analyzed. Tissues were processed with the aid of the automatic tissue processor, embedded with an embedding system, sectioned with rotary microtome at 3microns and stained with Haematoxylin and Eosin staining technique. About 43 cases with histopathological diagnosis were included in this review.

Study Population: The study population included 43 tissue blocks of patients with larynx
biopsy from January 2002 to December 2012.

Inclusion and Exclusion Criteria: The inclusion criteria were for patients to have larynx biopsy during the study period. All other patients were excluded in the study and also patients with incomplete data were excluded from the study.

Data Collection: The biodata, nature of specimens, clinical diagnosis and histological diagnosis
of the patients with larynx biopsy were retrieved from the histology register.

247 **Sample Collection:** Tissue blocks of patients with larynx biopsy were selected from the 248 histopathology store. Sections, 3μ m thick, were cut from the tissue block using a rotary

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microtome. These were then floated out in a float-out water bath preheated at 3-5°C below the melting point of the paraffin wax, picked up onto a clean, grease-free and well albumenized glass slide. These were laid onto a hot plate preheated at 3-5°C above the melting point of the paraffin wax for a few minutes and were then stained.

253 **Staining Technique Employed:** Each of the sections was stained using the Heamatoxylin and 254 Eosin staining technique. Stained and mounted slides were viewed and diagnoses were 255 confirmed by a pathologist. photomicrographs of the slides were taken and the results were 256 recorded.

257 Heamat

Heamatoxylin and Eosin Staining Technique

- a. The sections were dewaxed in two changes of xylene, five minutes each.
- b. These were then hydrated in a decreasing gradient of alcohol (90%-70%-50%), two
 minutes each and then rinsed in water.
- c. Hydrated sections were stained with Harris Heamatoxylin for five minutes
- and rinsed in water.
- 263 d. Sections were then differentiated in 1% acid alcohol for 30seconds and rinsed in water.
- e. Differentiated sections were blued in Scott's tap water for 5minutes and rinsed in water.
- f. Sections were counterstained in Eosin solution for two minutes and rinsed in water.
- 266 g. These were dehydrated in increasing gradient of alcohol (90% alcohol, two changes of267 absolute alcohol), for two minutes each.
- h. Cleared in two changes of xylene, for two minutes each.
- i. Cleared sections were mounted using Distyrene Plasticizer Xylene (DPX) mountant
- 270 [31]

271 **3.0 DATA ANALYSIS**

272 Data obtained was analyzed using EPI INFO VERSION 3.5.4.

273 **40. RESULTS**

A total of forty three larynx biopsies were received from January 2002 to December 2012, which amounts to 0.5% of all the biopsies received over that period. The mean age of the patients were 35.6 years, median age of 35years and the age range was 1year to 82years, with a modal age of 1year (Table 1).

Twenty six (26) (60.5%) of the larynx biopsies were malignant. The age range is between 6 and 82years and the modal age is 40years, while the mean and median age of the patients with malignant tumours is 50.1years and 50years respectively (Table 2). Table 3 shows the patients with benign tumours. The 17 patients with benign tumours were in the age range of between 1year to 60years, with a model age of 1 year. While the mean and median ages were 13.4 years and 10 years respectively.

Table 4 Shows the sex distribution of the larynx biopsies patients, were 8 (19%) were female and
35 (81%) male with ratio of 1:4.3.

Table 5 shows the sex distribution patients with laryngeal carcinoma where 4 (15.4%) of the patients were female and 22 (84.6%) male. Male to Female ratio was 5.5:1. While table 6 shows the sex distribution of patients with benign tumours, where 4 (25%) of patients were female and 12 (75%) were male. Male to Female ratio was 3: 1. The percentage and Number of patients with benign tumours and malignant tumours of 17 (39.5%) and 26 (60.5%) respectively, are shown on Table 7A.

Juvenille papilloma was the commonest benign tumours, with frequency of 58.8% followed by Squamous cell papilloma (23%). While in those patients with malignant tumours, Squamous cell carcinoma has the highest frequency of 92.3% while non Hodgkins lymphoma and Hybrid carcinomas have frequency of 3.8%. See table 7B and table 7C respectively.

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Age	Frequency	Percentage	Cummulative Percentage
1	4	9.3%	9.3%
3	1	2.3%	11.6%
4	1	2.3%	14.0%
6	2	4.7%	18.6%
7	1	2.3%	20.9%
10	1	2.3%	23.3%
12	1	2.3%	25.6%
13	1	2.3%	27.9%
14	1	2.3%	30.2%
16	1	2.3%	32.6%
18	1	2.3%	34.9%
30	4	9.3%	44.2%
35	3	7.0%	51.2%
40	4	9.3%	60.5%
45	1	2.3%	62.8%
46	1	2.3%	65.1%
50	3	7.0%	72.1%
51	1	2.3%	74.4%
55	1	2.3%	76.7%
60	2	4.7%	81.4%
64	2	4.7%	86.0%
65	1	2.3%	88.4%
70	3	7.0%	95.3%
80	1	2.3%	97.7%

297 TABLE 1: AGE DISTRIBUTION OF PATIENTS

82	1	2.3%	100.0%	
Total	43	100.0%	100.0%	

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299 TABLE 2: AGE DISTRIBUTION OF PATIENTS WITH MALIGNANT TUMOURS.

Age	Frequency	Percentage	Cummulative Percentage
6	1	3.8%	3.8%
30	2	7.7%	11.5%
35	3	11.5%	23.1%
40	4	15.4%	38.5%
45	1	3.8%	42.3%
46	1	3.8%	46.2%
50	3	11.5%	57.7%
51	1	3.8%	61.5%
55	1	3.8%	65.4%
60	1	3.8%	69.2%
64	2	7.7%	76.9%
65	1	3.8%	80.8%
70	3	11.5%	92.3%
80	1	3.8%	96.2%
82	1	3.8%	100.0%
Total	26	100.0%	100.0%

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303 TABLE 3: AGE DISTRIBUTION OF PATIENTS WITH BENIGN TUMOURS.

Age	Frequency	Percentage	Cummulative Percentage
1	4	23.5%	23.5%
3	1	5.9%	29.4%
4	1	5.9%	35.3%
6	1	5.9%	41.2%
7	1	5.9%	47.1%
10	1	5.9%	52.9%
12	1	5.9%	58.8%

Total	17	100.0%	100.0%	
60	1	5.9%	100.0%	
30	2	11.8%	94.1%	
18	1	5.9%	82.4%	
16	1	5.9%	76.5%	
14	1	5.9%	70.6%	
13	1	5.9%	64.7%	

306 TABLE 4: SEX DISTRIBTION OF PATIENTS

Sex	Frequency	Percentage	Cummulative Percentage
Female	8	18.6%	18.6%
Male	35	81.4%	100.0%
Total	43	100.0%	100.0%

309 TABLE 5: SEX DISTRIBUTION OF PATIENTS WITH MALIGNANT TUMOURS

Sex	Frequency	Percentage	Cummulative Percentage
female	4	15.4%	15.4%
male	22	84.6%	100.0%
Total	26	100.0%	100.0%

312 TABLE 6: SEX DISTRIBUTION OF PATIENTS WITH BENIGN TUMOURS

Sex	Frequency	Percentage	Cummulative Percentage
female	4	25.0%	25.0%
male	12	75.0%	100.0%

	Total	16	100.0%	100.0%
313				
314				

315 TABLE 7A: HISTOPATHOLOGICAL TYPES

Benign 17 39.5% 39.5%	U
Malignant 26 60.5% 100.0%	
Total 43 100.0% 100.0%	

320 TABLE 7B: HISTOPATHOLOGICAL TYPES (BENIGN)

Benign	Frequency	Percentage	Cummulative Percentage
Granular cell myoblastoma	1	5.9%	5.9%
Inflammatory	1	5.9%	11.8%
Juvenile papilloma	10	58.8%	70.6%
laryngeal nodule	1	5.9%	76.5%
Squamous papilloma	4	23.5%	100.0%
Total	17	100.0%	100.0%

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322 TABLE 7C: HISTOPATHOLOGICAL TYPES (MALIGNANT)

Malignant	Frequency	Percentage	CummulativePercentage
Hybrid carcinoma	1	3.8%	3.8%
Non Hodgkins Lymphoma	1	3.8%	7.7%





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Figure 1- Photomicrograph of Juvenile papilloma showing papillary acanthotic squamous
epithelium. White arrow shows papillary acanthotic squamous epithelium. H & E X100.

Figure 2- Photomicrograph of squamous papilloma showing papillary acanthotic squamous

epithelium. White arrow shows papillary acanthotic squamous epithelium. H & E X100

Figure 3a- Photoicrograph of Inflammatory polyp showing numerous inflammatory cells
inflitrate in an edematous background. H & E X100.

Figure 3b- Photomicrograph of inflammatory cells inflitrate , thin arrow shows lymphocyte and

thick arrow shows plasma cell, in an edematous background. H & E X 400

Figure 4a- Photomicrograph of Non Hodgkin's lymphoma showing sheets of tumour cells. H &E X 100.

- Figure 4b- Photomicrograph of Non Hodgkin's lymphoma showing sheets of monomorphic
 tumour cells. H & E X 400.
- Figure 5a- Photomicrograph of keratinizing squamous cell carcinoma composed of polygonal
 and spindle tumour cells with keratin perls (arrow). H & E X 100.
- Figure 5b- keratinizing squamous cell carcinoma composed of polygonal and spindle tumour
 cells with keratin perls (arrow). H & E X 400.
- Figure 6a-Photomicrograph of Verrucous carcinoma with polypoid pattern of growth. H & EX100
- Figure 6b- Photomicrograph of Verrucous carcinoma with areas of well differentiated tongues of
 conventional squamous cell impinge on the underline stroma (arrow). H & E X 400

353 **5.0 DISCUSSION**

From the age distribution of patients on the table 1, it was observed that the age groups with the 354 highest frequency are 1 year, 30 years, 40 years, which account for 9.3% of larynx disorders. Each 355 356 of this trend is in agreement with the work of [10] who reported that the peak age range is 50-357 59years and 30-75 years [10]. The age groups with lowest frequency are 3,4,7,10,12,13,14,45,46,51,55,65,80,82 years which account for 2.3% each of larynx disorders. 358 The peak age for most head and neck cancers in the developed world is from 6th decade of life 359 [32].Cancer of the larynx occurs in increasing age with the peak incidence being in the 5th 360 decade. In this work peak is at 4th decade. Mean age 50.1 years, peak age range 35 to 70 years and 361

age range of 6 to 82years. This study has showed the involvement of lower age groups from third decade of life and one from first decade of life. The reason for this higher affectation of the younger age group in this area and in Nigeria as a whole are not clear but may be attributed to race, genetics, unknown viral infection and nutritional deficiencies in diet and poverty in addition to cigarette smoking and alcohol consumption which are already known strong etiological factors.

It was also observed from table 2 that the mean age with malignant tumour is 51 years. The peak age is 82 years while the lowest age is 6 years. It was observed that the malignant tumours are more common among the age groups of 40 years which account for 15.4% of malignant cases. The general pattern of the distribution of malignant tumours among the various age groups is haphazard, as the distribution cut across the entire age groups, from young, middle age and old age.

374 As indicated from the Table 4, larvnx disorders are more common among male gender. It was observed that male account for 81% of total larynx disorders among the patients presenting with 375 the condition in Usmanu Danfodiyo University teaching hospital Sokoto. The male to female 376 377 ratio was 5.5:1. This observation was in agreement with the work [1] who stated that, in the USA, the male to female ratio is 4:1, in Canada (Mannitoba), 6:1, and in Italy (Varesa) 378 32:1where the maximum male to female ratio has been recorded. [5] in their 15 year study of 379 cases of juvenile papilloma in University College Hospital Ibadan, reported a male to female 380 ratio of 1.9 : 1 and a mean age of 8.7 years. 381

Out of the 26 patients with laryngeal carcinoma, 4(15.4%) were females while 22(84.6%) were found to be males. Generally, laryngeal carcinoma was observed to be more common among the

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males than females. Globally the male to female sex ratio for laryngeal cancer is accepted to be
10:1 despite regional variations [2].

- From the findings, it was also observed that out of the fourty three (43) biopsies, 17(39.5%) were
- benign tumours and about 26(60.5%) are malignant tumours as shown in table 7A.
- As shown in Table 7B, of benign tumours, juvenile papilloma was observed to be most common of all histologically classified laryngeal benign tumours with the frequency of 58.8%. This was followed by the squamous cell papilloma with the frequency of 23%. Granular cell myoblastoma, inflammatory and laryngeal nodule were appeared to be less common histological types among the benign laryngeal tumours with the frequency of 5.9% each.
- Among the histologically classified malignant tumours of larynx as shown in Table 7C, squamous cell carcinoma was found out to be the most common malignant type accounting for 92.3% of total malignant tumours of larynx. The rest such as hybrid carcinoma and non Hodgkin lymphoma were rarely accounting for (0.12%) each.

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- College Hospital Ibadan, reported a male to female ratio of 1.9: 1 and a mean age of 8.7 years
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401 **6.0 CONCLUSION**

402 There were more malignant (60.5%) laryngeal tumours in Sokoto than benign (39.5%) lesions
403 with male preponderance. The prevalent age for malignant lesions was from 35 years to 70 years

which signifies a younger population. The study showed that the most common histologicaltypes were squamous cell carcinoma and juvenile papilloma.

Cancer of the larynx is a disease found more commonly in poor class people addicted to smoking 406 407 and they being poorly health conscious present late in the hospital leading to poor treatment outcome in them. The findings in this study raise concern on the burden and management 408 challenges of this cancer in our environment. Therefore it is desirable to educate the public about 409 the disease so that early diagnosis and treatment can make a lot of difference in the morbidity 410 and mortality. Early detection of the disease has a great importance in the management of the 411 412 disease. Primary prevention of larynx tumour must be addressed through the control of tobacco smoking and early detection and evaluation. 413

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415 **7.0 RECOMMENDATIONS**

- There is need to improve the socio-economic status of the populace, create awareness for
 subtle signs and symptoms and have high index of suspicion for early diagnosis and
 appropriate referral.
- 419 2. There is need for public enlightenment on the possibility of high cure rates and voice420 preservation in early laryngeal cancer.
- 421 3. Cost of oncology care should be subsidized by government while an oncology centre422 should be established in each of the six geopolitical zones in Nigeria.
- 423 4. Continuous medical education on early detection and investigation of causes of424 hoarseness will discourage late presentation.
- 425 5. Setting up of more radiotherapy centres

426 6. There is need to educate people, especially those at higher risk, about the nature of the427 disease and its presenting symptoms.

- 428 7. Recommend Health policy makers in gap analysis and development of strategic429 interventions for the control of larynx disorders in the region.
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