

# Esophageal Cancer in Sudan: Demographic and Histopathological Variations

Asma Mahir Hamad<sup>1</sup>, Mohamed Elbagir K. Ahmed<sup>2</sup>, Abdulfattah Abdelgadir<sup>3</sup>, Ikhlas B. Suliman<sup>4</sup>

<sup>1</sup>Sunderland Royal Hospital, Sunderland, UK

<sup>2</sup>College of Medicine, King Khalid University, Abha, KSA

<sup>3</sup>University of Medical Sciences & Technology, Khartoum, Sudan

<sup>4</sup>Ministry of Health, Khartoum, Sudan

Email: mohamedelbagir@live.com

**How to cite this paper:** Hamad, A.M., Ahmed, M.E.K., Abdelgadir, A. and Suliman, I.B. (2017) Esophageal Cancer in Sudan: Demographic and Histopathological Variations. *Open Journal of Gastroenterology*, 7, 124-129.

<https://doi.org/10.4236/ojgas.2017.73014>

**Received:** July 26, 2016

**Accepted:** March 28, 2017

**Published:** March 31, 2017

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## Abstract

**Background:** Sudan is experiencing a growing cancer problem. Esophageal cancer (EC) is a devastating disease with high mortality. Our objective was to study the demographic factors and histopathological pattern of EC cancer in Khartoum, Sudan. **Methods:** In a retrospective cross-sectional study, the records and histopathology reports of all patients diagnosed endoscopically as EC and who were referred to Zain center, a reference histopathology center in Khartoum Sudan, were studied over a 6-month period. Descriptive and simple statistics were used for analysis. **Results:** Out of 74 histopathologically studied patients, 66 (89.2%) had squamous cell (SCC) cancer (average age 59 y, mainly females) and 8 (10.8%) had adenocarcinoma (AC-average age 69 y). The female to male ratio is 1.5:1. In females with SCC, the tumors mainly located in the upper and middle thirds of the oesophagus. On the other hand, 6 out of the 8 patients with AC were men, with the tumors located mainly in the lower third. **Conclusions:** In Khartoum, Sudan, esophageal cancer affects females (predominantly SCC) more than males (predominantly AC). It occurs at a relatively young age, and is predominantly squamous cell in type. No specific risk factors were identified and this needs further studies.

## Keywords

Esophagus, Cancer, Histopathology, Sudan

## 1. Introduction

Esophageal cancer (EC) is the 6th most common cause of cancer death worldwide, with around 400,000 deaths in 2012 (5% of the total) [1]. Worldwide in 2012, there were 14.1 million new cancer cases, 8.2 million cancer deaths, and

32.6 million people living with cancer within 5 years of diagnosis. Moreover, 57% (8 million) of new cancer cases, 65% (5.3 million) of the cancer deaths and 48% (15.6 million) of the 5-year prevalent cancer cases occurred in the less developed regions [1].

The two predominant histological subtypes of oesophageal cancer are squamous cell carcinoma (SCC), which is more prevalent in developing countries and adenocarcinoma (AC) is more common in the developed countries [2].

These two forms of oesophageal cancer are etiologically unrelated because adenocarcinoma is primarily associated with gastric reflux and Barrett's Oesophagus [3], whereas squamous cell carcinoma is mainly associated with multiple factors such as smoking, alcohol consumption, hot tea drinking, red meat consumption, poor oral health, low intake of fresh fruit and vegetables, and low socioeconomic status [4]-[9]. The highest incidence is reported in what is so-called the "Asian oesophageal cancer belt" stretching from Eastern Turkey through North-eastern Iran, Northern Afghanistan and Southern Russia [10] [11], and to Northern China. However, Europe and North America show lower rates compared to the Asian belt [12].

In Sudan, earlier reports (1977) showed that the incidence of EC was 1.4% of all malignant tumors. The disease affected both sexes equally; and was most common at the age group of 50 - 69 [13].

In contrast, a recent study (2012) from Gezira province in central Sudan showed that 9.6% of patients referred for endoscopy proved to have esophageal cancer. Also, greater proportions of women rather than men were affected with the disease [14].

The main objective of this study was to explore the histological pattern and its relation to age and gender in Khartoum, the capital of Sudan.

## 2. Methods

This is a retrospective cross sectional study which was performed with the main aim of studying the histopathological pattern of EC and its relation to gender and age. The records and histopathology reports of all patients diagnosed endoscopically as EC and who were referred to Zein center, a reference histopathology center in Khartoum Sudan, were studied over a 6-month period. The demographic factors were recorded as well as the report of the endoscopy. The endoscopic diagnosis was made in two main endoscopy centers in Khartoum, Biopsies were then sent to the histopathology center, a reference in Khartoum that one of the authors (AA), an experienced pathologist, processed and performed the histopathology diagnosis. Descriptive and simple statistics were used for analysis using SPSS 14 packages.

## 3. Results

We studied 74 histologically proven esophageal cancer (EC) patients, out of whom there were 44 females (59.5%) and 30 males (40.5%), constituting a female to male ratio of 1.5:1

The minimum age affected was 37 years old, whereas the maximum age was 85 years with a mean age of 60 years (SD 9 years)

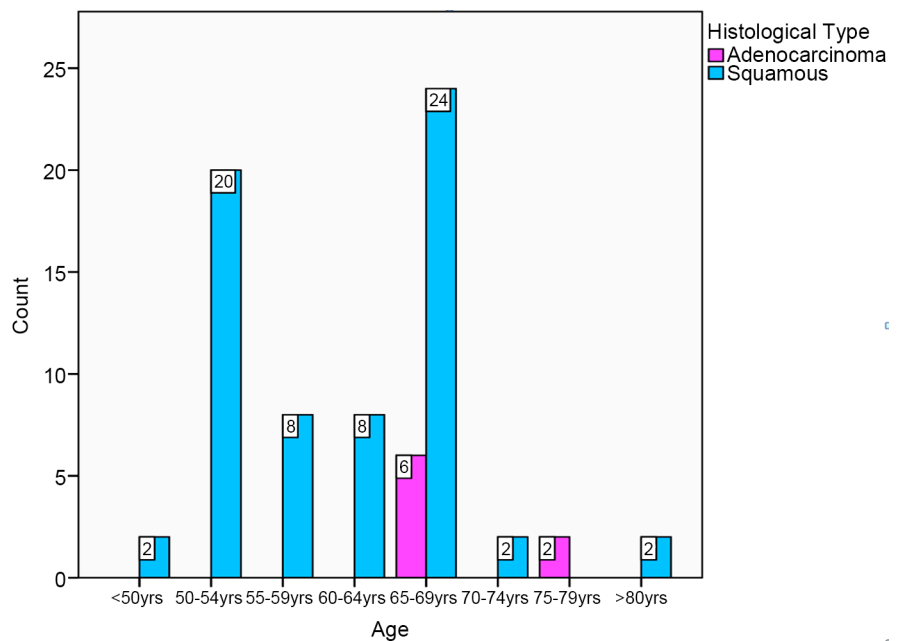
The peak of the patients with EC was in the age group 65 to 69 years, constituting 40% of all. Another peak occurred in the age group 50 to 54 years, which constituted only 27%. For patients less than 50 years and over 70 years old, the rates were much less, constituting 2.7% and 8.1% respectively (**Figure 1**).

The distribution of the site of EC was found to be equal in both the lower and middle thirds, each of which, making up 29.73%, whereas the upper third was the most frequently affected site (40.54% **Table 1**).

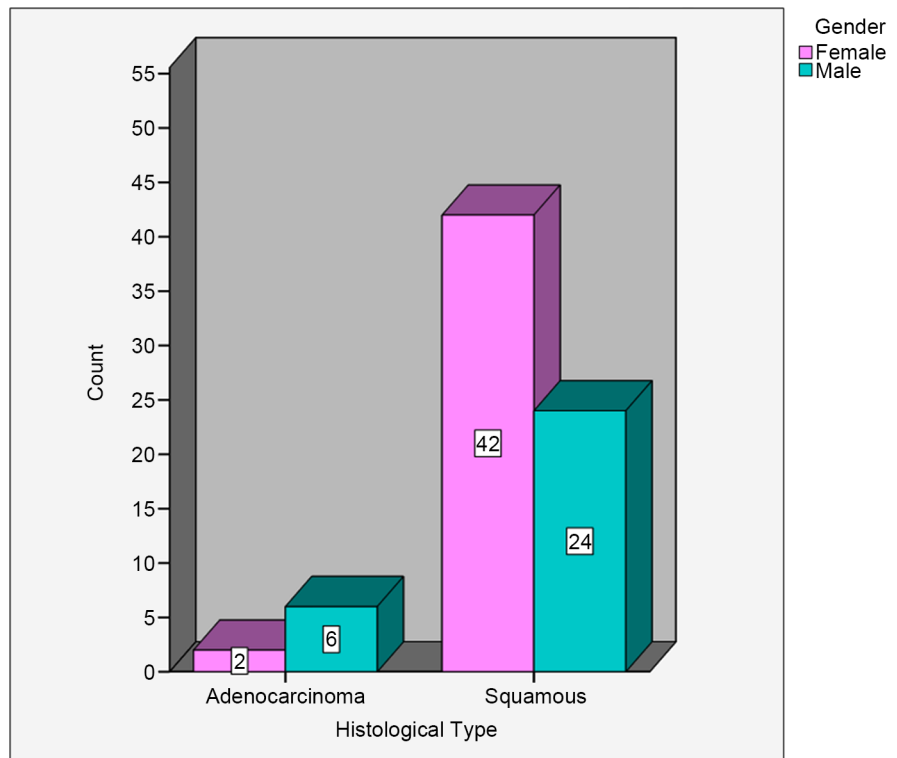
With regard to histological type, Squamous cell carcinoma (SCC) was noticeably the commonest type of EC (89.2%), compared to adenocarcinoma (AC) which amounted for 10.8%. Adenocarcinoma (AD) was found to be more frequent in males, comprising 75%, whereas it was only 25% in females. Interestingly, no documentation of Barrett’s oesophagus was reported. On the other hand, SCC, occurred predominantly in females (63.6%), compared to males (36.4%), a statistically significant difference (P value 0.036) (**Figure 2**). Moreover, SCC was evenly distributed over the different age groups with a slight peak at age group 50 - 54 years, while the AC was most frequently reported among the age group 75 - 79 years.

**Table 1.** Distribution of esophageal carcinoma in relation to the site of the tumor.

Site	Frequency	Percent (%)
Lower third	22	29.73
Middle third	22	29.73
Upper third	30	40.54
Total	74	100



**Figure 1.** Histological type by age groups.



**Figure 2.** Histological types by gender.

#### 4. Discussion

This study in Sudan has demonstrated a distinct gender and histological patterns of EC with female predominance. In contrast, studies in other countries showed that the incidence is 2 - 4 times higher in men than in women. In males, the highest incidence of esophageal cancer is observed in Southern Africa [age-standard rate (ASR): 22.3 per 100,000], Eastern Asia (ASR: 20.3 per 100,000), and Eastern Africa (ASR: 14.9 per 100,000). Similarly, these areas are also sites of the highest incidence among females [15].

Several other epidemiologic studies suggested that gender may be an intervening factor for esophageal cancer. Women with esophageal cancer tend to have a better prognosis than men. However, patients with the same clinical features and treatments may have different clinical outcomes, indicating that genetic variants may play an important role in esophageal cancer prognosis [16].

The gender variations documented in this study that women were more affected with SCC at a relatively younger age, while AC was more prevalent among elderly men, are intriguing. Early studies (1977) in Sudan found that men and women were equally affected [13], but our present findings are in agreement with the recent reports from Sudan, confirming female predominance [14]. These gender variations especially female predominance might point towards specific risk factors that prevailed overtime among Sudanese women. These may include dietary and life style changes, but obviously this matter needs further exploration. On the other hand, the most documented risk for AC is Barrett's esophagus complicating longstanding reflux oesophagitis which was shown in pre-

vious reports [17], however, no documentation of Barrett's esophagus was reported among our patients.

The higher frequency of SCC of the esophagus among Sudanese women presents a significant health problem because the development of the disease can be asymptomatic, resulting in late diagnosis and therefore a poor prognosis. The 5-year survival of the SCC is less than 10%, a statistic that has remained unchanged over the past 30 years [18].

Furthermore, the risk factor for this serious disease needs further exploration so that preventive measures can be universally implemented.

However, cancer control encompasses a package of diverse interventions aiming at reducing morbidity and mortality with wide variations in costs and potential impact. It has been shown in a recent study from the Netherland that, specifically for current smokers, vegetables and possibly also fruits intake was inversely associated with SCC and AC risk [19].

In general, there is a clear need to develop strategies that will allow early diagnosis of this disease so as to develop clear preventive and better therapeutic approaches leading to reduction in mortality especially in developing countries with limited resources.

A better understanding of the aetiology and molecular mechanisms involved in the development of oesophageal cancer may allow these critical issues to be addressed more effectively [20]. Thus, identification of crucial molecular pathways involved in esophageal adenocarcinogenesis would ultimately improve therapy and facilitate development of new treatment strategies [21].

Unfortunately, taking the variation in epidemiology of EC, especially in developing countries, serious budgetary constraints and competition with the demands of other endemic diseases, cancer control programmes need to make wise choices to maximise the efficacy of any therapeutic or preventive measures [22].

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