

FACTORS ASSOCIATED WITH ESOPHAGEAL CANCER IN SUDAN: A CASE CONTROL STUDY

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Abstract

Background: *There is a rising prevalence of esophageal cancer in Sudan with catastrophic consequences. Little is known regarding risk factors connected with esophageal cancer, in the Sudanese setting. Without knowing this vital information, preventative efforts are not feasible. The goal of this article was to highlight the risk factors linked with Oesophagus cancer in the Sudan.*

Methods: *A hospital-based case-control research of the connection between risk factors and esophageal cancer was carried out at the Radiation and Isotopes Centre Khartoum (RICK) in Khartoum state, Sudan. The study focused on the association between risk factors and esophageal cancer. This research included a total of 420 participants: 240 patients diagnosed with esophageal cancer and 240 healthy individuals serving as controls. Using logistic regression models, a comparison was made between these two groups for a variety of characteristics that increase the risk of esophageal cancer. Odds ratios along with 95% confidence intervals (CI) were generated.*

Results: *All of these factors had strong associations with esophageal cancer of the oesophagus, with odds ratios ranging from 1.272 (95% CI: 1.043-1.551), 0.758 (95% CI: 0.597 -0.963), 0.756 (95% CI: 0.636-0.897), and 1.200 (95% CI: 0.14-2.55) respectively. Additionally, hypertrophic gastropathy and gastroesophageal reflux are significantly associated with odds ratio.*

Conclusions: *It was discovered that esophageal cancer is significantly connected with a number of risk factors that are possible to be changed. Confirming these relationships requires more research, after which it will be possible to establish how to intervene on the modifiable risk factors that are present in the setting of Sudan.*

Key Words: esophageal cancer- case control study- risk factors- Sudan.

Introduction

Oesophageal cancer ranks as the seventh most prevalent form of the disease in males and as the thirteenth most common form of the disease in women. In 2018, there were more than 572,034 newly reported cases [1]. Esophageal cancer (OC) is the 8th most prevalent cause of cancer mortality globally, with roughly 508,585 fatalities in 2018 [1]. The diagnosis of oesophageal cancer often occurs at a late stage, which contributes to the low survival rates associated with this kind of cancer.

In Sudan, prior data (1977) found that the incidence of EC was 1.4% of all malignant tumours. The condition was equally prevalent in males and females of all ages, with the peak incidence occurring between the ages of 50 and 69 [2]. Recent findings (2012) from Gezira region in central Sudan found that 9.6% of patients referred for endoscopy proved to have Oesophagus cancer and bigger proportions of women rather than males were afflicted with the illness in Sudan [3].

In 2009, Sudan became home to the world's first National Population-based Cancer Registry (NCR), which was operated by the country. The NCR supplied up-to-date information on each and every kind of cancer that may be found in Sudan. According to the preliminary findings of the NCR for Khartoum State (2009–2010), the rate of oesophageal cancer was 5.8 cases per 100,000 people [4].

Esophageal cancer is not occurring by one single risk, but rather a big variety of variables such as smoking, alcohol drinking and food intake. There may be regional or national variations in the relative contributions made by each of these risk factors to esophageal cancer, as well as differences in the degrees of exposure to each component alone and in combination.

There are numerous risk variables such as age, male gender, ethnic origin, gastro esophageal reflux, poor level of fruit and vegetable intake, hiatal hernia identified in the development of esophageal adenocarcinoma (9). (9). Alcohol use, tobacco use, a history of chronic irritation, and exposure to the human papillomavirus are all contributors to the development of squamous cell carcinoma of the oesophagus (10).

A recent comprehensive meta-analysis regarding risk factors of Oesophagus cancer (OC) suggested the protective role of vegetables and BMI control in the development of esophageal adenocarcinomas; on the other hand, higher intakes of red and processed meats and alcohol is significantly associated with squamous cell carcinomas [5]. [Citation needed]

There are a limited number of studies in Sudan that focus on the variables that put people at risk for oesophageal cancer (OC). The primary purpose of this study is to investigate the variables that put people at risk for developing oesophageal cancer in Sudan. The Radiation and Isotopes Centre Khartoum (RICK), located in Khartoum, Sudan, was the source of patients for this study.

Materials and methods

Study design and setting

An examination of cases and controls carried out at the Radiation and Isotopes Centre in Khartoum (RICK). Radiotherapy, chemotherapy, and hormone therapy are the primary forms

of treatment offered at Rick, which is the primary cancer treatment centre in the Sudan. The recommendations come to the centre, which is situated in Khartoum, the capital of Sudan; however the centre serves the whole nation.

Study participants and sampling procedures

Using a case control methodology, the purpose of this research was to evaluate the variables that have been linked to an increased risk of esophageal cancer in Sudan. Adult patients at the RICK centre who had been clinically diagnosed with oesophageal cancer were included in the study. Patients had to be at least 18 years old to be included. Between January 2018 and December 2018, forty patients diagnosed with esophageal cancer were selected from the Ricks database, while forty healthy persons served as the control group. Patients were recruited in the study between the months of January and December 2018. Participants in the control group were chosen from the same catchment regions as the study's patients and were required to have no previous history of cancer or esophageal disorders.

Data Collection and Study Instrument:

In order to gather the data on cancer risk factors, a questionnaire was developed and employed. The instrument contained comprehensive demographic information, a person's behaviours and medical history, as well as a family history of cancer. For each case and control, a questionnaire was filled out that asked about a variety of information, including personal characteristics, any history of cancer in the family, any history of disease in the past, any particular addiction to drugs or cigarettes, stale food, and existing dietary habits of the patients prior to the commencement of clinical symptoms. The use of canned food, spicy food, a family history of cancer, hypertrophic gastropathy, gastroesophageal reflux, burned food, smoking, shisha, snuff, consuming alcohol, and the time period for each of these factors, Source of drinking water, drinking very hot liquids, physical activities, herbs used for treatment, chemical environment, and the use of plastic for hot liquid food were all risk factors.

Statistical Analysis

Both the statistical package for social sciences (SPSS version 20) and the LogXact 8 software packages were used throughout the process of carrying out statistical analyses. Data analysis includes descriptive statistics as well as certain methods of inferential statistics. A straightforward tabulation, as well as frequencies and cross-tabulations, were included in the descriptive statistics. The chi-square test was utilised to examine changes in proportion while the logistic regression models were applied to estimate risk/protective of each item for oesophageal cancer. The odds ratios (ORs), and their 95% confidence intervals (CIs) were utilised as measures of strength of the connection between the oesophageal cancer and the predictors. The threshold of statistical significance was determined to have been reached when the p-value was lower than 0.05.

Study Ethics

It was made clear to the participants that they might quit participating in the research at any moment without penalty, that their personal information would be kept confidential, and that any data gathered would be used only for scientific research. After the goal of the research was explained to all of the participants, a signed informed permission was then acquired from each individual participant. Additionally, prior to the collecting of data, approval was received from the director of RICK. In conclusion, the Institutional Review Board of the Ministry of Health

in Khartoum State and the government of Khartoum State both gave their permission for this research to comply with ethical standards.

Results

The patients had an average age of 59.2 years, whereas the controls had an average age of 58.3 years. Males made up 59.1% of the case population whereas only 46% of the control population did so. The table presents an overview of the essential features (1).

Peasants accounted for over half of the cases, and nearly half of the patients, as well as nearly half of the controls, had a history of esophageal cancer in their families. The fundamental features of the cases and controls did not substantially vary from one another. There was a correlation between esophageal cancer and age (41-59 years old) and a history of esophageal cancer in the family (p-value 0.05).

The findings establish the relationship between esophageal cancer and Spicy food, Banned food, consuming extremely hot liquids, and Herbs used for therapy, and the p-value for this association is less than 0.05. In table (2), both smoking and drinking alcohol are demonstrated to have an effect size (EC) that is not statistically significant, as shown by a p-value that is more than 0.05. The odds ratios (ORs) for those who smoked cigarettes and drank alcohol were 0.172 (95% confidence interval [CI], 0.013-2.286) and 1.755 (95% confidence interval [CI], 0.435 7-.076), respectively. The other covariates (as Tobacco), such as Snuff and Shisha, the odds ratios were 0.734 (95% CI, 0.338-1.594) and 0.245 (95% CI, 0.039-1.523), respectively. Both of these figures fall into the tobacco category.

Hypertrophic gastropathy and gastroesophageal reflux are significantly associated with OR 0.249 (95%CI, 0.085-0.732) and OR 17.317 (95%CI, 6.205-48.330) respectively. The percentage of Hypertrophic gastropathy in case and control (58%, 2%) respectively and associated with esophageal cancer (p-value 0.05).

Discussion

Even though the true scope of the cancer problem in Sudan is unknown, the number of cases that have been documented there has climbed from 303 in 1967 to 8228 in 2017. In 1977, researchers in the Sudan looked into esophageal cancer and discovered that it impacted both men and women equally [3]. However, our research revealed that males are more likely to be afflicted by the disease than women are.

This disorder may occur in certain persons who have chronic gastroesophageal reflux disease, often known as GERD, or inflammation of the oesophagus, which is known as esophagitis. Barrett's oesophagus is a term that refers to this problem (6). In addition, it was shown to have a sensitivity that was much higher than that of radiography in the detection of Barrett's oesophagus (p 0.001), (7).

Pesticide usage in agriculture field as risk factor of esophageal cancer in Sudan in this study it take OR 0.5720 (95%CI, 0.462-0.708), the role of pesticide usage in the aetiology of gastrointestinal tract cancers such as esophageal and gastric cancer is researched most frequently by population-based case control studies. There is inconsistency in the findings of these research. In some of the investigations, the correlation was able to be established, but in others, it was not. (8). In the case-control research that Meyer et al. (2011) carried out on

Brazilian agricultural labourers, they found that employees who were exposed to high levels of pesticide had an increased chance of dying from esophageal cancer (13). Around 50 case-control studies and 2 cohort studies have investigated the association of drinking hot tea (green, black, and other types), coffee, maté, and other hot foods and drinks with EC, (11) in our study this variable (Drinking very hot liquids) OR 0.756 (95%CI, 0.636-0.897), and the percentage in case and control are 79%,55% respectively, and its association with EC was found to be statistically significant.

The role that alcohol plays in the development of esophageal cancer varies greatly from one region and country to the next. Because consuming alcohol is not very frequent in Linxian, researchers were able to determine whether or not it had a role in the development of esophageal cancer (6). Alcohol consumption plays a relatively minor role for the risk of esophageal cancer, with an odds ratio of 1.755 (95% confidence interval: 0.435-7.076), but the other factors in table 3 are not associated with oesophagus cancer, according to our study. The p-value for this association is greater than 0.05.

Chemical environment is a risk factor of esophageal cancer, which exposes you to high levels of heavy metals, rubber,, asbestos, and dealing with chemicals on a daily basis. The results of table (3) show that the percentage of people who work in unhealthy or risky environments is (31.0%,8.1%) respectively in the case and control groups. According to the findings of the research, working in a high-risk workplace had an OR of 6.417 (95% CI: 2.598-15.849)

In table 3, it is shown that the percentage of case patients and control patients who have ever used herbs for medical purposes is 80% and 71%, respectively, with an odds ratio of 1.436 (95% confidence interval: 0.971-2.124). According to the findings of the research, those who use herbs as a therapy were related with a higher risk of developing esophageal cancer (p-value 0.05).

Several research (14, 15) have shown that there is an inverse connection between physical activity and the incidence of esophageal cancer; nevertheless, the findings have been inconsistent (16, 17). The risk of esophageal cancer has not been addressed in any of the several systematic studies that have been conducted on the topic of physical exercise and cancer prevention (18, 19). In this study, the odds ratio for physical activity was 0.728 (95% confidence interval: 0.49-1.084), and the percentages of people who had esophageal cancer in the case group and the control group were 71% and 70%, respectively. The researchers found no correlation between physical activity and the risk of esophageal cancer.

Conclusion

Declarations

Acknowledgments:

The authors are grateful to everybody who took part in the research for their time. The authors would like to express their gratitude to the Radiation and Isotopes Centre Khartoum (RICK) for their general support in the performance of this research. Additionally, we would like to express our appreciation to the patients for their cooperation and for providing the data.

Funding

This research received no external funding.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Table 1: Characteristics of cases and controls for (Age, Sex, and Family history of esophageal cancer)

	Cases N (%)	Controls N (%)	p-value
Age (years)			< 0.05
<=40	75(35.71%)	142 (67.6%)	
41 – 59	74(35.2%)	50(23.8%)	
>=60	61(29%)	18(8.57%)	
Gender			> 0.05
Male	109(51.9%)	97(46%)	
Female	101(48.1%)	113(53.8%)	
Family history of Esophageal cancer			< 0.05
Yes	107(51%)	200(95.2%)	
NO	103(49%)	10(4.7%)	
Total	210 (100%)	210 (100%)	

Table (2) Association between Habitual Food Consumption, Tobacco use and Esophageal Cancer

Variables	Cases	Contr ol	<i>p</i> - value	<i>OR</i>	95 % C.I. <i>OR</i>	
	N (%)	N (%)			Lo wer	Up per
Canned food	94 (45%)	108(51%)	0.081	20.7	19.04	22.34
Spicy food	145(73%)	168(80%)	0.017	1.272	1.043	1.551
Burned food	96 (46%)	68 (32%)	0.023	0.758	0.597	0.963
Plastic for hot liquid food	142(68%)	130(62%)	0.672	0.940	0.706	1.252
Drinking very hot liquids	166(79%)	116(55%)	0.001	0.756	0.636	0.897
Smoker	51 (24%)	43 (20%)	0.182	0.172	0.013	2.286
Alcohol users	23(11%)	19 (9%)	0.429	1.755	0.435	7.076
Shaisha use	14 (6%)	20 (10%)	0.131	0.245	0.039	1.523
Snuff use	40(19%)	30 (14%)	0.435	0.734	0.338	1.594

Table 3: Other related risk factors for Esophageal Cancer

Variables	Case	Control	<i>p</i> -value	<i>OR</i>	95. % C.I. <i>OR</i>	
	N (%)	N (%)			Lower	Upper
Hypertrophic gastropathy	122(58%)	5 (2%)	0.002	0.249	0.085	0.732
Gastroesophageal reflux	125(60%)	2(0.95%)	0.000	17.317	6.205	48.330
Chemicals environment	65 (31%)	17 (8 %)	0.090	6.417	2.598	15.849
Herbs used for treatment	169(80%)	150(71%)	0.050	1.436	0.971	2.124
Pesticide	112(53%)	25(12%)	0.103	0.572	0.462	0.708
Physical activity	150(71%)	147(70)	0.118	0.728	0.490	1.084