



## Punjab and Esophageal Cancer- The Possible Causes

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Date of Submission: 25-12-2023

Date of Acceptance: 05-01-2024

### ABSTRACT-

**BACKGROUND-**Cancer in Punjab has been a news item in the recent

past. Malwa is a region of Punjab south to river Sutlej with increasing incidence of Esophageal cancer. Definite cause is still unknown.

**MATERIALS AND METHODS-** Forty histologically proven Esophageal cancer patients were studied. Possible causes from history were enumerated and data was described in form of numerals.

**RESULTS-** Esophageal Cancer in Malwa area of Punjab mostly occurs in age group of 51-60 years with major Histology of Squamous cell carcinoma more in Females as compared to males. Possible etiologies include Passive smoking and Chullha use in females. Smoking, alcohol and pesticide exposure in males form Major risk factors. Spicy diet and GERD are major common risk factors irrespective of sex.

**CONCLUSION-** There are variety of causes and not a single cause for esophageal cancer in Malwa region of Punjab. Water pollution sampling can further help in study of the same.

### I. INTRODUCTION-

Esophageal cancer is the seventh most common malignancy and sixth most common cause of cancer related deaths worldwide. According to GLOBOCAN 2020 data, an estimated 604,100 new esophageal cases with an incidence of 3.1% and 544,076 deaths occurred in 2020. The 5 year prevalence rate is 8.55 per 1 lac persons[1].

According to cancer statistics India, 2020 report from National cancer registry programme, 52,826 new cases were reported[2].

According to Punjab cancer atlas Cancer incidence in Punjab (AAR: Age Adjusted Rates of Cancer Incidence / 100,000 Population) is 2.1 to 6.6 for males and 3.2 to 8.9 for females [3].

Malwa is a region of Punjab **south to river Sutlej**. The Malwa area makes up majority of the Punjab region consisting 11 districts. Cities such as Ludhiana, Rupnagar, Patiala, Sangrur, Bathinda, Mansa, Firozpur, Fazilka, Rajpura, Moga and Ajitgarh are located in the Malwa region. Malwa is also famous for cotton farming.

FIGURE 1 Shows distribution of Malwa, Majha and Doaba regions of Punjab according to rivers separating them.

Cancer in Punjab has been a news item in the recent past. It was thought that cases in Punjab exceeded the national average and felt that "Punjab the country's food bowl was in throes of cancer"[4].

Esophageal cancer ranks 2<sup>nd</sup> in males after lung cancer in Punjab and 4<sup>th</sup> among females after Breast, Cervix and Ovary According to Punjab Cancer Statistics [3]

Esophageal Cancer is in increasing trend in Punjab. Both print and electronic media have created an impression that Punjab, especially the cotton belt of Malwa Region, has become a high incidence cancer region. Actually the increased number of cancer patients might be at least partly because of



increasing population and heightened health awareness and reporting [4,5].

**Predisposing conditions:** Gastro-esophageal acid reflux disease (GERD), acid reflux is one of the main risk factors for esophageal cancer, increasing its risk by 5- folds. Obesity there is strong evidence for a casual association between obesity and higher risk of EA(esophageal atresia). Hiatus hernia increases EA risk by 2-6-fold, most likely by increasing gastroesophageal acid reflux. Achalasia increases risk of both EA(esophageal atresia) and ESCC(esophageal squamous cell carcinoma) by 10-fold. Cigarette smoking is significant causal factor in development of esophageal cancer. The risk increases with the amount smoked. Tobacco use is more strongly associated with ESCC (3-7-fold increased risk) than EA (2-fold increased risk. Excessive alcohol use (>3 drinks/day) is a strong risk factor for ESCC(esophageal squamous cell carcinoma),increasing risk by 3-5- fold. There is little evidence for an association between alcohol use and EA(esophageal atresia) risk. Various chemicals associated with esophageal cancer like Polycyclic aromatic hydrocarbons (PAHs); intake of processed meat, which contains large amounts of N-nitroso compounds (NNCs); Acetaldehyde is the common denominator linking alcohol consumption, poor oral health, and gastric atrophy to esophageal cancer[13].

## II. MATERIALS AND METHODS-

The study was started after approval by ethical committee of the institute. The total of 40 patients from Malwa region of Punjab were assessed in this study over a time-period extending from March 2022 to August 2023.

**INCLUSION CRITERIA-**The study included Histologically proven esophageal cancer of Stage I to III and Performance Scale ( $\leq 3$ ).

**EXCLUSION CRITERIA-** The study excluded patients with Synchronous malignancy. A written and informed consent was taken from the patients .

Complete history and Examination was done to rule out every possible aspect which could be identified as the probable etiology of the disease.UGIE and biopsy was used as an evidence of esophageal cancer. Radiological investigations CECT Chest Abdomen was done to define disease extent.

## III. RESULTS-

Data is described in terms of range; frequencies (number of cases) and relative frequencies as appropriate. Results are given in numerical values according to various components of study. The variables taken are Age, sex, area ,occupation, smoking , alcohol, family history , nutritional and performance status , hot beverages and spicy diet intake as well as socioeconomic status according to modified kuppusswami scale . Gastritis history, use of Chullha at home ,hot beverages , industrial pollution or smoke areas nearby were also used as variables.

We observed that Esophageal Cancer in Malwa area of punjab mostly occurs in age group of 51-60 years with major Histology of Squamous cell carcinoma more in Females as compared to males. Possible etiologies include Passive smoking and Chullha us in femlaes .Smoking , alcohol and pesticide exposure in males form Major risk factors.Spicy diet and GERD are major common risk factors irrespective of sex.

TABLE 1- DISTRIBUTION OF PATIENTS ACCORDING TO VARIOUS VARIABLES CONSIDERED IN THE STUDY

VARIABLE	SERIES	NO. OF PATIENTS
AGE GROUP	< 50 YEARS	6
	51-60 YEARS	21
	> 60 YEARS	13
SEX	F	24
	M	16



AREA	RURAL	32
	URBAN	8
OCCUPATION	POULTRY	3
	BUSINESSMAN	2
	FARMER	10
	HOUSEWIFE	20
	LABOURER	4
	MASON	2
	TEACHER	2
SOCIOECONOMIC STATUS( MODIFIED KUPPUSWAMY SCALE)	LOWER MIDDLE	16
	UPPER LOWER	17
	UPPER MIDDLE	7
ECOGPS	1	18
	2	22
FAMILY HISTORY	POSITIVE FAMILY HISTORY OTHER THAN CANCER	2
	NEGATIVE HISTORY	38
SMOKING	YES	24
	NO	16
ALCOHOL	> 180	1
	90-180	4
	< 90	6
	NO INTAKE	29
HIGH SALT INTAKE AND SPICY DIET	YES	33
	NO	7



HOT BEVERAGES	INTAKE PRESENT	20
	NOT PRESENT	20
AREAS OF SMOKE NEARBY RESIDENCE OR USE OF CHULLHA GASTRITIS	PRESENT	31
	ABSENT	9
	PRESENT	29
	ABSENT	11

#### IV. DISCUSSION -

In the present study most of the patients were in the age group of 51-60yrs. The median age of presentation was 59 years comparable to the study done by Haefner et al. where median age was 62 years[6].

In the present study 24 out of 40 patients were females and rest were males. This was consistent with the SEER database which suggests that male to female ratio of esophageal cancer starts decreasing after the age group of 50-54. The hypothesis is that the endocrine milieu in pre- and peri-menopausal females serves as a protective factor against esophageal carcinoma, and with loss of estrogen or due to the increasing time period away from estrogen exposure, the rate of esophageal carcinoma incidence increases in the post-menopausal female more than 50 years [7].

In the present study, 17 out of 40 patients had growth of more than 7 cm on CECT chest. It was observed in a study that tumor length forms an important prognostic index in esophageal cancer[16].

In the present study, 33 out of 40 had squamous cell carcinoma.

In the present study, 21 out of 40 patients had mid and lower thoracic esophageal carcinoma. Zhang et al. Studied incidence of esophageal carcinoma and found that predominant site for squamous cell carcinoma of esophagus was middle third[16].

In the present study majority of the patients (32 out of 40) were from rural area and agricultural background. A study done in Brazilian farmers who suffered from esophageal carcinoma suggested that pesticide exposure forms a risk factor related to their occupation [8].

In the present study majority of the patients (17 out of 40) were from lower class. A study done at Shandong University, China suggested that patients of low socio economic

status develop esophageal cancer more than the higher socioeconomic status group due to significant health care delay and treatment [9].

In the present study, the performance status of majority of patients was ECOG PS2. A study done by Song et al. at Hangzhou Medical College, China suggested that body mass index, performance score pre treatment play an important role in response to chemoradiotherapy[10].

In the present study majority of the patients (29 out of 40) had prior exposure to CXR as well as CECT less than 4 times in an year, but none of them was therapeutically irradiated previously for any thoracic cancer. A study on radiation induced malignancies suggested that each Gray (Gy) of irradiation increases the solid cancer rate by approximately 58% in females versus 35% in males [11,12].

In the present study, 16 out of 40 patients had history of smoking, 8 patients in each arm). Tobacco, consumed in any form, causes damage to the DNA in the esophageal lining cells, impairs the healing of damaged DNA and also weakens the gastroesophageal sphincter, the muscular valve that keeps acidic fluids in the stomach and protects the esophagus. Damage to this valve can lead to heartburn or gastroesophageal reflux disease (GERD), another risk factor for esophageal cancer. In the smoking intensity analysis, smoking was associated with poor survival in esophageal squamous-cell carcinoma [13].

In the present study, 11 out of 40 patients had history of chronic alcohol intake. Alcohol is a proven risk factor of esophageal cancer [14]. This is because alcohol partially converts to acetaldehyde during metabolism which can cause irreversible damage to DNA and these changes may lead to cancer.

In the present study, 33 out of 40 patients had history of spicy diet intake, 20 out of 40



patients had history of hot beverages intake and 13 out of 40 had history of gastritis. The findings are consistent with epidemiological studies which observed that spicy diet and hot beverages leads to gastroesophageal reflux disease and therefore forms a major risk factor for esophageal carcinoma [14].

In the present study, 19 out of 40 patients used chullha at home and 12 out of 40 had smoke area near residence. A prospective study of Chinese individuals showed that long-term exposure to fine particulate matter (PM<sub>2.5</sub>) increased the risk of oesophageal cancer [15].

### V. CONCLUSION-

There are variety of causes and not a single cause for esophageal cancer in malwa region of punjab.

We conclude that Esophageal Cancer in Malwa area of punjab mostly occurs in age group of 51-60 years with major Histology of Squamous cell carcinoma in middle one-third region of esophagus more in Females as compared to males. Possible etiologies include Passive smoking and Chullha use in females. Smoking, alcohol and pesticide exposure in males form Major risk factors.

The main shortcoming of our study is small sample size and also drinking water samples from malwa region can be studied for pollution which can establish rooted cause of Esophageal cancer in this region.

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FIGURE 1- Shows distribution of malwa , majha and doaba regions of punjab according to rivers separating them.