

ORIGINAL ARTICLE

ESOPHAGEAL CANCER AND TYPE OF FOOD AND BEVERAGE CONSUMPTION

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Abstract

Objective-The high prevalence of esophageal cancer (EC) in northern Iran, along with its unknown etiology, continues to be a major public health problem. Ecological and case-control studies have discussed the probable role of dietary factors in this disease. The aim of this study was to determine the relationship between EC and the type and characteristics of consumed food and beverages at the time of the study as well as in the past.

Methods-A total of 99 cases and 192 controls were enrolled in this study. Clinicians and pathologists referred the patients to the Babol Research Base, which is under the supervision of the Institute of Public Health Research of Tehran University of Medical Sciences. For each patient two controls were selected from their neighbors. Data were collected by means of a structured questionnaire concerning dietary habits.

Results-There were no significant differences between the case and control groups in respect to the age, sex and ethnic origin. The case group showed significant differences in family history of cancer other than EC, history of gastroesophageal reflux, habit of rapid drinking of hot tea, and eating of hot foods. These factors were found to be related to the presence of EC, whereas eating cheese, vegetables, fresh fruits, black pepper and turmeric were found to be protective factors.

Conclusion-This study showed some differences in the diet content and habits of patients suffering from EC in comparison to normal controls. Further elaborate studies are required to reveal the true pattern of dietary divergence in these patients. Besides, the authors are aware that recall bias might have distorted some of the results. More objective measures for assessment of diets are recommended.

Keywords • Esophageal cancer • diet • dietary habits

Introduction

The geographical distribution of esophageal cancer (EC) which lies on a line extending from China to Iran, along with the unknown etiology of this disease, has become an international health problem. Western studies indicate the effect of cigarette smoking and alcohol consumption in the development of this disease,^{1,2} whereas studies conducted in countries lying on this line have failed to determine any specific etiological factor. Dietary factors, including the

consumption of hot tea, left-over food and lack of vegetables or dairy products in the diet have been considered as etiological factors in EC.³⁻⁷ Regarding a similar study that had been conducted in the Caspian littoral of Iran around 20 years ago⁸, we sought to investigate the relation between dietary factors and EC through a case-control study.

Materials and Methods

All patients attending the Babol Research Base, whose disease had been diagnosed by a clinician and confirmed by pathological from September 1998 to September 1999 were recruited this for

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Table 1. Distribution of case and control groups according to their ethnic origin.

Ethnic origin	Case (%)	Control (%)	Total
Turkman	16 (16.2)	36 (18.8)	52 (17.8)
Azari	4 (4)	7 (3.7)	11 (3.7)
Fars	19 (19.2)	34 (17.8)	53 (18.2)
Mazandarani	55 (55.6)	107 (56)	162 (55.6)
Miscellaneous	5 (5)	7 (3.7)	12 (4.1)
Total	99	192	291

study. For each patient, two controls with a similar age (within a range of +/- 5 years) were selected from the patient's neighbors. All subjects were inquired about variables such as history of EC in first-degree family members, cigarette smoking and esophageal reflux. The type of bread and amount of dairy products consumed daily as well as the amount of dried whey, red meat, fowl meat, fish, fresh vegetables, pickles, canned food, citrus fruit, fresh fruits, various edible oils, food additives and left-over foods were also investigated. The subjects were also questioned about how tea and cooked foods were consumed (hot/cold). Data were obtained about the dietary habit of the cases prior to the development of signs of the disease and current dietary habits in the controls.

The patients were visited and interviewed in their residence. In case the patient was unable to participate in the interview or was unable to recall his past dietary status, the opinions of key informants living with the patient were obtained.

Statistical data analysis

Descriptive results are expressed as mean and number (percent), and the correlation between factors and EC is expressed in the form of odds ratio and 95% confidence interval. Since the controls were selected from the patient's neighbors, data were analyzed by the Mantel Hanzel method. The conditional logistic regression model was used to eliminate the effect of confounding factors. Data were analyzed by the SPSS 9.01 software system.

Results

A total of 99 patients and 192 controls were enrolled into this study. The mean age in the case and control groups was 65.0 years (± 10.85) and 64.2 years (± 10.18), respectively. Men constituted 47.5% of the case and 55.1% of the control groups. Ethnic origins of the case and control groups are summarized in Table 1.

No significant relationship was detected between cases and controls in regard to family history of EC and history of cigarette smoking. This relationship was however, significant in case of non-esophageal cancer [odds ratio: 4 (CI_{95%} =1.65-9.72)] (Table 2).

History of esophageal reflux was found to be significantly more frequent in the cases as compared to the controls [odds ratio 5.96 (CI=2.91-12.20)].

A significant difference did not exist between the case and control groups in regard to the consumption of milk, butter, dried whey, red meat, fowl meat, fish, animal fat, saturated vegetable oils, polyunsaturated vegetable oils, dried meat, salted fish, canned food, pickles and citrus fruit. Table 3 shows the odds ratio and 95% confidence interval, calculated by the Mantel Hanzel method, for the dietary regimen and method of food intake which show a statistically significant difference between cases and controls.

In addition to the above-mentioned factors, the odds ratio was above two in subjects who consumed large amounts of red meat, dry meat,

Table 2. Family history of esophageal and non-esophageal cancer in case and control groups. Note the history of smoking does not differ significantly in the two groups.

Type of history	Case (%) [n=99]	Control (%) [n=192]	P value
Family history of esophageal cancer	23 (23.2)	36 (18.7)	0.3
Family history of non-esophageal cancer	22 (22.2)	14 (7.3)	0.001
History of smoking	27 (27.3)	37 (19.3)	0.12

Table 3. Odds ratio (with confidence interval 95%) for the effect of drinking and eating style and type of bread on esophageal cancer.

Exposure	Ratio	Odds ratio (CI 95%) at the time of study
Type of bread	Home made/bakery	---
Method of drinking tea	Fast and hot/slow and warm	17.00 (7.32-39.51)
Method of having food	Fast and hot/slow and warm	12.00 (5.25-27.44)

salted fish and canned food but the relationship was considered to be statistically insignificant.

As shown in Table 4 consumption of the listed products for more than a few times a week, offers protection toward EC.

Discussion

The most important factors involved in EC is the habit by which tea and foods are consumed. In most studies, the rapid ingestion of hot food and tea has been shown to be risk factor.⁹ Previous studies show that drinking hot coffee or other types of hot drinks is associated with esophagitis, (which is probably a pre-neoplastic condition). Although this association has been criticized by the inability to discriminate the role of the constituents of the drinks from their thermal effects and the problem in recalling the past dietary habits, multiple replication of the finding has granted credibility to the claim.

Inadequate intake of dairy products has been also regarded as a risk factor for EC in many studies. In the study conducted by Cook, et al⁸, cheese was found to prevent EC when ingested more than once a week compared to less frequent intake.

Fresh fruits have also been found to prevent EC. In the study conducted by Cook and his colleagues⁸, the intake of fruit more often than once a week, has been regarded as a protective factor against EC.

In this study, consumption of fresh vegetables (Table 4), pepper and turmeric have been considered to prevent EC. This might be due to the abundance of vitamins and micronutrients in these ingredients.

Although the study reveals significant impact of some dietary habits and content of foods consumed daily by EC patients, some important shortcomings should be considered. One of the most important shortcomings was the fact that both the interviewer and the interviewee were aware of the disease. Thus, measurement bias and the public opinion that hot tea is considered a risk factor in EC, might have distorted the results. The relative risk, which is derived in this study, is probably overestimated, although the actual effect of hot tea cannot rule out.

The problem of recall bias tends to occur whenever case-control studies are used, especially when past dietary status is assessed. Afflicted individuals might have recalled the habits differently in comparison to controls.

It is speculated that the food consumed is similar in neighborhoods. Thus, the observed differences are related to the individual's dietary habit rather than a specific habit prevailing in the region or availability of foods.

In general, due to the difficulty in remembering the dietary habit in the past and due to the changes in the dietary habit over time, case-control studies are considered to be unsuitable methods for determining the role of dietary regimen in cancer

Table 4. Odds ratio (with confidence interval 95%) for the effect of food on esophageal cancer.

Exposure	Ratio	Odds ratio (CI 95%) at the time of study
Yogurt	Several time a week/once a week	0.49 (0.25-0.96)
Cheese	Several time a week/once a week	0.16 (0.06-0.42)
Raw vegetable	Several time a week/once a week	0.30 (0.13-0.72)
Fresh fruits	Several time a week/once a week	0.16 (0.06-0.41)
Turmeric	Usually in foods/seldom or never	0.34 (0.15-0.76)
Pepper	Usually in foods/seldom or never	0.22 (0.09-0.51)

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studies especially EC. But regarding the limited ability of other studies in determining the role of various factors in different cancers, case-control studies continue to be used.

Regarding the above-mentioned information, it appears that the dietary habits affecting EC have not changed in the North of Iran since 1978. Further studies should take more in-depth look at the exact chemical constituents of the diet along with possible role of infestation with various fungi as confounding factors.

Acknowledgment

We would like to sincerely thank the staff of the Babol Research Base, Babol, Iran, for assistance in data gathering.

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