

The association between diet and esophageal cancer in Afghanistan: A case control study

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Abstract

Esophageal cancer is one of the most common cancers worldwide(1). Esophageal cancer in men are 3 to 4 times more likely than women in developed countries(2). Esophageal cancer is the eighth most common cancer in the world and the sixth leading cause of death from cancer in the world(3, 4). According to WHO estimates, there are around 19,450 new cancer cases from 38 million populations in Afghanistan, Esophageal cancer is the fourth most common cancer among Afghan men and the fifth most common cancer among Afghan women in 2018(5, 6). A study in Afghanistan showed that the high incidence of esophageal cancer in the Uzbek and Turkmen ethnic group(7). Several studies have been conducted on the economic burden of esophageal cancer, for instance, a study reported that the costs estimate \$50620(95%CI: \$47677 - \$53562) for esophageal cancer beyond 1 year after diagnosis(8).

Risk factor of esophageal cancer include genetic(9), sex(10), tobacco(11), alcohol(12), obesity(13), Human papillomavirus (HPV) (14), chemical exposure(15), race/ethnicity and Dietary intake have long been associated with the risk of esophageal cancer(16, 17). For instance, a case-control study in Uruguay, which includes 261 cases and 522 controls, showed that eating daily barbecue meat increases the risk of esophageal cancer(18). Another case control study showed that high intake of hot foods, fried and barbecued meats increased the risk of esophageal cancer(19). case-control studies showed that consumed less fresh fruits and raw vegetables increased the risk of esophageal cancer(20, 21). Moreover, a case control study in South America showed that consumed hot beverage increases the risk of esophageal cancer and high intake of fruits and vegetables decreased risk of esophageal cancer(22). Several studies showed that drinking the high temperature of tea and coffee increases the risk of esophageal cancer(23, 24). Further case-control studies found that salted meat increases the risk of esophageal cancer(25, 26). According a study in Uruguay showed that consumed red meat, stewed meat and salted meat were related with moderate to strong effects on the risk esophageal cancer(27). On the other hand, case control studies showed that high intake of white meat, poultry and fish presented moderate inverse associations with esophageal cancer(27, 28). Some studies showed that high intake of lean meat, fruits and raw vegetables decreased the risk of esophageal cancer (29-33).

Given these findings, it seems that the intake of fruits, vegetables, lean meat decreased the risk of esophageal cancer. No previous study has examined the association between diet and esophageal

cancer in Afghanistan. In the current study, we aimed to examine the association between diet and risk of esophageal cancer among Afghan adults.

The case control study conducted (maximum one month elapsed since the detection) in Jamhuriat hospital, Kabul, Afghanistan in the period of Jan-Nov 2018, which is only cancer center in the country. Cases were 82 patients with esophageal cancer and 164 controls. We considered the odds ratio of 2.5. We assumed type I error of 5%, study power of 80% ($\beta=0.20$) and the ratio of cases to controls as 1. Cases were selected from patients who have histologically diagnosed as esophageal cancer who have been registered in the cancer word of Jamhuriat hospital. Controls were selected from the patients who are admitted in other wards of Jamhuriat hospital. The cases and controls are aged between 20 and 75 years and matched in terms of age \pm 5year and sex. All cases and controls provide written informed consent. The inclusion and exclusion criteria were the followings, which the inclusion criteria are to have histological diagnosis of esophageal squamous cell carcinoma in case criteria and to be in sufficiently good physical and mental health to give reliable answers to the questionnaire in case and control criteria. Those with a history of chemotherapy or radiotherapy (due to cancer) were not included in the study.

Assessment of variables

A pretested questionnaire was used which the questionnaire included information on socio-demographical factors, about age, sex, physical activity, residence (urban and rural), smoking (less than 3 cigarettes a day, 3-5 cigarettes a day, 6-9 cigarettes a day, ≥ 10 cigarettes a day and family history of cancer, drink tea, fried foods, outdoor foods, salt intake. Meal temperature, spicy food consumption and drink tea. Short form of International Physical Activity Questionnaire (IPAQ) was used for measuring physical activity of participants. Weight and height were measured to the nearest 0.1 kg using a digital scale and tape measure with minimal clothes without shoes and standing position. Body mass index (BMI) was calculated as weight (kg) divided by height squared (m²).

Data Collection

All participants were interviewed face to face by trained female investigators using structured questionnaires. Monthly, weekly or daily frequencies of consumption of fresh fruits, vegetables, tea, peppers, meat (Red and Processed) were collected with open-end questions. Frequency of consumption was divided into four

categories, which is never, 1time or more per month, 1time or more per week, 1time or more per day. Each interview usually took about 40 or 50 minutes.

Sampling

Controls meeting our inclusion criteria were selected from the hospital population. We calculated required sample size(34). Eligible subjects including 82 cases and 164 controls were recruited. Written informed consent was obtained from all subjects.

Statistical analysis

Differences in general characteristics and diet between cases and controls were examined by the t test and chi-square test. The Binary Logistic Regression used to examine the association between food consumption and esophagus cancer. A p-value of <0.05 was considered significant. All statistical analyses will be done using the Statistical Package for Social Science version 24 (SPSS Inc., Chicago, Illinois, USA).

In the current study, a significant positive association was seen between diet and odds of esophageal cancer in Afghanistan. The association was independent of potential confounders such as age, sex and other various environmental factors. To the best of our knowledge, this is the first study examining the relationship between diet and risk of esophageal cancer in Afghanistan.

Esophageal cancer is the eighth most common cancer in the world and the sixth leading cause of death from cancer in the world(35, 36). Diet is very important variable for increase and decrease the risk of esophageal cancer(31). For instance, a case control study in Taiwan showed that consumed salted food (OR=2.3, 95%CI: 1.2-4.2), pickled vegetables (OR=2.5,95%CI: 1.3-4.5) less than one week increased the risk of esophageal cancer in men(37). A case control study in Uruguay revealed that high intake of alcohol, tobacco, salted meat increased the risk of esophageal cancer(27). Some other studies showed that lower intake of fruit and vegetable increase the risk of esophageal cancer(38). A retrospective cohort study in China showed that a positive family history, low education, surface water use, pork consumption in male gender were increased the risk of esophageal cancer, while smoking and alcohol use, and pickled vegetable and moldy food consumption were not risk factors in this study(39). Additional, a study in North east-

ern region of India showed that consumption of very spicy food, hot foods and beverages was positively associated with the risk of esophageal cancer. However, Green leafy vegetables and fruits were decreased the risk of esophageal cancer(40). A case control study in south western china revealed that the smoking (OR=4.06, 95%CI: 1.55-10.6), eating food rapidly (OR=5.84, 95%CI, 2.05-16.7), drinking shallow ground water (OR=4.18, 95%CI, 1.30-13.4), frequent intake of pickled vegetables (OR=2.12, 95%CI, 1.00-4.49) and alcohol drinking (OR=2.49, 95%CI: 1.06-5.85) were increased the risk of esophageal cancer(41). Although, frequent intake of fresh fruit (OR=0.42, 95%CI, 0.19-0.89), fresh vegetables (OR= 0.62, 95%CI, 0.32-1.17) and eggs (OR=0.59, 95%CI, 0.25-1.39) decreased the risk of esophageal cancer(41). Several studies showed that high intake of hot drinking beverage such as coffee with milk but not coffee alone and tea increased the risk of esophageal cancer(42, 43). Several studies showed that high intake of hot food, fast eating speeds increased the risk of esophageal cancer(44-46). On the other hand, A case control study in revealed that dietary intake of protein, vitamin C, B1 and E was reduce the risk of esophageal cancer(47). An Epidemiology study showed that higher intake of fruits and vegetable was reduced the risk of esophageal cancer(48). Several studies showed that the high consumption of carrots, green vegetables and fresh fruits were reduced the risk of esophageal cancer(32, 49). Our study had several strengths. This is the first study to examine the association between diet and esophageal cancer in Afghanistan. Easily accessible patients in hospital and enough time for filling the questioner. However, there are also a few limitations, due to the case-control design of the study, recall bias might be present and Language barrier. In conclusion, we found that high intake of salty food, pepper and meat positively associated with risk of esophageal cancer and increasing the intake of fruits, vegetables, Fish and poultry reduce the risk of esophageal cancer in Afghans study group. Further studies (e.g. cohort studies) with large sample size are required to establish this association.