SURVIVAL PROBABILITIES AND LIFESTYLE OF LUNG AND THROAT CANCER PATIENTS IN BANGLADESH

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ABSTRACT

Purpose: In this study, we aimed to find out the survival probabilities and lifestyle of lung and throat cancer patients in Bangladesh.

Methods: The dataset was collected from several hospitals of eight divisional cities in Bangladesh using a semi-structured questionnaire at two-time points initially and after 12 months. Descriptive statistical tools, Multiple Responses analysis, Factor analysis and Kaplan –Meier survival curve were used to analyze the data.

Results: The results revealed that the prevalence of lung cancer is 6.7% and for the throat, it is 9.6%. It was observed that those whose fathers had lung or throat cancer; have more chance to be affected by cancer. It was also found that the median survival time of lung cancer (18.88 months) patients is more than that of throat cancer (10.67 months) patients. Communalities of Smoking (0.788) and fast food (0.785) were found highest compared to other lifestyle factors.

Conclusions: Taken together, we conclude that the survival probabilities of lung cancer patients are higher than throat cancer patients and smoking and fast food are highly related to lung and throat cancer. Therefore, we should avoid smoking and fast food to improve public health sectors in Bangladesh.

INTRODUCTION

Cancer is a very common and deadly noncommunicable disease(WHO 2014). Lung cancer, the most common form of cancer globally and the main cause of cancer-related mortality is more common in men than in women. In the United States, lung cancer was responsible for 27% of all cancer deaths in 2015 and 20% in the European Union (EU) region in 2016 (Malvezzi et al. 2016; Siegel, Miller, and Jemal 2015). Approximately 124,200 men were diagnosed with lung cancer in 2012, accounting for 17% of all male malignancies and 9% of all female malignancies in the same year(Ferlay et al. 2015). About 3% of all malignancies identified in the United States each year are mouth or throat cancers, and the risk increases with age (Jemal et al. 2010). The larynx is a tissue-based organ in the throat. Cells, the basic units of tissue construction, are where cancer originates. Damaged and old cells do not die as they should when the body does not require new cells, and new cells are formed instead. A tumor is a mass of tissue formed by the improper development of additional cells. Laryngeal tumors may be benign (not cancerous) or malignant (cancer) (National Institutes of Health 2010). Several factors cause cancer in the human body. Research suggests that cigarette smoking is responsible for between 70%to 80% of lung cancer cases in females and 90 % in

males (Rodgman and Perfetti 2013) Tobacco smoke contains substances that may cause, initiate, or accelerate the development of cancer(Hecht 2012; Liu et al. 2008). Inhaling these substances causes genetic changes in throat cells, which may eventually lead to cancer. The larynx is directly exposed to cigarette smoke, which increases the likelihood of developing throat cancer.Only around 8% of lung cancers may be traced back to a direct hereditary cause(Jonsson et al. 2004; Liu et al. 2008). It has been shown before that owing to genetic recombination, first-degree relatives of a lung cancer proband have a greater probability of developing cancer than other nonsmokers(Wu et al. 1996). People with disorders caused by hereditary gene flaws (mutations) have an extremely high risk of throat cancer, particularly hypopharyngeal carcinoma (American Cancer Society 2021). Among the many stages of lung cancer, small-cell lung cancer (SCLC) has a dismal 6% survival rate, whereas non-small-cell lung cancer (NSCLC) has a 23% survival rate(Kendall K. Morgan 2021). More than 30% of persons diagnosed with throat cancer survive for at least five years following their diagnosis (CANCER RESEARCH UK 2022). People above the age of 65 are more likely to get lung cancer. Lung cancer is most often diagnosed in those over the age of 70; the fewest cases are seen in people under the age of 45(American Cancer Society 2022) Obesity has been linked to an increase in the risk of acquiring many different cancers, including throat cancer, it has been shown to lessen the risk of lung cancer in several studies(Walser et al. 2008; American Cancer Society 2020).

The survival rate for female cancer patients was found to be greater than that of male cancer patients and the increased risk of cancer was also seen in those who consumed more alcohol, fast food, chips/chocolate/ice cream, smoked cigarettes, or used betel nuts(Akter et al. 2021) Males, younger patients, and those with a healthy body mass index have better survival chances than females, those with a higher body mass index, and those who are overweight when it comes to stomach and colon cancer(Ahammed et al. 2020). The objective of this study is to assess the validity of the risk factors of cancer from the perspective of Bangladesh.

METHODOLOGY

To compare lung and throat cancer patients in Bangladesh, we used data of only lung and throat cancer patients from the dataset that was collected for a cross-sectional study titled "Extent of lifestyle and heritability effects on cancer in Bangladesh" in January 2019. The study was funded by the University Research Centre, Shahjalal University of Science and Technology, Sylhet and approved by its ethical committee. The study randomly collected information on cancer patients (n = 384) from public/private hospitals in eight divisions of Bangladesh. A structured questionnaire was used, which included patients' personal information, personal cancer-related information, food habits, and family history of cancer, cost-related information, and lifestyle to collect information from cancer patients.

In the beginning, we formed a cohort in each stratum by randomly selecting certain cancer patients. Overall, we were able to gather data on 384 cancer patients from hospitals in 8 of Bangladesh's divisional cities. At the outset (T_0), we used a questionnaire to gather cross-sectional data from a sample of patients, including information on their lifestyle, diet, height, weight, demographics, and the results of several blood tests. Next, we used a simple random selection method to choose 4 (four) cohorts from the total of 8 (eight) divisions or cohorts. The patients who were originally chosen (longitudinal data) were followed for around a year, with data being collected every month. That is, after 12 months (T_{12}) we collected the survival time of the patients. We found total 63 patients of lung and throat cancers in the longitudinal study.

To identify the lifestyle factors associated with lung and throat cancer patients with their survival probability, we extracted the data of 63 lung and throat cancer patients from a total

of 384 cancer patients. Descriptive analyses with multiple responses and Kaplan –Meier survival curve was used for the survival data.

RESULTS AND DISCUSSION

The mean age of the study patients was 50.76 years. Out of 384 cancer patients, we found 26 lung cancer (6.7%) and 37 throat cancer (9.6 %). Among 63 lung and throat cancer patients, 41.3% were lung cancer and 58.7% were throat cancer patients. In both cases, male patients are more than female patients which is similar to the findings of WHO (2018). We also observed that body mass indices of lung patients were 21.51 (before cancer) and 19.08 (after cancer), as well as throat patients, was 22.06 (before cancer) and 19.04 (after cancer). It indicates that weight is decreasing after cancer in both cases. A total of 38.5% of lung patients were diagnosed with other diseases before detecting cancer and it was 16.2 % for throat patients. Multiple response analysis showed that around 30.8 % of cases of fathers had lung or throat cancer and around 7.7 % of cases of mothers had cancer. Indicates whose father had lung or throat cancer, he or she has more chance to be affected by these diseases.

In Factor Analysis (FA), commonality indicates the proportion of common variance found in a particular variable and its value lies between 0 and 1. The commonalities of the top five variables of the lifestyle were presented in Table 1.

Table 1: Communalities of top five variables of lifestyle/Food habits

Dietary habits/Lifestyle	Communalities	Rank of dietary habits/lifestyle
Smoking	0.788	1st
Fast food	0.785	2nd
Betel-nuts	0.774	3rd
Not doing exercise	0.755	4th
Beverages	0.669	5th

From the commonalities of each variable, we found that among the variables of "Lifestyle" smoking explained 78.8% of the variation, followed by fast food (78.55%), betel-nuts (77.4%), , not doing exercise (75.5%) and Bevarges (66.9%). It was indicated that lung and throat cancer patients are used to smoking and fast food. Betel nuts and beverages were also associated with breast cancer (Akter et al. 2022).
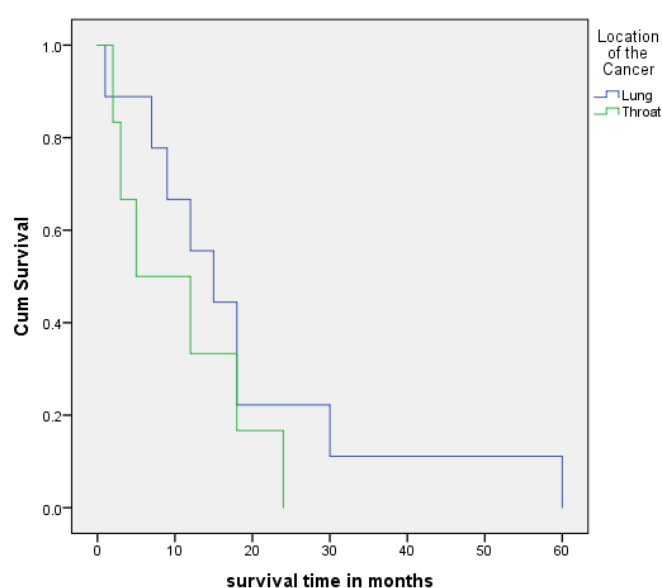
Survival Analysis

Figure 1. Survival Probability of Patients

We observed median survival time of lung cancer patients is 18.88 (CI: 6.2, 23.7) and throat cancer is 10.67 (CI: 0, 15.8) indicating that patients with lung cancer had survived longer than throat cancer. The results of this study suggest that lung and throat cancer are prevalent among middle-aged individuals, and most patients are males. The findings also indicate that weight loss is common after cancer diagnosis in both lung and throat cancer patients. It is noteworthy that a considerable proportion of lung and throat cancer patients had other diseases before the cancer diagnosis.

Regarding lifestyle factors, smoking and fast food were the top two communalities associated with lung and throat cancer. This finding is consistent with previous studies indicating that smoking is the most significant risk factor for lung cancer, and dietary habits such as fast food are also associated with an increased risk of cancer. Additionally, the preference for beverages was found to be a risk factor for throat cancer, with a higher preference.

In terms of survival analysis, the median survival time of lung cancer patients was significantly longer than that of throat cancer patients which is similar to the findings of Koskinen et al. (2022). This finding is consistent with the literature, as lung cancer tends to be diagnosed at an earlier stage and has a higher five-year survival rate than throat cancer. However, it is important to note that survival rates can vary depending on the stage of cancer at diagnosis and other factors such as treatment options and overall health.

CONCLUSION

This study provides valuable insights into the prevalence, risk factors, and survival outcomes of lung and throat cancer. The findings suggest that early detection and lifestyle modifications, such as quitting smoking and adopting a healthy diet and routine exercise, may help prevent or manage these diseases. The sample size is not so large. More sample size is needed for future studies.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

Ahammed, Tanvir, Mst Farzana Akter, Afroza Jannat Suchana, Anisa Ahmed Chowdhury, Md RafilTazir Shah, Md Siddkur Rahman, Ayesha Akter, and Mohammad Ohid Ullah. 2020. "Survival Probabilities of Stomach and Colon Cancer Patients in Bangladesh." *Asian Journal of Medical and Biological Research* 6(1):123–29. doi: 10.3329/ajmbr.v6i1.46486.

Akter, Mst Farzana, Shahnaj Sultana Sathi, SabikunnaherMitu, and Mohammad Ohid Ullah. 2021. "Lifestyle and Heritability Effects on Cancer in Bangladesh: An Application of Cox Proportional Hazards Model." *Asian Journal of Medical and Biological Research* 7(1):82–89. doi: 10.3329/ajmbr.v7i1.53313.

American Cancer Society. 2020. "Does Body Weight Affect Cancer Risk?" *American Cancer Society*. Retrieved November 16, 2022 (https://www.cancer.org/healthy/cancer-causes/diet-physical-activity/body-weight-and-cancer-risk/effects.html).

American Cancer Society. 2021. "Risk Factors for Laryngeal and Hypopharyngeal Cancers." *American Cancer Society*. Retrieved November 17, 2022 (https://www.cancer.org/cancer/laryngeal-and-hypopharyngeal-cancer/causes-risks-prevention/risk-factors.html).

American Cancer Society. 2022. "Key Statistics for Lung Cancer." *American Cancer Society*. Retrieved November 16, 2022 (https://www.cancer.org/cancer/lung-cancer/about/key-statistics.html).

CANCER RESEARCH UK. 2022. "Survival for Laryngeal Cancer." *CANCER RESEARCH UK*. Retrieved November 16, 2022 (https://www.cancerresearchuk.org/about-cancer/laryngeal-cancer/survival).

Ferlay, Jacques, Isabelle Soerjomataram, Rajesh Dikshit, Sultan Eser, Colin Mathers, MariseRebelo, Donald Maxwell Parkin, David Forman, and Freddie Bray. 2015. "Cancer Incidence and Mortality Worldwide: Sources, Methods and Major Patterns in GLOBOCAN 2012." *International Journal of Cancer* 136(5):E359–86. doi: 10.1002/ijc.29210.

Hecht, Stephen S. 2012. "Research Opportunities Related to Establishing Standards for Tobacco Products under the Family Smoking Prevention and Tobacco Control Act." *Nicotine and Tobacco Research* 14(1):18–28.

Jemal, Ahmedin, Rebecca Siegel, Jiaquan Xu, and Elizabeth Ward. 2010. "Cancer Statistics, 2010." *CA Cancer J Clin* 60:277–300. doi: 10.1002/caac.20073.

Jonsson, Steinn, UnnurThorsteinsdottir, Daniel F. Gudbjartsson, Hjortur H. Jonsson, KristleifurKristjansson, SigurdurArnason, VilmundurGudnason, Helgi J. Isaksson, Jonas Hallgrimsson, Jeffrey R. Gulcher, Laufey T. Amundadottir, Augustine Kong, and Kari Stefansson. 2004. "Familial Risk of Lung Carcinoma in the Icelandic Population." *The Journal of the American Medical Association* 292(24).

Kendall K. Morgan. 2021. "Your Chances of Surviving Lung Cancer." *WebMD*. Retrieved November 16, 2022 (https://www.webmd.com/lung-cancer/guide/lung-cancer-survival-rates).

Liu, Pengyuan, Haris G. Vikis, Daolong Wang, Yan Lu, Yian Wang, Ann G. Schwartz, Susan M. Pinney, Ping Yang, Mariza De Andrade, Gloria M. Petersen, Jonathan S. Wiest, Pamela R. Fain, Adi Gazdar, Colette Gaba, Henry Rothschild, Diptasri Mandal, Teresa Coons, Juwon Lee, Elena Kupert, Daniela Seminara, John Minna, Joan E. Bailey-Wilson, Xifeng Wu, Margaret R. Spitz, Timothy Eisen, Richard S. Houlston, Christopher I. Amos, Marshall W. Anderson, and Ming You. 2008. "Familial Aggregation of Common Sequence Variants on 15q24-25.1 in Lung Cancer." *Journal of the National Cancer Institute* 100(18):1326–30. doi: 10.1093/jnci/djn268.

Malvezzi, M., G. Carioli, P. Bertuccio, T. Rosso, P. Boffetta, F. Levi, C. La Vecchia, and E. Negri. 2016. "European Cancer Mortality Predictions for the Year 2016 with Focus on Leukaemias." *Annals of Oncology* 27(4):725–31. doi: 10.1093/annonc/mdw022.

National Institutes of Health. 2010. *Cancer of the Larynx*.

Rodgman, A, and Thomas A. Perfetti. 2013. *The Chemical Components of Tobacco and Tobacco Smoke*. CRC Press.

Siegel, Rebecca L., Kimberly D. Miller, and Ahmedin Jemal. 2015. "Cancer Statistics, 2015." *CA: A Cancer Journal for Clinicians* 65(1):5–29. doi: 10.3322/caac.21254.

Walser, Tonya, Xiaoyan Cui, Jane Yanagawa, Jay M. Lee, Eileen Heinrich, Gina Lee, Sherven Sharma, and Steven M. Dubinett. 2008. "Smoking and Lung Cancer: The Role of Inflammation." Pp. 811–15 in *Proceedings of the American Thoracic Society*. Vol. 5.

WHO. 2014. *GLOBAL STATUS REPORT on Noncommunicable Diseases 2014*. WHO. WHO.

Wu, Anna H., Elizabeth T. H. Fontham, Peggy Reynolds, Raymond S. Greenberg, Patricia Buffler, Jonathan Lift, Peggy Boyd, and Pelayo Correa. 1996. "Family History of Cancer and Risk of Lung Cancer among Lifetime Nonsmoking Women in the United States." *American Journal of EPIDEMIOLOGY* 143(6).