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Research Article

Identification of Symptoms and Factors Influencing Lung Cancer in Bangladeshi Adults

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Abstract

The study was performed using the secondary data of 309 adults of Bangladesh, out of them 87.4% were reported as lung cancer patients during survey period. Among the respondents 52.4% were males, 95.1% were of ages 50 years and above, 56.3% were smokers, 55.7% were alcoholic, 67.3% were fatigue, 55.7% were suffering from allergy, 50.5% were suffering from chronic diseases, 57.0% had yellow finger, 55.7% felt chest pain, 55.7% had wheezing problem, 46.9% had swallowing difficulty, and 50.2% were under peer pressure. These were some symptoms and factors related to lung cancer and some of these factors had significant impact on prevalence of lung cancer as was observed from the study of association and in fitting logistic regression model using prevalence of cancer as dependent variable. The previous research report indicated that there were 7 symptoms of lung cancer. This analysis indicated that the symptoms coughing, swallowing, and becoming fatigue had significant impact on prevalence of lung cancer. Beside these, adult people having yellow finger had 15% more risk of suffering from lung cancer. The factors chronic disease, allergy, smoking habit were also enhancing the risk of lung cancer.

Key Words: lung cancer; symptoms of lung cancer; factors associated with lung cancer; logistic regression; association of lung cancer with some factors and symptoms; risk ratio

1. Introduction

Lung cancer is a wide spread disease worldwide creating public health hazard in both men and women and it continuous to be the leading cause of death everywhere and it has been the most common cancer. It kills over 1 million people throughout the world every year [1, 2, 3]. There has been a large relative increase of lung cancer patients in developing countries including Bangladesh [4, 5]. The percentage of prevalence of cancer patients in developing countries was approximately 49.9% in developing countries, on the other hand 69% cases were reported in developed countries in 1980. The increased cases of cancer was 51% since 1985 [3].

Lung cancer was the most commonly diagnosed disease and it was the leading cause of cancer death in men in 2008 and the fourth most commonly diagnosed cancer and the second leading cause of cancer death in female [6]. In 2008 cancer accounted for 13% of all cancer cases and 18% cancer related deaths worldwide. In 2020, deaths due to cancer accounted for nearly 10 million, out of these 2.21 million cases of lung cancer [6-9]. It was reported that in 2013 1.3 to 1.5 million cancer patients were reported in Bangladesh with 0.2 million newly diagnosed cancer cases each year [10]. One of the top cancer disease was lung cancer in males [10] and the rate of increase of cancer patient was in increasing trend. The reason is that there exists the problem of facilities for early detection and treatment, where treatment and diagnosis is very costly. Higher rate of increase of the disease is due to increase in obesity, increasing rate of physical inactivity, bacterial infection, papilloma virus in human beings, rate of increase in hepatitis B virus, hepatitis C virus, Epstein –Barr virus, helicobacter pylori infection, etc. Thus, one needs to identify the significant symptoms of lung cancer and to identify the responsible social factors for lung cancer. In this paper, an attempt was made to do so.

2.Methods

The analytical results presented here was based on data collected from the website online lung cancer prediction system. The data were recorded from 309 adults, recorded information of each adult were on gender, age, smoking habit, yellow finger, anxiety, peer pressure, allergy, fatigue, chronic disease,

wheezing, habit of alcohol consumption, coughing, shortness of breath, swallowing difficulty, chest pain, and prevalence of lung cancer. Among these variables some are symptoms of lung cancer; these symptoms are coughing, feeling chest pain, suffering from chronic disease, fatigue, swallowing difficulty, shortness of breath, and weight loss. The other variables like age, gender, smoking habit, peer pressure, alcohol consumption are not the symptoms of lung cancer but are associated with prevalence of lung cancer. Except age, all the variables were recorded in nominal score and presence of any variable was noted by numerical figure 2 for ease of analysis. The numerical figure 1 was assigned if the variable was not observed in any respondent. Out of 309 respondents lung cancer prevailed in 270 adults and 39 adults did not report the prevalence of lung cancer in them during investigation. Thus, we have two groups of adults. Among the lung cancer patients 145 were males and 125 were females. In other group 17 were males and 22 were females. The respondents were classified into 4 groups according to their age; in the first group there were 15 adults of ages less than 50 years, in the second group there were 95 respondents of ages 50 - < 60 years, third group was of 129 adults of ages 60 - < 70 years, the remaining 70 adults were of ages 70 years and above. According to the objective of the study association of each of the recorded variables with prevalence of lung cancer was studied. Significance of association of a variable with prevalence of lung cancer was decided if the p-value of an observed Chi-square statistic is less than or equal to 0.05. The risk ratio along with its confidence interval was calculated for any level of a variable when the prevalence rate of lung cancer was found higher for the level of the variable. Finally, logistic regression model was fitted to identify the responsible symptom and variable for the prevalence of lung cancer. All the calculations were done using SPSS Version 25.

3. Results

There were 52.4% male respondents in the sample; out of them 89.5% were suffering from lung cancer. This prevalence rate was slightly higher compared to the rate observed in females (85.0%). These two prevalence rates were not significantly different as was observed by Chi-square test [χ^2 = 1.398, -value=0.237]. The risks of prevalence of lung cancer for males and for females were almost similar [R.R.=1.05; C.I. (0.96, 1.21]. There were 22.7% respondents of ages 70 years and above; 95.7% of them were cancer patients. The lowest (80.0%) prevalence rate was noted in adults of ages less than 50 years (4.9%). The percentage of cancer patients among 64.4% respondents of ages 60 years and above was 88.4. Though insignificant, there was an increasing trend of prevalence of lung cancer [χ^2 =6.220, p-value=0.111] with the increase in ages of adults. Highest prevalence rate (95.7%) was noted in 22.7% adults of ages 70 years and above, but for them the risk of prevalence was only 13% more compared to the risk of other adults [R.R.=1.13; C.I. (1.05, 1.21)]. There were 56.3% smokers in the sample; among them 89.1% were cancer patients. Among non-smoker adults the rate of prevalence of lung cancer was 85.2%. However, these two rates were not significantly different [χ^2 = 1.046, p-value=0.306]. Though highest prevalence rate was observed in smoker adults, but for them the risk of prevalence was only 5% more compared to the risk of non-smokers [R.R.=1.05; C.I. (0.96, 1.15)]. The percentage of adults habituated in drinking alcohol was 55.7; among them 95.9% were cancer patients. This prevalence rate was too high compared to the prevalence rate (76.6%) in non-alcoholic adults. These two rates were significantly different [χ^2 = 25.725, p-value=0.000]. Alcoholic persons had 25% more risk of affecting by lung cancer.

[R.R.=1.25; C.I. (1.3, 1.38)]. The percentage of adults who were in anxiety was 49.8; lung cancer prevailed in 92.2% of them. The corresponding percentage in adults who were not anxious was 82.6. This rate was significantly lower compared to that prevailed in anxious adults [χ^2 = 6.492, p-value=0.011]. Anxiety created a higher risk of suffering from lung cancer by 12% [R.R.=1.12; C.I. (1.03, 1.22)]. Peer pressure was felt by 50.2% respondents; among them 93.5% were suffering from lung cancer. Significantly lower prevalence rate (81.2%) was noted in adults for whom there were no peer pressure [χ^2 =10.735, p-value=0.001]. Peer pressure created a higher risk of lung cancer by 25% [R.R.=1.25; C.I. (1.15, 1.36)].

There were 50.5% patients of chronic diseases; among them 91.0% were suffering from lung cancer. This percentage was almost significantly different than the corresponding percentage (83.7%) observed in adults free of chronic diseases [χ^2 =3.800, p-value= 0.051]. Patients of chronic diseases had 9% more risk of affecting by lung cancer [R.R.=1.09; C.I. (1.00, 1.19)]. The percentage of allergic adults in the sample was 55.7; 97.1% of them were suffering from lung cancer. The percentage of non-allergic lung cancer patients was 75.2. Proportion of allergic lung cancer patients was significantly too high than that in non-allergic adults [χ^2 = 33.196, p-value=0.000]. The risk of the discussed disease was 29% more in allergic adults [R.R.= 1.29; C.I. (1.17, 1.42)]. There were 67.3% fatigue respondents; the prevalence rate of lung cancer in them was 90.9%. This percentage was significantly higher than that prevailed (80.2%) in non-fatigue adults [χ^2 = 7.015, p-value=0.008]. Fatigue adults had 13% more risk of suffering from lung cancer [R.R.=1.13; C.I. (1.02, 1.26)]. Chest pain was felt by 55.7% respondents; among them 93.0% were lung cancer patients. The percentage of lung cancer patients in adults who had no chest pain was 80.3%. This proportion was significantly lower compared to the proportion of lung cancer patients in adults who had chest pain [χ^2 = 11.208, p-value=00.1]. The risk of lung cancer in adults feeling chest pain was 16% more compared to the risk of other group [R. R=1.16; C.I(1.06, 1.27)]. Yellow finger was noted in 57.0% adults; among them 92.6% were suffering from lung cancer. Significantly lower rate of the disease (81.2%) was recorded in respondents who had no yellow finger [χ^2 =10.161, p-value=0.001]. The risk of lung cancer was 15% more in adults who had yellow finger [R.R.=1.15; C.I. (1.05,1.26)]. Coughing was noted in 57.9% adults; the prevalence rate of lung cancer in this group was 94.4%. Rate of prevalence of lung cancer was 77.7% in adults who had coughing problem. These two prevalence rates were significantly different [χ^2 =19.092, p-value=0.000]. The risk of lung cancer was 22% more in patients suffering from cough [R.R.=1.22; C.I. (1.09, 1.36)]. The percentage of adults feeling shortness of breathing was 64.1%; 88.9% of them were lung cancer patients. Prevalence rate of lung cancer was found 84.7% in adults who had no breathing problem. These two prevalence rates were not significantly different [χ^2 =1.140, p-value=0.286]. The risk of the diseases was only 5% more for the adults suffering from shortness of breathing [R.R.=1.05; C.I. (0.96, 1.16)]. Shortness of breathing is a problem due to which a person may feel suffocation when he/she breathes. Wheezing is another type of breathing problem which occurs due to airway obstruction if any other symptom of disease is diagnosed. In this study it was diagnosed

that 55.7% adults had wheezing problem and 94.8% of them were suffering from lung cancer. The corresponding percentage among adults without wheezing symptom was only 78.1. This percentage was significantly very low compared to that prevailed in adults experienced of wheezing problem [χ^2 = 19.204, p-value=0.000]. Those who were suffering from wheezing for them the risk of prevalence of lung cancer was 21% more [R.R.=1.21; C.I. (1.10,1.33)]. Swallowing difficulty or dysphagia includes coughing or choking when eating or drinking. The problem prevailed in only 46.9% respondents, but 96.6% of them were facing the problem of lung cancer. Lung cancer also prevailed in adults free of swallowing difficulty; prevalence rate in them was 79.3%. This rate was significantly low [χ^2 =20.845, p-value= 0.000]. Former group had 24% more risk of affecting by lung cancer [R.R.=1.24; C.I. (1.15,1.40)].

Table 1: Distribution of respondents according to prevalence of lung cancer and other responsible factors and symptoms.

Symptoms and factors	Levels/ prevalence	Prevalence of lung cancer				Total	
		Yes		No			
		Number	%	Number	%	Number	%
Gender	Male	145	89.5	17	10.5	162	52.4
	Female	125	85.0	22	15.0	147	47.6
	Total	270	87.4	39	12.6	309	100.0
Age (in years)	< 50	12	80.0	3	20.0	15	4.9
	50 – 60	82	86.3	13	13.7	95	30.7
	60 – 70	109	84.5	20	15.5	129	41.7
	70+	67	95.7	3	4.3	70	22.7
Smoking	Yes	155	89.1	19	10.9	174	56.3
	No	115	85.2	20	14.8	135	43.7
Alcohol consumption	Yes	165	95.9	7	4.1	172	55.7
	No	105	76.6	32	23.4	137	44.3
Chronic disease	Yes	142	91.0	14	9.0	156	50.5
	No	128	83.7	25	16.3	253	49.5
Allergy	Yes	167	97.1	5	2.9	172	55.7
	No	103	75.2	34	24.8	137	44.3
Anxiety	Yes	142	92.2	12	7.8	154	49.8
	No	128	82.6	27	17.4	155	50.2
Chest pain	Yes	160	93.0	12	7.0	172	55.7
	No	110	80.3	27	19.7	137	44.3
Coughing	Yes	169	94.4	10	5.6	179	57.9
	No	101	77.7	29	22.3	130	42.1
Wheezing	Yes	163	94.8	9	5.2	172	55.7
	No	107	78.1	30	21.9	137	44.3
Shortness of breath	Yes	176	88.9	22	11.1	198	64.1
	No	94	84.7	17	15.3	111	35.9
Swallowing difficulty	Yes	140	96.6	5	3.4	145	46.9
	No	130	79.3	34	20.7	164	53.1
Yellow finger	Yes	163	92.6	13	7.4	176	57.0
	No	107	80.5	26	19.5	133	43.0
Peer pressure	Yes	145	93.5	10	6.5	155	50.2
	No	125	81.2	29	18.8	154	49.8
Fatigue	Yes	189	90.9	19	9.1	208	67.3
	No	81	80.2	20	19.8	101	32.7
Total		270	87.4	39	12.6	309	100.0

Results of Logistic Regression Analysis

The analytical results presented above showed that some of the symptoms of lung cancer were significantly associated with prevalence of lung cancer. The risk of lung cancer was more for the prevalence of some symptoms. None of social factors was significantly associated with prevalence of lung cancer. Thus, further attempt was made to identify the significant impact of any symptom on lung cancer. It was done by fitting binary logistic regression model using prevalence of lung cancer as dependent variable and social factors and symptoms as explanatory variables. The included explanatory variables were gender, age, smoking habit, allergy, anxiety, habit of consumption of alcohol, feeling fatigue, coughing, feeling chest pain, shortness of breath, swallowing difficulty, wheezing, prevalence of chronic

disease, yellow finger, and peer pressure. The fitted model was significant as was observed from the results – 2 log likelihood= 91.909 and Nagelkerkee R^2= 0.695. The results were presented in Table 2.

Table 2: Results of logistic regression analysis.

Variable	B	S.E.	Wald statistic	p-value	Exp (B)
Gender	-0.526	0.709	0.551	0.458	0.591
Age	0.022	0.034	0.413	0.520	1.022
Smoking	1.776	0.702	6.402	0.011	5.906
Alcohol consumption	1.410	0.799	3.114	0.078	4.095
Chronic disease	3.192	0.888	12.909	0.000	24.326
Allergy	1.646	0.769	4.583	0.032	5.187
Anxiety	0.888	0.813	1.193	0.275	2.430
Chest pain	0.559	0.689	0.658	0.417	1.749
Coughing	3.311	1.072	9.547	0.002	27.420
Yellow finger	1.376	0.743	3.436	0.064	3.961
Fatigue	3.070	0.825	13.844	0.000	21.551
Wheezing	0.966	0.834	1.342	0.247	2.628
Shortness of breath	-0.729	0.760	0.920	0.338	0.482
Swallowing difficulty	3.122	1.130	7.636	0.006	22.644
Peer pressure	1.731	0.660	6.875	0.009	5.648
Constant	-30.657	5.483	31.267	0.000	-

It was found that the fitted model gave satisfactory results. Each of the variables smoking habit, prevalence of chronic disease, peer pressure, and allergy had significant influence in enhancing the disease lung cancer. The probability of prevalence of lung cancer was significantly increasing with the increase in level of each of the above mentioned variable. This was noted from the values of Exp(B) > 1. Coughing, swallowing difficulty, and fatigue were the 3 significant symptoms in detecting lung cancer. The increasing level of incidence of each of these 3 symptoms increased the probability of suffering from lung cancer. The probability of lung cancer was in increasing trend, though not significant, with the increase in severity of wheezing, feeling more chest pain, and yellow finger indicated that these 3 symptoms were the risk factors for lung cancer. Anxiety was also a risk factor in enhancing lung cancer. It was also noted that if all variables and all the symptoms prevailed in a male of age 70 years and above, he would be affected by lung cancer with probability 0.978.

4. Discussion

Worldwide lung cancer kills more than one million people per year and it is established in earlier studies that the major cause of the disease is smoking. Long back the disease was prevalent in developed countries. Now, it is one of the health hazards in developing countries also [1-4]. It was evident from earlier studies that the disease prevailed in people of ages less than 50 years [11-13]. Current evidence is that the disease prevails in non-smokers also [14] and is associated with age, and smoking and more prevalent in females [15,16]. The other responsible factors are demographic differentials and one or more co-morbidity, poverty, and lack of facilities for treatment [17-21]; obesity, physical inactivity, cancer causing virus and bacterial infection, human papilloma virus, hepatitis B virus, hepatitis C virus, helicobacter pylori infection, Epstein –Barr virus, etc. In this paper an attempt was made to identify some responsible factors influencing lung cancer and to identify the symptoms those were significantly created higher risk for prevalence of lung cancer.

To identify the responsible factors and the higher risk generating symptoms for lung cancer analysis was done on the basis of data collected from 309 adults. Out of them 270 were lung cancer patients of both sex in the ratio 53.7: 46.3. Among the patients, only 12 were of ages less than 50 years; 95.6% were of ages 50 years and above. The analysis showed that age and gender were not associated with prevalence of lung cancer. However, older people of ages 70 years and above had 13% more risk of prevalence of the disease. The study also indicated that smoking and chronic disease were not significantly associated with prevalence of lung cancer and these two factors were not the risk creating factors, though higher proportion (56.3%) of adults were smokers and higher proportion of respondents (50.5%) were patients of chronic diseases. Each of the variables anxiety, alcohol consumption and peer pressure were significantly associated with prevalence of lung cancer. Each of both allergic and alcoholic respondents was 55.7%. Allergic patients had 29% more risk of affecting by the disease. For alcoholic respondents the risk was 25% more. There were 50.2% adults who were under peer pressure; for this group the risk of the disease was 25% more.

The data on symptoms of lung cancer recorded from the respondents were coughing, chest pain, shortness of breath, swallowing difficulty, wheezing, yellow finger and fatigue. The percentages of adults who had these symptoms were 57.9, 55.7, 64.1, 46.9, 55.7, 57.0 and 67.3, respectively. All these symptoms, except shortness of breath, were significantly associated with the prevalence of lung cancer. For each group the risk of prevalence of the disease was found out separately. These risks were 22%, 16%, 24%, 21%, 15%, and 13% more, respectively.

Logistic regression analysis indicated that coughing, swallowing difficulty, and fatigue were the most influencing symptoms for prevalence of lung cancer. Increasing rate of prevalence of these symptoms increased more risk of prevalence of the disease. The risk of the disease was also in increasing

trend with the increase in prevalence rates of the factors peer pressure, chronic disease, and allergy.

5. Conclusion

The study was planned to identify the responsible symptoms and factors for prevalence of lung cancer among mostly adults. There were 309 investigated units; among them 52.4% were males, 95.1% were of ages 50 years and above, 56.3% were smokers, and 50.5% had chronic disease. None of these 4 variables was associated with prevalence of lung cancer. There were 55.7% allergic adults, 49.8% were feeling anxiety, 55.7% alcoholic adults, and 50.2% were facing peer pressure. These 4 variables were significantly associated with the prevalence of the disease. Out of these 4 variables the incidence of the disease was in increasing trend with the increase in level of peer pressure and allergy. Peer pressure and allergy had significant influence on prevalence of lung cancer. Increased peer pressure and increased prevalence of allergy increased the probability of incidence of lung cancer. Though smoking and chronic disease were independent of lung cancer, the probability of occurrence of the disease was more among smokers and among patients of chronic disease.

The symptoms, except shortness of breath, of lung cancer were the risk factors for prevalence of the disease. The probability of the disease was significantly more in fatigue patients. Coughing, and swallowing difficulty also enhanced the probability of occurrence of lung cancer. These were observed in fitting logistic regression model.

Finally, it might be concluded that to get rid of lung cancer people should (i) avoid tobacco consumption, (ii) take healthy food, and diet, (iii) maintain healthy body weight, (iv) do physical work of any type, (v) avoid alcohol consumption, (vi) avoid ultra violet radiation exposure, (vii) avoid indoor and outdoor air pollution, (viii) getting vaccinated against HPV and hepatitis B, (ix) avoid can and processed food, (x) arrange treatment of allergy and chronic disease.

6. References

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