

A Pilot Study on Screening of High Risk Individuals for Early Detection of Lung Cancer

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Summary :

Lung cancer is presently the commonest and deadliest malignancy throughout the world. In Bangladesh too, it is the leading cancer for males accounting for 19.4% of all cancers. The relative risk of developing lung cancer is almost 10-30 fold more in smokers, particularly in high risk individuals, i.e. heavy smokers who smoke >20 cigarettes/day as compared to non-smokers. Early stage disease (Stages I & II) is the prerequisite to surgical treatment which is the only cure for the disease. Unfortunately, when patients seek medical attention, an overwhelming majority (85-90%) have advanced stage disease, practically precluding them from surgical intervention. We screened 50 apparently healthy male smokers by chest radiographs for early detection of lung cancer since it currently represents the most powerful strategy to reduce death risk from cancer. 18 subjects (36%) had an abnormal x-ray of whom four had radiological lesions suspicious of malignancy. By fiberoptic bronchoscopy, two patients (4%) were found to have lung cancer, their clinical stage was Stage I. Although small in size, our study demonstrates the effectiveness of early screening of high risk individuals for detection of lung cancer. Availability of the fiberoptic bronchoscope has made the procedure of tissue diagnosis relatively simpler, safer and better tolerated.

Introduction :

Lung cancer is presently the most common malignancy throughout the world¹. It is also the leading cause of cancer related deaths. In addition to mortality lung cancer leads to tremendous morbidity and severely affects the quality of life of patients. In Bangladesh too, it is the leading cancer for males accounting for 19.4% of all cancers². Over the last half century, lung cancer cases and deaths have shown a steady rise in the USA and it is apprehended that the situation is similar in our country too.

Although the epidemiological association of smoking and cancer was revealed as early as 1950 through the landmark study of Doll and Hill³, a direct link has been established very recently⁴. The relative risk of developing lung cancer is almost 10-30 fold more in smokers as compared to non-smokers¹. The risk is almost double in heavy smokers who smoke > 20 cigarettes/ day than those who smoke <20 cigarettes / day; such individuals are labelled as high-risk individuals. Despite being the most preventable cancer in the world, lung cancer has risen steadily.

The alarming rise is directly related to the high prevalence of smoking in Bangladesh which has been estimated between 31-70%⁵. In view of the successful anti smoking campaign in the West, tobacco companies have bolstered their marketing efforts in the Third world. As a consequence, it is apprehended that the trend of smoking may increase further leading to more lung cancer cases.

On the management side, non-small cell lung cancer (NSCLC) patients, who undergo complete resection are the only ones likely to achieve cure.

Early stage disease (Stages I & II) is the prerequisite to surgical treatment. Unfortunately, when patients seek medical attention, an overwhelming majority (85-90%) have advanced stage disease¹, practically precluding them from surgical intervention. According to Khan et al, the inoperable fraction of patients admitted in the Surgical department of Institute of Diseases of Chest and Hospital, Mohakhali, (IDCH) was 72%⁶. In our country, poverty and lack of proper health awareness as well as shortage of diagnostic facilities are important factors compounding this delay.

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Early detection currently represents the most powerful strategy to reduce death risk from cancer⁷. Long term survivors are 2-3 fold higher in screened populations¹.

In view of the above evidence, screening for individuals at high risk of developing lung cancer is strongly justified. It is believed that between 1-5% of participants in a large screening trial will be diagnosed with cancer⁷. In this study screening has been done on male smokers (>20 cigarettes/day) above forty years of age by chest X-ray and malignancy has been confirmed by bronchoscopic biopsy.

Objectives

The objectives of this study were-

1. To identify patients with radiological signs suggestive of lung cancer.
2. To confirm diagnosis of lung cancer among the suspected patients by bronchoscopic biopsy.

Subjects and Methods :

This was a cross-sectional study. Fifty apparently healthy male smokers were selected for the study. Their mean age was 45.6 years (range 40-70). The inclusion criteria was-male persons aged more than forty years who have smoked > 20 cigarettes/day for at least 20 years i.e. are heavy smokers. Exclusion criteria of subjects included a) Presence of obvious symptoms/ signs like chest pain and hemoptysis. b) History of uncontrolled hypertension and ischaemic heart disease and c) history of cancer of other organs. After completing the patient data sheet, a chest radiograph was taken in posteroanterior view according to standard procedure.

The radiograph was interpreted by an experienced radiologist, and the subjects were informed about their respective reports. Bronchoscopy was performed on four patients with suspicious lesions according to the following procedure-

After explaining the procedure of bronchoscopy, informed consent was obtained. Using an Olympus BF-TE bronchoscope, bronchoscopy was performed under local anesthesia; bronchial biopsy and brushing were also done. Collected specimens were assessed by a histopathologist. Patients with apparently normal x-ray were told about the deleterious effects of smoking and motivated to quit smoking.

Results :

Majority of our subjects smoked between 21-30 cigarettes/birris in a day (Fig.-1). Two-thirds of the subjects had commenced smoking between the age of 12-15 i.e. adolescence, as shown in Table-I. More than a third of them had smoked for more than 30 years (Fig.-2). Fig.-3 shows that 60% of them smoked cigarettes as well as birris.

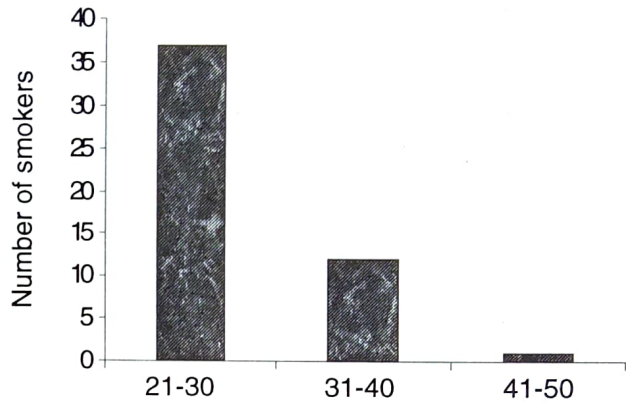


Fig.-1 : Distribution of subjects according to number of cigarettes / birris smoked per day.

Table - I
Age at commencement of smoking

Age in years	No. of subjects	Percentage
12-15	33	66
> 15	17	34
Total	50	100

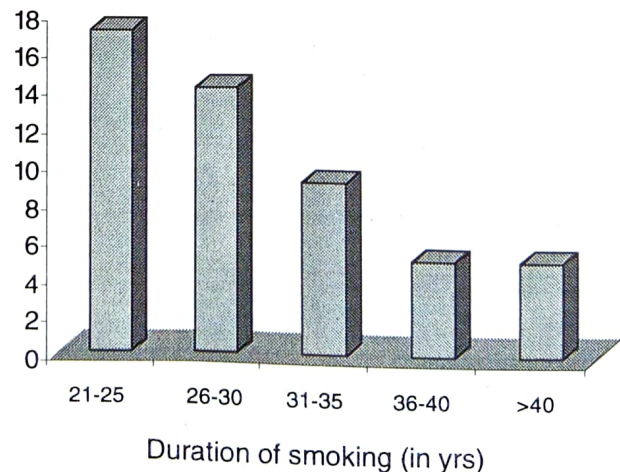


Fig.-2 : Distribution of subjects according to duration of smoking.

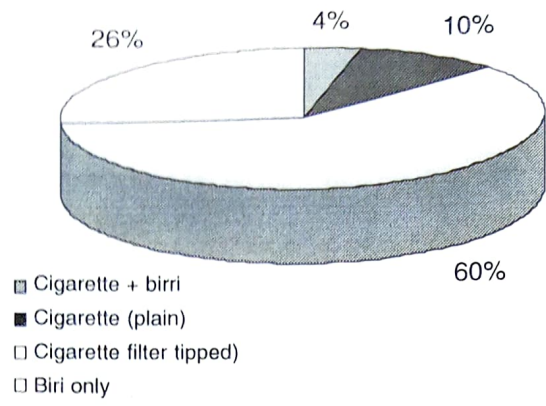


Fig.-3 : Type of smoking

Chest radiographs revealed abnormal findings in 18 patients (36%) (Fig.-4). The pattern of abnormal findings has been elaborated in (Table-II). Cross tabulation of radiological findings with age and duration of smoking shows a significant difference

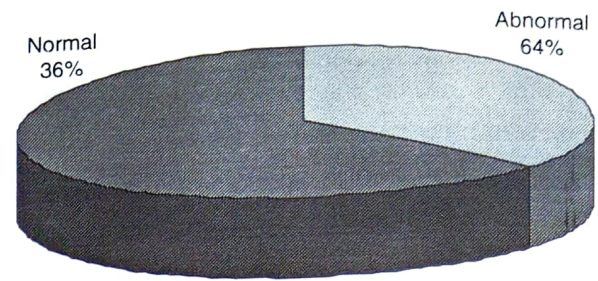


Fig.-4 : Distribution of radiological findings.

($P < 0.005$) between subjects who are above 50 years of age (Table III, $X^2 = 5.8$) and those who have smoked for more than 30 years (Table-IV, $X^2 = 9.6$).

Bronchoscopy was performed on four patients with suspicious radiological lesions; case summary of the patients is tabulated in Table-V. This led to a diagnosis of lung cancer in two patients; one each with squamous cell carcinoma and adenocarcinoma.

Table-II
Pattern of abnormal radiological findings

Suggestive of malignancy		Others	
Findings	Frequency	Findings	Frequency
Nodules		Old pulmonary TB	4
Single	3	Emphysematous changes	6
Multiple	0	Cardiomegaly	1
Hilar mass	1	Non-specific streakiness	8
Total	4	Total	19

Note : Total is more than number of abnormal findings since more than one findings were encountered in some radiographs e.g. Lung nodule with emphysematous change.

Table-III
Relation of radiological findings with age

Radiological findings	Age in years		Total
	≤ 50	> 50	
Normal	25	7	32
Abnormal	08	10	18
Total	33	17	50

$X^2 = 5.8, P < 0.005$

Table-IV
Relation of radiological findings with duration of smoking

Radiological findings	Age in years		Total
	≤ 30	> 30	
Normal	25	7	32
Abnormal	06	12	18
Total	31	19	50

$X^2 = 9.6$; $p = 0.005$

Table-V
Case summary of patients who underwent bronchoscopy

Sl. No.	Age	Duration of smoking (yrs)	No. of sticks/day	Radiological findings	Bronchoscopic findings	Tissue diagnosis	Stage	Outcome
01	65	42	21-25	Lt. Hilar mass	Spur of LUL and LLL is swollen	Squamous cell cancer	1	Pt refused surgery, taking radiotherapy
02	48	23	21-25	Lt. Upper zone nodule	Apicoposterior segment blocked	Adeno-carcinoma	I	Contemplating Surgery
03	40	28	21-25	Rt. mid zone nodule	No. endobronchial lesion seen	No malignancy seen		
04	45	33	21-25	Lt. mid zone nodule	Lingula, lower lobe compressed	No malignancy seen		Anti-TB drug prescribed empirically Adv : followup.

Discussion :

Majority of our subjects had commenced smoking during their adolescence; this is attributable to the greater freedom enjoyed by adolescents as well as the myth that smoking is a sign of manliness. The age of commencement is concordant with that reported by N. Islam and co workers⁵. More than half of our subjects smoked both cigarettes and biris. Although they preferred cigarettes, they were compelled to smoke biris owing to financial constraints. On this point, we tried to convince them that smoking is a sheer waste of money and they should quit. In contrast, 67% of subjects from Mohakhali Health Institutes smoked cigarettes⁸.

More than one third of the subjects had abnormal findings on their chest radiographs. Table-II shows that among signs suggestive of malignancy, nodules were the commonest (n-3, 75%) – a finding similar to other reports⁹. Regarding other changes, non-

specific streakiness led the list, as expected, followed by emphysematous changes (Table-II, right panel).

In Table –III, the occurrence of abnormal radiological findings is significantly higher in patients more than 50 years of age. This findings has been reported by other workers as well¹.

Table-IV reveals that the occurrence of abnormal radiographs is twofold in subjects who have smoked for more than 30 years in comparison to those with a shorter history of smoking (n=12 vs 6); this was also statistically higher ($P>0.005$, $X^2 = 9.6$).

Fibreoptic bronchoscopy was performed on four patients with suspicious signs of malignancy. Of them, two patients were ultimately found to have lung cancer i.e. a positive yield of 4%. This is concordant with the expected yield of 1-5% mentioned by Strauss⁷. In the Memorial Sloan Kettering study, 288 patients of lung cancer were detected among 10,040

men¹⁰. Ninety-one cases (0.83%) were identified in the Mayo Lung project¹¹. The cumulative lung cancer incidence was higher in both Mayo Lung project and the Czechoslovak study^{11,12}. A recent study covering 1000 men and employing both CT and chest x-ray showed a positivity of 2.7% and 0.7% on CT and chest X-ray respectively¹³.

Contrary to our expectations, the two patients with lung cancer have not yet undergone surgery. Fortunately, both have Stage I disease making them amenable to surgery and are financially solvent to bear the expenses of surgery. However, the first patient refused to undergo surgery due to fear and the second one still believes that his disease can be cured by spiritual methods. This is another area where health education and motivation can save our patients from quacks and voodoo spiritual healers. Interestingly, the patient with squamous cell carcinoma had a long history of smoking (42 years)-this being consistent with the strong correlation of these two entities.

Conclusions :

In conclusion, we would like to state that

1. Four percent of the screened subjects were ultimately found to have lung cancer which was at Stage I i.e. amenable to surgery.
2. The fiberoptic bronchoscope has made it very easy to diagnose lung cancers at an early stage.
3. The occurrence of abnormal chest radiographs was significantly higher in subjects more than 50 years of age who had long smoking history; health education measures should therefore be directed towards this group.
4. Majority of smokers start at an early age – serious measures should be considered to prevent sale of cigarettes to young people.
5. Such screening is helpful in detecting smoking related changes in patients with mild symptoms. Antismoking education by showing them their own radiographs will be more effective.

Future recommendations

1. This survey can be done on a larger scale to cover more male smokers
2. Subjects presently enrolled can be followed up at regular 6 months intervals.

3. By dissemination of information through the media, smokers can be made more cautious about hazards of smoking.
4. Financially solvent persons can be motivated to have a chest radiograph taken regularly at their own cost.

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