

Profile of Lung Cancer in Predominantly *Bidi* Smoking Rural Population of Northern Himachal Pradesh

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ABSTRACT

Background. Lung cancer is a leading cause of morbidity and mortality among both genders. The histopathological patterns of lung cancer in different parts of India appear to be variable.

Objective. To study the profile of lung cancer in northern Himachal Pradesh.

Methods. Patients of all age groups and either gender with history and complaints suggestive of lung cancer were subjected to further investigations to study the histopathological types of lung cancer over a period of 14 months.

Results. Out of 105 histopathologically confirmed patients with lung cancer (mean age 62.7±11.6 years; 96 males), 89.5% were “ever smokers” and 82.9% were “current smokers”; 92% of current smokers were *bidi* smokers. Most common presenting complaints were chest pain (46.7%) and cough (35.2%). Mean duration of longest presenting complaint was 64 days. The histopathological types included squamous cell carcinoma (37.1%), adenocarcinoma (36.2%), small cell carcinoma (8.6%), un-classifiable (16.2%), and other types (1.9%).

Conclusions. Majority of the lung cancer patients in northern Himachal Pradesh were *bidi* smoking males from rural areas and the incidence of adenocarcinoma and squamous cell carcinoma is almost equal.

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Key words: Lung cancer, *Bidi* smokers, Rural population, Northern Himachal Pradesh.

INTRODUCTION

Lung cancer was the most commonly diagnosed cancer (1.1 million cases, 16.5% of all cancers) in males and fourth most commonly diagnosed cancer (513,000 cases, 8.5% of all cancers) in females, representing 12.7% of all new cancers in 2008 globally.^{1,2} It was also the most common cause of death from cancer, with 1.38 million deaths (18.2% of the total) worldwide.^{1,2} The majority of the cases now occur in the developing countries (55%), a large increase since the estimates in 1980, when it was estimated that only 31% of lung cancer cases occurred in the developing countries.²

A vast majority of lung cancer cases are attributed to smoking. Smoking habits are documented to influence not only the incidence but also the types of lung cancer as low tar cigarette smokers and “never smokers” have completely different histopathological patterns.^{3,4} Other factors responsible for the disease include genetic predisposition, exposure to radon, asbestos, air

pollution, environmental tobacco smoke and heavy metals, etc.⁵

In India lung cancer was thought to be rare before 1950s. In a multi-centric study the incidence in hospital population was found to be 27.4 per million in 1950 and 78.6 per million in 1959.⁶ Data collected by the Indian Council of Medical Research (ICMR) from six different, both rural and urban, parts of the country had also shown varying figures at different places.⁷ But, at present, as per the data of ICMR, three-year report of population-based cancer registries 2006-2008 in India, lung cancer is a leading cause of morbidity and mortality in majority areas in both the genders. Age adjusted incidence rates have ranged from 2.2 to 36 cases per 100,000 population in males and 0.8 to 38.7 cases per 100,000 population in females, constituting 5.1 to 23.1% of all cancer patients in males and 1.5 to 16.2% of all cancer patients in females. These data suggest that there is a considerable variation in the incidence and pattern of various types of lung cancer in different parts of

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the country.⁸ The present study was conducted to know the profile of lung cancer patients in predominantly *bidi* smoking population of northern areas of Himachal Pradesh.

MATERIAL AND METHODS

The study was conducted over a period of 14 months (1st January 2011 to 28th February 2012) in the Department of Pulmonary Medicine of a Government Medical College in Himachal Pradesh after obtaining permission from the Institutional Ethics Committee. Patients of all age groups and either gender with history and complaints suggestive of lung carcinoma were subjected to further investigations in the following manner.

All the patients, presenting to the pulmonary medicine out-patient department (OPD) with complaints and/or history suggestive of lung cancer were studied. Written informed consent was obtained from the patients participating in the present study. All patients were subjected to a detailed history and clinical examination. Smoking index^{9,10} was calculated as the average number of *bidis* or cigarettes consumed per day multiplied by the duration of smoking in years. The average number of cigarette or *bidis* smoked per day was calculated by summing up the product of different periods and dividing the whole by the duration of smoking in days.

$$\text{Estimated average number of cigarettes/bidis smoked per day} = \frac{n_1 d_1 + n_2 d_2 + \dots + n_x d_x}{D}$$

where,

n_1 =average number of cigarettes/*bidis* smoked per day,

d_1 =duration of that smoking frequency in days, and

D=total duration of smoking in days.

If lung cancer was suspected, chest radiograph was obtained. Subsequently, computed tomography (CT) of the chest was performed to know the extent of the disease if the patient was willing to undergo the procedure. Haematological and biochemical investigations were also carried out. The patients were subjected to one or more of the following investigations to confirm the diagnosis: (i) bronchoscopy with collection of appropriate samples and specimens; (ii) pleural biopsy; (iii) lymph node biopsy; (iv) CT guided or blind fine needle aspiration cytology of lung mass or lymph nodes; (v) pleural fluid aspiration; and (vi) sputum collection. The samples collected from the above procedures were subjected to cytopathological and histopathological

investigations to establish the diagnosis and find the type of lung cancer.

RESULTS

During the 14 months period of study a total of 353,620 patients visited the hospital for different ailments and 42,450 were admitted. Lung cancer was confirmed in 105 patients histopathologically. Of these, 104 were from the rural areas and only one was from the urban setting. Of the 105 patients, 96 were males (Tables 1, 2 and 3). Lung cancer prevalence was calculated to be 29.7 per 100,000 out-patients and 2.5 per 1000 admissions in the hospital. Lung cancer also constituted 1.5% of all the out-patients visiting the pulmonary medicine service and 10.8% of all patients admitted in pulmonary medicine wards.

Table 1. Demographic profile of patients with lung cancer (n=105)

| Variable | Number (%) |
|-------------------------------------|------------|
| Age (years) | |
| <50 | 18 (17.1) |
| 51-60 | 22 (21.0) |
| 61-70 | 40 (38.0) |
| >70 | 25 (23.8) |
| Occupation | |
| Farmers | 53 (50.5) |
| Retired government servants | 10 (9.5) |
| In-service (private and government) | 9 (8.6) |
| Labourers | 9 (8.6) |
| Retired army personnel | 8 (7.6) |
| Shopkeepers | 8 (7.6) |
| Housewives | 8 (7.6) |

Mean duration of presenting complaints was 64 days (range one day to one year). Information about duration of present illness could not be obtained with certainty from one patient who had recurrent pleural effusion and was on anti-tuberculosis treatment (Table 2).

Of the 105 patients with histopathologically confirmed lung cancer, 94 (89.5%) were "ever smokers" and ratio of ever smokers to "non-smokers" was 8.55:1. Of the 96 male patients 92 (95.8%) were ever smokers with a ratio of ever smokers to non-smokers of 23:1. Among *bidi* smokers (n=80), median smoking (range) was 800 (20-3000). Among cigarette smokers (n=4), median smoking index (range) was 660 (300-720). Seven male patients were ex-smokers with an average smoking index of 464 (range 50-1200) and range of smoking free period being 4-30 years with an average of 14.9 years. Only two of the nine female patients were smokers (Table 3).

Table 2. Clinical profile of lung cancer patients in northern Himachal Pradesh

| Variable | No. (%) |
|---|-----------|
| Presenting Complaint | |
| Chest pain | 49 (46.7) |
| Cough | 37 (35.2) |
| Shortness of breath | 26 (24.8) |
| Haemoptysis | 23 (21.9) |
| Fever | 18 (17.1) |
| Swelling on face and/or neck | 12 (11.4) |
| Loss of appetite | 5 (4.8) |
| Backache | 5 (4.8) |
| Hoarseness of voice | 3 (2.9) |
| Dysphagia | 2 (1.9) |
| Weakness | 2 (1.9) |
| Recurrent pleural effusion | 2 (1.9) |
| Giddiness | 1 (1.0) |
| Weight loss | 1 (1.0) |
| Duration of Presenting Complaint | |
| <7 days | 3 (2.9) |
| 7-15 days | 18 (17.1) |
| 15 days -1 month | 21 (20.0) |
| 1-2 months | 34 (32.4) |
| 2-3 months | 13 (12.4) |
| 3-4 months | 6 (5.7) |
| Site of Primary Lesion | |
| Right side | 63 (60.0) |
| Left side | 40 (38.1) |
| Bilateral | 2 (1.9) |

smoke is smaller allowing them to get deposited in distal areas of lung, also filtered cigarettes deliver lesser amounts of nicotine compared to unfiltered device so the smoker tends to inhale more forcefully. This is particularly observed with low-nicotine and low-tar cigarettes, pushing the particles even further into the bronchial tree.^{5,11} This could have an effect on the site and type of carcinoma. On the other hand, unfiltered smoke contains many more chemicals that could change the response of tissues to carcinogens. This becomes more obvious from the fact that incidence of adenocarcinoma is steadily rising throughout the world since 1960s correlating with introduction of filtered and low-tar cigarettes though the association is not yet established.^{3,5} The incidence of adenocarcinoma is also more in women and non-smokers suggesting a different aetiology and strengthening the hypothesis that various smoking habits could lead to a specific histopathologic pattern of lung carcinoma.^{12,13}

Bidi, a hand-rolled pipe of *tendu* (*Diospyrus melonoxylon*) leaves containing low-grade tobacco is the most commonly used unfiltered smoking device in India and other south-east Asian countries.^{10,14} Very few studies conducted in India suggests equal or more causal relationship of *bidi* smoking with lung cancer as compared to cigarette¹⁰ but studies establishing relationship of *bidi* smoking to a particular histopathological type of lung carcinoma are not available.¹⁵⁻¹⁸ Pattern of lung carcinoma in *bidi* smokers may be different from unfiltered cigarette smokers also as *bidi* is made up of a poorly combustible leaf and needs more frequent and deeper inhalations.¹⁴

Table 3. Smoking status and histopathological profile of lung cancer patients (n=105)

| Smoking Status | Squamous Cell Carcinoma No. (%) | Adenocarcinoma No. (%) | Small Cell Carcinoma No. (%) | Unclassifiable No. (%) | Others No. (%) |
|-----------------------------|---------------------------------|------------------------|------------------------------|------------------------|----------------|
| Current smokers (n=87) | 35 (40%) | 29 (33%) | 7 (8%) | 14 (16%) | 2 (2%) |
| Ex-smokers (n=7) | 2 (29%) | 2 (29%) | 1 (14%) | 2 (29%) | – |
| Non-smokers (n=11) | 2 (18%) | 7 (64%) | 1 (9%) | 1 (9%) | – |
| <i>Bidi</i> smokers (n=80) | 32 (40%) | 26 (32%) | 7 (9%) | 13 (16%) | 2 (3%) |
| Cigarette smokers (n=4) | 2 (50%) | 2 (50%) | – | – | – |
| <i>Hookah</i> smokers (n=3) | 1 (33%) | 1 (33%) | – | 1 (33%) | – |

DISCUSSION

It has been proved that smoking and lung cancer are closely related but the association of various types of lung cancer with smoking is not clear. There is variability in histopathological pattern of lung carcinoma from place to place and from time to time making it difficult to associate types of smoking to types of lung carcinomas. There is a significant difference in the quality and particle size of filtered and unfiltered smoke. The size of particles of filtered

According to the hypothesis of particle size, the number of adenocarcinoma patients should be very low in *bidi* smokers as it contains very crude smoke with large smoke particles.¹⁶ But in our study adenocarcinoma comprised of 36.2% of all lung carcinoma patients, almost equal to squamous cell carcinoma and comparable to other published studies in India.¹⁸⁻²¹ Other published studies²²⁻²⁴ report a share of adenocarcinoma from 3% to 43.8% of all lung carcinomas. Squamous cell carcinoma is reported from 25.7% to 73.3% and un-classifiable carcinomas from

0.54% to 41% of all lung carcinomas.¹⁸⁻²¹ In our study, squamous cell carcinoma was 37.1% and 16.2% were found unclassifiable; 8.6% cases belonged to small cell carcinoma whereas other studies report 8%-17% cases of small cell carcinoma worldwide.²⁰⁻²⁵

Smoking was rarely observed in female patients being obtained in only two of the nine patients (22.2%); they had a smoking index of 500 and 750. All were housewives, one of them was also involved in farming and all of them were involved in cooking on a regular basis. Adenocarcinoma is the predominant histologic subtype reported in this population.^{26,27} In the present study, male to female ratio is also 10.7:1; on the other hand, the average male to female ratio of studies conducted before and after 1985 in India is 5.76:1 and 6.67:1, respectively.¹⁸ Mean age of patients at the time of reporting (62.7±11.6 years) observed in the present study was also higher as compared to other studies conducted in India where it was 52.2 years in studies conducted before 1985 and 54.6 for studies after 1985. This has remained almost same over a period of time.^{18,21}

Average duration of presenting complaints in the present study was only 64 days. Considering the fact that around 37% of patients had symptoms since one month or less, there is a need for screening of high risk group population for lung cancer. The duration of symptoms reported in other Indian studies has been less than three months in 32.6%-44%; 3-6 months in 16%-34.3% and greater than six months in 21%-24% of the patients. Cough with expectoration was the most common complaint followed by chest pain.¹⁸

CONCLUSIONS

We conclude that majority of the lung cancer patients in northern Himachal Pradesh are *bidi* smoking males from rural areas and the incidence of adenocarcinoma and squamous cell carcinoma is almost equal. These observations need to be substantiated in similar studies of larger magnitude, preferably population based.

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