**Bidi smoking and lung cancer**

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**Summary**

This article discusses the role of bidi smoking as a risk factor for lung cancer. A review of the documented evidence is presented. The literature from Pubmed has been searched using the key words 'beedi smoking', 'bidi smoking' and 'lung cancer'. The bibliographies of all papers found were further searched for additional relevant articles. After this thorough search, eight studies were found. The evidence suggests that bidi smoking poses a higher risk for lung cancer than cigarette smoking and risk further increases with both the length of time and amount of bidi smoking. The focus of tobacco control programs should be expanded to all types of tobacco use, including bidis, to reduce the increasing problem of lung cancer.

*Keywords:* Smoking, bidi, cigarette, lung cancer, India

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**1. Introduction**

The "epidemic" of lung cancer mortality has been identified as a major health issue confronting both developed and developing countries. It is the leading cause of cancer deaths in developed countries and is also rising at alarming rates in developing countries. Almost half (49.9%) of the cases occur in the developing countries of the World – a big change since 1980, when it was estimated that 69% were in developed countries (1). Worldwide, it is by far the most common cancer in men.

In India, lung cancer has been considered to be an infrequent entity, but an increased rate of diagnosis of bronchogenic carcinoma was recognized in the early 1960s by Vishvanathan *et al.* (2). Population-based as well as hospital-based data from the Cancer Registry of the Indian Council of Medical Research (ICMR) and the Cancer Atlas Programme of the ICMR revealed that lung cancer has increased in India during the last few years (3-5).

Tobacco smoking is the most important etiologic factor for the development of lung cancer. 90% of all lung cancers in men and 79% in women are directly attributed to smoking (6). Smoking habits in India differ from other countries like USA. In India out of total tobacco consumption, smoking accounts for 72% of the total, 73% is related to bidi and the other 27% is due to cigarettes (7). Reports of an increase in prevalence of bidi consumption have also emerged from other countries in Asia, as well as other parts of the world, such as USA, France, Canada and Australia (8-13).

In India, tobacco smoking in general and bidi smoking in particular have long enjoyed social acceptance and respectability in some parts of the culture like wedding ceremonies in the rural area (14). The leaf-wrapped appearance of bidis and absence of health warnings on their package lead to the perception among young people that bidis are "safe, herbal" cigarettes. Even though, a number of worldwide, population based case controlled studies as well as cohort studies have proved the association of tobacco smoking to the lung cancer, very few studies have been carried out to demonstrate the association between bidi smoking and lung cancer.

**2. Data Sources**

The Pubmed medical literature database was searched for published articles that had the key words 'bidi-smoking', 'beedi-smoking' and 'lung cancer'. The bibliographies of all papers found were searched for further relevant
articles. Any study, whether case-control, retrospective, cross-sectional or longitudinal, was included.

3. Results

After this thorough search, there were only 8 studies where the association between bidi smoking and lung cancer had been specially analyzed. A review of this study is presented.

The first study was done by Notani and Sanghvi (15). This retrospective study of 520 patients with lung cancer conducted at Tata Memorial Hospital, Bombay revealed the relative risk of all types of smokers to nonsmokers was 2.45, of cigarette smokers 2.23 and bidi smokers 2.65.

In another study by Notani et al. (16), the relative risks for bidi and cigarette smoking were assessed from analysis of 683 male lung cancer cases and 1,279 male non-cancer patients from Mumbai. The relative risk of 3.38 for bidis was higher than the 2.36 relative risk for cigarette smoking, compared to non-smokers.

In another retrospective study by Jussawalla et al. (17), 792 male lung cancer patients for whom detailed smoking history is available, were matched for age, and community with randomly selected controls. All smokers appear to be at high risk (16.8) compared with non-smokers. The relative risk in bidi smokers of 19.3 was, however, even higher than in cigarette smokers.

Prasad et al. (18) from Lucknow conducted a hospital-based case-control study comparing 52 cases of lung cancer with 156 healthy controls. They were able to demonstrate that bidi smokers had an odds ratio of 5.05 (2.21-11.7). The authors were also able to show a significant length of time smoking and dose-relationship between bidi smoking and lung cancer. The risk of lung cancer in bidi smokers of 11-20 bidis per day was seven times that of nonsmokers (7.06; 5.41-11.24) while that of smokers of more than 20 bidis per day, the risk was more than 10 times (10.60; 6.82-15.36). The effect of increasing duration of bidi smoking is reflected by the increasing odds ratios from 3.43 (1.62-6.84) for bidi smokers of 1-39 years duration to 14.24 (8.34-24.31) that of bidi smokers of more than 40 years.

Gupta et al. (19) from Chandigarh conducted a case-control study comparing 265 cases of lung cancer with 525 matched controls from 1995 to 1997. The odds ratio for bidi smoking was 5.76 (3.42-9.70) while that for cigarette smoking was 3.86 (2.11-7.06).

A study from Bhopal (20) revealed that the risk of developing lung cancer was higher for bidi smokers when compared to cigarette smokers. The odds ratio for bidi smoking was 11.6 (6.4-21.3) while that for cigarette smoker was 7.7 (3.2-18.4). The authors were also able to demonstrate that the risk of lung cancer increases with the increase in duration of cigarette smokers.

Gajalakshmi et al. (21) from Chennai and Thiruvananthapuram conducted a case-control study comparing 778 lung cancer cases with 3,430 controls. The odds ratios were 4.54 (2.96-6.95) and 6.45 (4.38-9.50) for more than 30 years of exclusive cigarette smoking and exclusive bidi smoking, respectively. The study also concluded that the lung cancer risk of former cigarette smokers drops more quickly after they quit smoking than it does for former bidi smokers.

In a study from Kolkata (22), 217 new patients with lung and larynx cancer along with 200 matched controls were recruited. Adjusted odds ratios observed for smokers for a duration of more than 40 years of smoking and smoking more than 40 bidis/cigarettes per day were 4.3 and 3.9, respectively. This study did not analyze the odds ratio of bidi smoking separately.

4. Why bidi is more hazardous than cigarettes

Although bidi contains about one-fourth the quantity of tobacco as a cigarette, the mainstream smoke of bidi contains a much higher concentration of several toxic agents including hydrogen cyanide, carbon monoxide, ammonia, other volatile phenols, and carcinogenic hydrocarbons such as benz(a)anthracene and benzopyrene (23). Bidis typically deliver 3-5 times more nicotine, tar and carbon monoxide as compared to conventional cigarettes (24). It has been reported that bidi contains 1.5 times more carcinogenic hydrocarbons than American cigarettes (25). The relatively low combustibility and non-porous nature of the tendu leaves require more frequent and deeper puffs by the smokers to keep bidi lit, and it is therefore harder on the smoker's lungs than cigarettes rolled in paper (26). Bidi smokers were found to take almost five puffs per minute compared to cigarette smokers who smoked two puffs per minute (23). All these facts are responsible for a greater deleterious effect of bidi in comparison to cigarettes.

5. Conclusion

A review of the literature strongly suggests that bidi smoking should be considered an important risk factor for the development of lung cancer. All eight studies on bidi smoking and lung cancer demonstrated a direct relationship and seven studies showed that bidi smoking is more hazardous than cigarette smoking. Two studies also demonstrated that the rate of developing lung cancer increases was directly proportional to the duration of smoking. One study showed that lung cancer risk of former cigarette smokers drops more quickly after they quit smoking than it does for former bidi smokers.

It can be concluded that bidi smoking also poses a very high risk of lung cancer. Traditionally, tobacco control programs have focused on reducing cigarette consumption. Effective strategies are now needed to expand the focus of tobacco control programs to all types of tobacco use, including bidis (27,28). Countries that adopted comprehensive tobacco control programs...
with a mix of interventions (including bans on tobacco advertising, strong warnings on packages, controls on the use of tobacco in indoor locations, high taxes on tobacco products, and health education and smoking cessation programs) have had considerable success in decreasing the prevalence of cigarette smoking (29). A similar policy framework with a mix of interventions will have to be implemented to control bidi use in India and other Southeast Asian countries where bidi use is prevalent, as well as in countries like USA where the bidi market is relatively new and expanding.

**References**


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