



An Epidemiological Survey of Occupationally Exposed Beedi Workers to Tobacco Dust

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ABSTRACT

Subjects occupationally exposed to potential mutagens/carcinogens represent the most suitable groups for epidemiological studies aimed at assessing the risk for the individual or the offspring. Several cancer risks to humans have been detected by epidemiological studies performed in occupational settings. The epidemiology studies have been able (a) to identify specific occupations or agents associated with the risk; (b) to verify the results of experimental studies; and (c) to test the effectiveness of changes in production or preventive measures in decreasing risks. Reproductive epidemiology has suggested a risk of spontaneous abortions or of malformation in the offspring of workers exposed to some chemicals or occupations, but data are often conflicting due to methodological problems. With the aim of early assessment of risk in mind, the epidemiological use of indicators of exposure or of the early effect of exposure to genotoxic agents is increasingly applied to occupational groups. Data on the fertility and other reproductive end points in 128 women beedi rollers exposed to tobacco dust were recorded by using standard questionnaire. The exposed group were further categorized based on duration of exposure, life style, smoking and non-smoking and socio-economic status. The statistical analysis shows that the differences in the reproductive end points between the control and exposed groups were significant ($P < 0.05$).

INTRODUCTION

Due to the modern industrial and the rapid development in the field of science and technology, man is continuously exposed to the environment pollutants like industrial and agricultural chemicals, food activities, drugs and cosmetics etc. Out of these compounds some are found to be mutagenic in lower organisms and also in mammalian system and some of these compounds will also cause birth defects. These occupational and environmental hazards have assumed yet another dimension of serious nature in Bhopal, Chernobyl and Basel.

The relationship between workplace exposure to dust particulates and respiratory diseases is one of the most widely studied subjects of modern epidemiology. A beedi industry occupies a prominent place in rural development in terms of its capacity to offer potential employment opportunities to a large number of people. The women employees who are rolling the beedies are enormous.

A beedi is a thin South Indian Asian cigarette made of 0.2 to 0.3 g of tobacco flake wrapped in a tendu (*Diospyros melanoxylon*) leaf and secured with coloured thread at both ends. As it is cheap form of tobacco consumption, it carries greater risk as it delivers more nicotine, carbon monoxide and tar than conventional cigarettes. Srinivasulu (1997) reported that 90% of beedi workers are women and when beedi

are stored in the house, food spoils quicker and family members experience headache (Panchanuikhi et al. 2000).

For women and children engaged in beedi rolling, beedies myriad of occupational hazards exist. 1. The process releases large amounts of coarse particles and dust in their work environment, 2. Rollers do not wear protective clothing, gloves or masks and are exposed to tobacco dust through their skin and by inhalation of harmful particles, 3. The health effects include pain and cramps in shoulders, neck, back, lower abdomen, anaemia and eye problems.

Women beedi rollers who start their profession at a very early stage of life are exposed to tobacco dust for approximately 4 to 10 hours each day. We conducted this study with the purpose of information on reproductive end points due to exposure of tobacco dust.

MATERIALS AND METHODS

Reproductive epidemiology: In the present study people working in Beedi industry in Hyderabad were selected to study the effects of tobacco dust on the reproductive end points such as still births, abortions, neonatal deaths, congenital malformations, etc.

The occupational epidemiology on the background of each individual was recorded using a standard questionnaire. The epidemiology broadly deals with the study of

relationship of various factors that influence the occurrence of a disease or an altered physiological status and its distribution in a given population. Data on the fertility and other reproductive parameters in 128 couples were recorded where males were occupationally exposed to tobacco dust. Their age group was between 20-50 years, and data from 102 couples belonging to same age group and not having any history of exposure to asbestos or other toxicants, were collected for comparison (controls). The Characteristics of control and exposed population are given in Table 1.

The workers were further divided into groups based on the duration of exposure, life style, diet, habits and socio-economic group. The workers were selected to serve as control subjects who were not exposed to any toxic chemicals. The data collection gives the information on reproductive end points like still births, congenital malformations and neonatal deaths, etc.

RESULTS AND DISCUSSION

The occupational epidemiology of each individual was recorded using standard questionnaire. The epidemiology broadly deals with study of relationship of various factors that influence the occurrence of a disease or an altered physiological status and distribution in a population. Data on the reproductive parameters in 128 occupationally exposed beedi rollers are recorded in Table 2.

There was a decrease in the number of fertile females in exposed group. Abortions and still births were increased among the females. The percentages were 22-59% and 16.94 in exposed, and 10.25 and 5.98 in controls respectively. The frequency of live birth decreased from 70.51% to 45.19% in exposed group. The percentages of neonatal deaths in exposed groups was 14.12% against control value of 3.84%. The difference in the frequency of reproductive end points was significant in exposed group as compared to control values ($P < 0.05$).

According to Bagwe & Bhisey (1991), beedi rollers are exposed to unburnt tobacco, mainly through the cutaneous and nasopharyngeal routes. Ranjit Singh & Padmalatha (1995) reviewed that beedi rollers were affected by respiratory disorder, gynaecological problems, susceptible to fungal disease, etc. Bhisey et al. (2006) recorded that inspirable dust of tobacco in the tobacco factory was associated with chronic bronchitis in workers. Kaur & Ratna (1999) and Agni & Gopal (2001) reported complications of pregnancy in women beedi rollers. Bagwe et al. (1992), Bhisey & Bagwe (1995), Mahimkar & Bhisey (1995) and Umadevi et al. (2003) observed the cytogenetic damage caused by occupational exposure to tobacco.

Human population is now exposed to a wide variety of

chemical substances used in the vast expanding industry and agriculture, has never witnessed it in the past. Many compounds interact with the genetic material in bacteria, mammalian system and cell cultures. If man is exposed continuously to these diverse types of environmental mutagens, there will be a great risk in future generations. Hence, in recent years a need for constant monitoring and vigilance for their ill effects on man and his environment has been felt and an urgency to devise appropriate remedial measure emphasized which permit comparison between the populations.

The reports regarding mutagenic activity of tobacco are rather conflicting as the studies on occupationally exposed population are meagre. The results of the present study show the effects on reproductive end points, hence precautions should be taken in work place to prevent health problems.

The study conducted on dental assistants, factory workers, painters and gardening workers, who were exposed to nitrous oxide, inorganic mercury, organic solvents and pesticides show that spontaneous abortions were found to be significantly increased in factory workers and painters. Occupational exposure to organic solvents during pregnancy is associated with an increased risk of major fetal malformations (Khattak 1999).

Welch & Cullen (1988) evaluated the semen samples from shipyard painters exposed to ethylene glycol ethers. Sperm concentrations, velocity, motility, morphology, morphometry and viability were measured. The measures of sperm counts were lower in painters. Exposure to six organic solvents (styrene, toluene, xylene, tetrachloroethylene, trichloroethylene and 1,1,1-trichloroethane) was conducted to investigate the effects of parental exposure of pregnancy. Spontaneous abortions and congenital malformations among the wives of men occupationally exposed to organic solvents were observed by Taskinen et al. (1989). Parental exposure as a risk for birth defects in offspring of painters was reported by Ohlson (1992). High exposure to toluene increase the risk of spontaneous abortions (Lindbohm 1995). Earlier Sallmen et al. (1922) reported that parental lead exposure is associated with congenital malformations. Further, in the year 2000 they reported that parental exposure to lead increases the risk of infertility at low occupational exposure levels. A delay was observed among the wives of men exposed to lead (Min et al. 1997), suggested that parental occupational lead exposure might be associated with low birth weight in the offspring. Epidemiological studies indicated that parental exposure to lead and mercury be associated with the risk of spontaneous abortions (Antilla et al. 1989).

The present results are also in agreement with that of higher frequency of various reproductive end points in occupationally exposed people other than tobacco like 600

Table 1: Characteristics of control and exposed population.

	No. of Samples	Age in years (± SD)	Duration of exposure
Control group	102	36.8 ± 1.2 to 45.2 ± 2.3	20 ± 1.2 yrs
Exposed group	128	38.8 ± 2.1 to 42.6	

Table 2: Data on reproductive histories in women bid rollers exposed to tobacco dust.

Parameters studied	Control group	Exposed group
No. of females	102	128
No. of fertile females	98 (96.30)	120 (93.75)
No. of pregnancies	234 (2.30)	354 (2.76)
Live birth	165 (70.51)	160 (45.19)*
Abortions	24 (10.25)	80 (22.59)*
Still births	14 (5.98)	60 (16.94)*
Neonatal deaths	9 (3.84)	50 (14.12)*
Congenital malformations	2 (0.85)	4 (0.11)*

*P<0.05

asbestos workers (Rudrama Devi & Kalyan Swamy 1992), 200 lead exposed workers (Vani & Rudrama Devi 1996) and chromium exposed workers (Jithender Naik 2001).

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