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Evaluation of Spirometry Parameters and Clinical Symptoms in Tobacco-Industry Workers Exposed to Dust in Tobacco Factory

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ABSTRACT

Background: *Despite the fact that many surveys have been carried out on adverse effects of tobacco and diseases attributable to smoking, only a few studies have described the effects of tobacco dust in tobacco-industry workers.*

Materials and Methods: *A total of 487 nonsmoking factory workers were randomly selected from different sections of the factory for this cross-sectional study. Having completed the questionnaire, they underwent spirometry and other examinations including DLCO, TLC, chest X-ray, and CT scan.*

Results: *Five cases developed COPD (1.27%) of whom 4 (0.96%) were working in cigarette fabricating section. Of 8 patients with asthma (1.92%), 3(0.72%) worked in an area where cigarettes were fabricated. Restrictive disorders were reported in 6 workers (1.42%) of whom 2 were in the sorting-blending and fabricating sections (0.48%) and 1 in tobacco packaging (0.24%) section.*

Conclusion: *The results implied high prevalence of obstructive disorders in the workers of cigarette fabricating section. We have concluded that working in different sections of a cigarette factory and also working experience have no significant relationship with pulmonary disorders and radiologic appearance of nonsmoking workers.*

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Keywords: *Spirometry parameters, Tobacco-industry worker.*

INTRODUCTION

Prior investigators have shown the deleterious effects of smoking and / or exposure to tobacco smoke; nevertheless, studies addressed the chronic effects of tobacco dust on tobacco-

industry workers are scarce (1,2). Green tobacco leaf is among the leading causes of occupational asthma in cigarette factories (3). Pulmonary function tests have shown considerable decrease in diffusion capacity values and expiratory flow rate of the subjects exposed to tobacco dust (4). On the other hand, the fungi growing on tobacco leaves such as aspergillus, induce hypersensitivity pneumonitis among tobacco workers (5).

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Tobacco dust contaminated with different types of fungi, cause conjunctivitis with dryness and inflammation of nasopharyngeal mucosa among workers (5-7).

A group of 75 tobacco workers were matched with a control group working in telephone industry. Results have revealed that symptoms such as cough and dyspnea were more prevalent in tobacco-industry workers. Meanwhile, FEV₁ and FVC values were significantly reduced(8).

Previous studies have described reduced respiratory capacity in tobacco-industry workers. Diffuse interstitial pulmonary fibrosis was more prevalent. Among these workers compared to auto-making workers. The prevalence of chest tightness was significantly higher in tobacco workers (9-11).

In Iran, tobacco-industries have been developing during the previous decades, and several workers are involved in the growing of harvesting, and cigarettes fabricating which require further studies. In the present study, we have determined the risk of respiratory disorders among tobacco-industry workers.

MATERIALS AND METHODS

A cross sectional study was performed on tobacco workers from different sections who were selected randomly.

Initially, the workers were divided according to the section of their duty, then the samples were chosen through a simple random sampling.

The smoking workers or those who had positive history of pulmonary disease, such as asthma, chronic bronchitis and emphysema before employment were excluded. Workers with an employment duration of at least one year were enrolled. An occupational medicine specialist had examined all the participant in accordance with the guidelines of the ministry of health.

Their medical history was recorded including the consumption of different types of tobacco production, cough, sputum, and dyspnea.

Furthermore, blood pressure, pulse rate, cardiac function and upper and lower respiratory tract symptoms were all assessed.

Worker underwent spirometry for at least 3 times (with Autospina Pul Minata set) and optimal results were considered as the patients' actual spirometry results (according to the ATS standard). Those presented with wheezing and crackle in the examination or found to have a specific pattern of disease in their spirometry were rechecked by a pulmonologist in National Research Institute of Tuberculosis and Lung Disease (NRITLD). If any suspicion arose, chest X-ray was obtained. Finally, data were analyzed by SPSS software.

RESULTS

Of a total 4000 data sheets of tobacco workers, 800 were randomly selected, of which 313 were excluded due to their smoking history. The remaining 487, working in different sections, were evaluated (Fig.1). No statistically significant difference was found among these different groups when considering age, genders, height, and working experience. Five cases developed COPD (1.27%) of whom 4 (0.96%) were working in cigarette fabricating section.

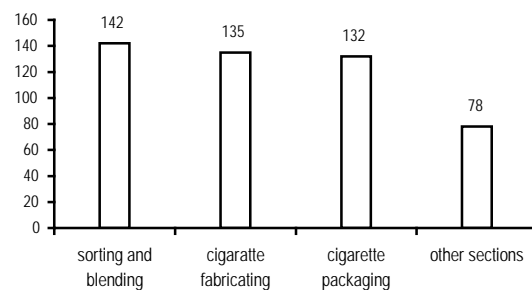


Figure 1. Frequency of distribution of non-smoking workers in different sections of tobacco-factory

Table 1- Frequency of respiratory complaints among non-smoking workers with regard to the work experience.

History of complaints	0-15 years	≥15 years	Total
Cough	15	27	42
Dyspnea	3	23	26
Tightness of chest	4	11	15
Sputum	8	23	31
Total	30	84	114

p-value=0.2, df=3, Chi-square = 4.5

Table 2- Frequency of spirometric patterns of non-smoking workers with regard to the work experience.

Spirometric patterns	obstructive	Restrictive and mixed	Total
Work experience(yrs)			
0-15	7	3	10
15-30	6	10	16
Total	13	13	26

p-value> 0.1, df=1, Chi-square=2.6

Table3 - Spirometric patterns of workers with regard to the section of their duty.

Different sections	Sorting	Cigarette making	Total
Spirometric pattern			
Obstructive	6	7	13
Restrictive and mixed	7	6	13
Total	13	13	26

p-value> 0.4, df=1, Chi-square=0.65

Table 4 - Radiologic appearance of non-smoking workers with abnormal spirometric pattern.

Chest radiography appearance	Number of patients(%)
Normal	37(79.5)
Obstructive	4(8.25)
Restrictive	2(4.5)
Other	4(8.25)
Total	47(100)

Of 8(1.92%) patients diagnosed for asthma, 3(0.72%) were working in cigarette fabricating section. Of 6 cases of restrictive disorders, 2 workers were in cigarette fabricating section, 2 workers were in sorting and blending section, 1 was in packaging section and the last one was in other sections. Our findings were presented in tables 1-4.

DISCUSSION

The measurement of tobacco dust performed previously in different sections showed that the total and respirable airborne dust concentration in the sections of sorting and blending were more than cigarette –making and cigarette-packing sections. The particles scattered in work environment contain G⁻ bacteria, mesophilic fungi, thermotolerant fungi, thermophilic actinomycetes and aspergillous. Generally, spores of the saprophytic fungi are the allergens that could induce hypersensitivity pneumonitis. As presented in the related tables, no significant difference was found between the workers' respiratory complaints (cough, sputum, dyspnea, chest tightness) and work experience, work condition in various sections and different concentrations of dust.

There was also no significant correlation between the workers' spirometric pattern, work experience, and their work environment. Despite the fact that most of the patients with lung disease were found in cigarette fabricating section, no significant correlation ($p>0.05$) was seen between type of pulmonary disease and different sections of the factory, and also between the above-mentioned disease, previous work history and exposure to tobacco.

Previous studies (3,9,10,12) have shown no significant relation between tobacco-dust exposure and workers' respiratory disorders. Levy et al. and Fruhmann et al. have demonstrated that respiratory disorders are more prevalent among tobacco-industry workers, of course, they have not excluded participants with history of respiratory disorder or smoking(11,13).

A few cases with respiratory disorders had abnormal radiographs. It is concluded that chest radiography, by itself, is not a reliable paraclinic test for screening and follow up of the workers exposed to tobacco dust. Like most of the relevant published articles, our results only represent the allergic reactions of workers respiratory system to tobacco dust; meanwhile, there is no conclusive reason indicating the frequent abnormal spirometric pattern in the tobacco-industry workers.

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