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CHRONIC RESPIRATORY SYMPTOMS AND VENTILATORY FUNCTION IN WORKERS EXPOSED TO TEA DUST: EFFECT OF DURATION OF EXPOSURE AND SMOKING

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Summary. *Many studies reviewed show that both workplace exposure to organic dust and smoking may cause chronic respiratory symptoms and airflow limitation in susceptible subjects.*
We performed a case-control study including 63 tea workers (36 male and 27 female, aged 36-55, duration of employment 3–30 years) and an equal number of office workers, matched by sex and age. Chronic respiratory symptoms (chronic cough, phlegm, dyspnea gr. 3-4, wheezing, wheezing with dyspnea, and chest tightness) were recorded by questionnaire. Skin prick tests and spirometric measurements were carried out. Environmental measurements were performed on site during the work shifts.
Prevalence of chronic respiratory symptoms in exposed workers was insignificantly higher (44.8% vs. 33.6%). Significantly higher prevalence of individual chronic respiratory symptoms was found for phlegm ($P<0.05$) and dyspnea gr. 3-4 ($P<0.05$). Chronic respiratory symptoms in exposed workers were significantly associated with duration of exposure ($P<0.05$) and current smoking ($P<0.05$, $P=0.011$), whereas relation of chronic respiratory symptoms and current smoking in controls just missed the significance ($P=0.056$). Values of FVC, FEV1, FEV1/FVC% and small airways indices in exposed workers were significantly lower. Small airways changes in exposed workers were strongly linked to duration of exposure ($P<0.05$) and current smoking ($P<0.01$), whereas relation of small airways changes and current smoking in controls was not significant.
Our data suggest interactive influence of workplace exposure to tea dust and current smoking in development of chronic respiratory symptoms and airflow limitation with predominantly smaller airways affecting.

Key words: *Chronic respiratory symptoms, duration of exposure, small airways, smoking, tea dust exposure*

Introduction

Subjects with workplace exposure to organic dust have high prevalence of respiratory diseases, such as asthma, chronic bronchitis, extrinsic allergic alveolitis, organic dust toxic syndrome, and interstitial lung disorders. Sometimes, respiratory pathologies are intricate and lead to a complex presentation where signs of irritation or inflammation of the respiratory tract are mixed (1).

Airways diseases associated with workplace exposure are common but still incompletely clear occupational diseases. There is increased evidence that any dust has potential to cause or to trigger symptoms of airways disease if the particles are water or lipid soluble and small enough to penetrate the lungs. Organic aerosols, including food, fur and textile dust, are described agents responsible for development of respiratory symptoms and airflow limitation (2). Some of them are shown to be potent sensitizers, such as dust from coffee, tea, soybeans, cotton, etc (3).

In a multicentric study carried out in 14 industrialized countries including 13,253 workers aged 20 to 40, Zock et al. (4) found an increased risk for development of bronchitis symptoms (cough and phlegm production for at least 3 months per year) and chronic bronchitis in agricultural, textile, paper, wood, chemical, and food processing workers. The European Community Respiratory Health Survey (ECRHS) data sets from Spain and New Zealand, where the risk of asthma-like symptoms (wheezing, cough, dyspnea, wheezing with dyspnea, and chest tightness) and asthma attributable to occupational exposure have been studied, suggest an increased risk of asthma-like symptoms and asthma in farmers and farm workers, plastic and rubber workers, cleaners and laboratory technicians. After creating a job exposure matrix, asthma-like symptoms and asthma was found to be associated with high dose exposure to biological and mineral dust, as well as to gases and fumes (5). In addition, smoking is the main potential confounder of most studies of respiratory disorders. The importance of tobacco smoke on respiratory impairment development has been demonstrated in both cross-sectional and longitudinal studies, and the extent of damage is constantly being updated (6).

In the present study we compared the prevalence of chronic respiratory symptoms and spirometric parameters, as well as its relation to duration of exposure and smoking between a group of workers exposed to vegetable dust (tea workers) and a group of unexposed controls (office workers), matched by sex and age.

Subjects and Methods

Study design

A case-control survey was carried out in the Institute of Occupational Health from June 2003 to September 2004.

Subjects

The exposed group included 63 subjects (36 males and 27 females, aged 36-55) employed in the manufacture of teas, that is, all workers in this plant. The duration of employment ranged from 3 to 30 years (≤9 yrs 61.6% of the employees, ≥10 yrs 38.4%), mean duration 12.2±7.9, median 9 yrs.

Teas processing was performed in 2 large closed working areas. Dried flowers, leaves, fruits and/or seed from the plants traditionally used for preparing tea (lime, birch, elder, chamomile, plantain, mugwort, dog rose, mint), as well as dried fruits (peach, strawberry, apple, orange) were cleaned and sorted. After that each sorted preparation was placed into the grinding machine in order to produce a crude powder which was packed as one tea component or complex mixture. During the working process the employees were protected by wearing working outfits, gloves and masks. According to the classification of occupational muscular work, tea processing was classified as a moderate muscular work (7).

Controls consisted of an equal number of office workers randomly selected from the general population, matched to exposed workers by sex and age.

Questionnaire

Chronic respiratory symptoms were documented using the European Community for Coal and Steel questionnaire (ECSC-87), and the ECRHS questionnaire (8, 9).

Specific symptoms were determined as follows:

- Chronic cough or phlegm: cough or cough up phlegm for at least 3 months per year (8);
- Dyspnea: Grade 3 – shortness of breath when walking with other people on the flat at a normal pace; Grade 4 – shortness of breath when walking at your own pace on the flat (8);
- Wheezing: wheezing or whistling in your chest at any time in the last 12 months (9);
- Wheezing and dyspnea – being at all breathless when the wheezing noise was present (9);
- Chest tightness: Wakening up with a feeling of tightness in the chest at any time in last 12 months (9).

The questionnaire also included questions about family history of asthma and atopic disease. Detailed smoking history, as well as any accompanying disease and medication use were evaluated.

Skin prick tests

Skin prick tests (SPT) to workplace allergens were performed using commercially available allergens (lime, birch, plantain, mugwort, fungi mixed, peach, and strawberry; Torlak, Beograd). The allergens were selected according to the presence of consequent plants in the working process. All tests include positive (1 mg/ml histamine) and negative (0.9% saline) controls. Prick tests were considered positive if the wheal diameter 20 min after allergen injection was at least 3 mm larger than the size of the negative control (10).

Spirometry

Spirometry, including measures of forced vital capacity (FVC), forced expiratory volume in one second (FEV1), FEV1/FVC ratio, maximal expiratory flow at 50% of FVC (MEF50), maximal expiratory flow at 25% of FVC (MEF25), and maximal expiratory flow at 25-75% of FVC (MEF25-75), was performed using a SanoScope-Schiller spirometer. The results were interpreted according to the recommendations of European Respiratory Society (ERS) (11).

Environmental measurements

Airborne vegetable dust was sampled on site during the 8-hours work shift. APA 30 sampler estimated total dust exposure by gravimetric method. In addition, the respirable fraction (particles with size less than 5μ) was determined by photometric method with device MINIRAM PDM-3. Temperature and relative air humidity were measured with an Asman's psychometer (VEB Type 11). The data obtained were presented as minimal, maximal, and mean values.

Statistical analysis

SPSS version 11.0 for Windows was used for data description and analysis. The data were presented as mean value with standard deviation or median. The Chi-square test was used for testing differences in the prevalence of respiratory symptoms among the groups. Comparison of spirometric measurements was performed by t-test for two independent samples. Association between variables was analyzed with Chi-square (or when appropriate Fisher's exact test) and Mann-Whitney U-test, whereas interactive influence of several variables on respiratory symptoms and ventilatory function was tested with multiple linear regression. A P-value less than 0.05 was considered as statistically significant.

Results

The anthropologic data and the smoking habits of the subjects enrolled in the study are given in Table 1.

Table 1. Characteristics of the subjects

Variable	Tea workers (n = 63)	Controls (n = 63)
Sex (M/F ratio)	1.3	1.3
Age (yrs)	45.6 ± 5.5	45.8 ± 6.1
BMI (kg/m^2)	26.5 ± 3.7	27.7 ± 3.8
Current smokers	25 (40.0%)	20 (32.0%)
Smoking experience (yrs)	18.7 ± 6.1	16.4 ± 6.2
Cigarettes per day	22.2 ± 9.8; Me 15	19.3 ± 10.2; Me 15
Ex-smokers	5 (8.0%)	7 (11.2%)
Passive smokers	9 (14.4%)	11 (17.6%)

Numerical data are expressed as mean value with standard deviation or median; the frequencies of current smoking, ex-smoking and passive smoking as number and percentage of examinees with certain variable.
M: male; F: female; yrs: years; BMI: body mass index; Me: median

Prevalence of positive SPT to workplace allergens was not significantly higher in tea workers (24% vs. 19.2%). The highest prevalence of positive SPT in tea workers was obtained for lime (19.2%), whereas in controls the highest prevalence of positive SPT was obtained for birch (14.4%).

The prevalence of chronic respiratory symptoms in tea workers and controls is shown in Table 2.

Table 2. Chronic respiratory symptoms in tea workers and controls

Chronic respiratory symptoms	Tea workers (n = 63)	Controls (n = 63)	Difference*
Any respiratory symptom	28 (44.8%)	21 (33.6%)	NS
Cough	26 (41.6%)	17 (27.2%)	NS
Phlegm	13 (20.8%)	5 (8.0%)	P < 0.05
Dyspnea gr. 3-4	18 (28.8%)	8 (12.8%)	P < 0.05
Wheezing	11 (17.6%)	6 (9.6%)	NS
Wheezing & dyspnea	8 (12.8%)	5 (8.0%)	NS
Chest tightness	6 (9.6%)	4 (6.4%)	NS

Data are expressed as number and percentage of examinees with certain variable.
NS: difference not statistically significant (P > 0.05).
* Tested by Chi-square test.

Respiratory symptoms in both tea workers and controls were not significantly associated with sex, age, sensitization to workplace allergens, and family history of asthma. Association of respiratory symptoms in tea workers with duration of exposure (≤9 and ≥10 yrs), current smoking, and passive smoking in tea workers and controls is shown in Table 3.

The association between chronic respiratory symptoms in exposed current smokers and smoking experience (≤5, 6 –10, 11 – 20, and ≥21 yrs) was statistically significant (P<0.01), as well as between chronic respiratory symptoms and cigarettes per day (≤10, 11 – 20, and ≥21) (P<0.05). In unexposed current smokers significance was found with smoking experience (P<0.05). A joint effect of the duration of exposure, active smoking, smoking experience, and cigarettes per day was significantly associated with respiratory symptoms in tea workers. All individual chronic respiratory symptoms, with the exception of chest tightness, showed a significant association with duration of exposure. Chronic cough and phlegm in both groups, as well as dyspnea in tea workers, were significantly associated with active smoking. There was not a significant association of any individual chronic respiratory symptom with passive smoking.

Spirometric parameters in tea workers were significantly lower (P<0.05) (Table 4).

Table 4. Spirometric parameters in tea workers and controls

Spirometric parameter*	Tea workers (n = 63)	Controls (n = 63)
FVC (%pred)	95.4 ± 10.5	103.4 ± 9.8
FEV1 (%pred)	88.4 ± 8.7	97.3 ± 9.2
FEV1/FVC%	75.6 ± 4.5	79.2 ± 3.1
MEF50 (%pred)	68.9 ± 10.7	90.5 ± 11.9
MEF25 (%pred)	58.0 ± 9.5	81.0 ± 11.0
MEF25-75 (%pred)	81.1 ± 16.7	104.5 ± 12.9

Data are expressed as mean value with standard deviation.
* FVC: forced vital capacity; FEV1: forced expiratory volume in one second; MEF50, MEF25, MEF25-75: maximal expiratory flow at 50%, 25% and 25-75% of FVC, respectively; % pred: % of predicted value.

Spirometric changes (mild grade of restrictive and obstructive changes, as well as small airways obstruction) are shown in Table 5.

Obstructive spirometric changes, as well as small airways changes, in both tea workers and controls were not significantly associated with sex, age, sensitization to workplace allergens, and family history of asthma.

Table 3. Association of respiratory symptoms with duration of exposure and smoking habit

Variable	Tea workers (n = 63)	P – value*	Controls (n = 63)	P – value*
Workplace exposure ≤ 9 yrs with respiratory symptoms	13/39 (33.3%)	P < 0.05	–	–
Workplace exposure ≥ 10 yrs with respiratory symptoms	15/24 (62.5%)			
Active smokers with respiratory symptoms	16/28 (57.1%)	P < 0.05	10/21 (47.6%)	NS
Active smokers without respiratory symptoms	9/35 (25.7%)		10/42 (23.8%)	(P = 0.056)
Passive smokers with respiratory symptoms	2/28 (7.2%)	(P = 0.011)	1/21 (47.6%)	NS
Passive smokers without respiratory symptoms	7/35 (2.0%)	NS	10/42 (23.8%)	

Data are expressed as number and percentage of examinees with certain variable with and without chronic respiratory symptoms.
Yrs: years; NS: difference not statistically significant (P > 0.05).
* Tested by Chi-square test.

Obstructive changes in both tea workers and controls were significantly associated with respiratory symptoms, whereas the association between small airways changes and respiratory symptoms in both groups was not significant.

Table 5. Spirometric changes in tea workers and controls

Variable	Tea workers (n = 63)	Controls (n = 63)	Difference*
Restrictive changes	3.2%	–	
Obstructive changes	9 (14.4%)	2 (3.2%)	P < 0.05
Small airways obstruction	23 (36.8%)	6 (9.6%)	P < 0.05

Data are expressed as number and percentage of examinees with certain variable.
* Tested by Chi-square test.

The association of obstructive changes in tea workers with duration of exposure, as well as active smoking, smoking experience, and cigarettes per day in tea workers and controls is shown in Table 6.

The association between obstructive changes and smoking experience, as well as cigarettes per day was not significant in both exposed and unexposed current smokers. A joint effect of duration of exposure, current smoking, smoking experience, and cigarettes per day on obstructive changes development in tea workers was not significant.

The association of small airways changes in tea workers with duration of exposure, as well as active smoking, smoking experience, and cigarettes per day in tea workers and controls, is shown in Table 7.

The association between small airway changes in exposed current smokers and smoking experience was statistically significant (P < 0.01), as well as between small airways changes and cigarettes per day (P < 0.01). The association between small airways changes and smoking experience, as well as cigarettes per day in unexposed smokers was not significant. A joint effect of duration of exposure, current smoking, smoking experience and cigarettes per day in tea workers was significant.

Data from environmental measurements suggested that workers employed in tea manufacture were exposed to respirable dust concentration and relative air humidity with borderline values obeying national standards (Table 8).

Table 8. Environmental measurements in the tea plant

Measurement	Result	Limit value
Respirable dust (mg/m^3)	3.1 ± 0.8 mg/m^3 (1.9 – 4.4)	3 mg/m^3
Air humidity (%)	41.0 ± 4.6% (37 – 45)	40 – 75%
Temperature (^{o}C)	20.5 ± 0.6 ^{o}C (20 – 21)	17 – 22 ^{o}C

Data are presented as mean value with standard deviation, minimal and maximal value.

Discussion

Chronic exposure to organic dust has been reported to lead to a greater prevalence of chronic respiratory symptoms and a reduction of ventilatory capacity. Workplace exposure leads to airways impairment in some workers, suggesting the importance of host factors in addition to environmental ones. As Boezen (14) con-

Table 6. Association of obstructive changes with duration of exposure and smoking habit

Variable	Tea workers (n = 63)	P – value*	Controls (n = 63)	P – value*
Workplace exposure ≤ 9 yrs with obstructive changes	3/24 (12.5%)	NS	–	–
Workplace exposure ≥ 10 yrs with obstructive changes	6/39 (15.4%)		–	
Active smokers with obstructive changes	4/9 (44.4%)	NS	0/2	NS
Active smokers without obstructive changes	21/54 (38.8%)		20/61 (32%)	
Passive smokers with obstructive changes	2/9 (22.2%)	NS	0/2	NS
Passive smokers without obstructive changes	7/54 (12.9%)		11/61 (18%)	

Data are presented as number and percentage of examinees with certain variable with and without obstructive changes.
Yrs: years; NS: difference not statistically significant (P > 0.05).
* Tested by Chi-square test.

Table 7. Association of small airways changes with duration of exposure and smoking habit

Variable	Tea workers (n = 63)	P – value*	Controls (n = 63)	P – value*
Workplace exposure ≤ 9 yrs with small airways changes	13/24 (54.1%)	P < 0.05	–	–
Workplace exposure ≥ 10 yrs with small airways changes	10/39 (25.4%)		–	
Active smokers with small airways changes	14/23 (60.9%)	P < 0.01	3/6 (50.0%)	NS
Active smokers without small airways changes	11/40 (27.3%)		17/57 (29.8%)	
Passive smokers with small airways changes	4/23 (17.4%)	NS	0/6	NS
Passive smokers without small airways changes	5/40 (12.5%)		11/57 (19.2%)	

Data are presented as number and percentage of examinees with certain variable with and without small airways obstruction.
Yrs: years; NS: difference not statistically significant (P > 0.05).
* Tested by Chi-square test.

cluded, "unfavourable environmental conditions are bad for all, but even worse for some". On the other hand, the severity of adverse respiratory health effects in susceptible subjects has not been consistently associated with the degree of exposure.

We studied the prevalence of chronic respiratory symptoms and ventilatory changes and its relation to duration of exposure and smoking in a group of subjects aged 35 to 55 years working in conditions of moderate muscular demand and exposure to vegetable dust and air humidity with borderline values regarding the national standards. Controls consisted of an equal number of unexposed subjects with sedentary work, matched by sex and age. Demographic data were similar for the subjects of both groups. The prevalence of current smokers was not significantly higher in tea workers, whereas the prevalence of passive smokers was not significantly higher in controls. We did not find a significantly higher prevalence of positive SPT to tea dust allergens in exposed workers. However, controls also exhibited a high prevalence of positive SPT as a consequence of a wide presence of these plants in non-occupational environment.

It is well established that workplace exposure to certain types of organic dust can cause respiratory inflammation and thereby leads to development of chronic respiratory symptoms and ventilatory function impairment. We found a higher prevalence of overall and individual chronic respiratory symptoms in tea workers with a significant difference for chronic phlegm and dyspnea gr. 3-4. The reviewed studies that analyzed the effect of organic dust exposure on respiratory health also showed a high prevalence of chronic respiratory symptoms. In a cross-sectional study including 240 animal food workers compared with internal controls, Kuchuk et al. (15) found a higher prevalence of chronic respiratory symptoms with a significant difference for bronchitis symptoms. Tanaka et al. (16), analyzing workplace-related chronic cough in 69 previously healthy subjects 2 years after starting work at mushroom farm, found its prevalence of 67%. In a cross-sectional study including 296 furniture workers Talini et al. (17) found a significantly higher prevalence of dyspnea and wheezing with dyspnea in woodworkers compared with assemblers (6.3% vs. 1.6%, and 7.7% vs. 1.6%, respectively) and an insignificantly lower prevalence of the same symptoms when woodworkers were compared with spray painters (6.3% vs. 11.5%, and 7.7% vs. 13.5%, respectively). Analyzing the respiratory effects of organic dust exposure in different occupations, Zuskin et al. (18) found the highest prevalence of chronic cough, phlegm and dyspnea in animal food workers (48.5%, 48.5%, and 28.5%, respectively) and the lowest one in spices workers (22.2%, 20%, and 26%, respectively). The prevalence of these symptoms in tea workers was found to be 34.6%, 30%, and 38%, respectively.

We found a strong association between all respiratory symptoms, as well as individual symptoms, with the exception of chest tightness, and duration of exposure, which is documented in other studies analyzing respiratory effects of organic dust (15, 16, 19). In addition, current smoking showed great importance in development of chronic respiratory symptoms in exposed workers, suggesting an interactive influence with workplace exposure. On the contrary, passive smoking was not significantly associated with chronic respiratory symptoms in both tea workers and controls (we didn't take into account the level of exposure to household and/or workplace tobacco smoke). A significant correlation of duration of exposure and current smoking with chronic respiratory symptoms is documented in many studies that analyzed the respiratory effect of different types of organic, as well as inorganic dust (20, 21). The results from the studies that analyzed the effect of passive smoking on respiratory symptoms development in exposed workers are somewhat inconsistent. Synthesizing the data from the studies reviewed, Jaakkola (22) concluded that it seems likely that passive smoking may cause chronic respiratory symptoms in both exposed and unexposed subjects and emphasized the need for more studies.

Spirometric parameters in tea workers were significantly lower, which confirms the constrictor effect of vegetable dust with predominantly smaller airways affecting. We found a significantly higher prevalence of obstructive changes and small airways changes among tea workers. The studies reviewed suggest that exposure to organic dust or mineral dust is associated with chronic airway limitation independent of cigarette smoking and separate from other effects of exposure such as pneumoconiosis, asthma or allergic alveolitis (23). In the study including 1,691 male farming students Omland et al. (24, 25) concluded that controls had higher FVC and FEV1 than exposed students, both nonsmokers and smokers, and that the shape of the maximum expiratory flow/volume curve reflected the farming exposure. We found a significant association between duration of exposure and reduced small airways flow, whereas the association with obstructive changes was not significant. Commonly, cross-sectional studies of respiratory effects of organic dust exposure show an annual decline in FEV1 depending on duration and level of exposure, whereas the results of the longitudinal studies are not always consistent (26). Wang et al. (27) reported a longitudinal decline in the lung function in workers exposed to cotton dust. Analyzing animal food workers Kuchuk et al. (15) reported a decrease in the lung function with duration of employment and small bronchi obstruction as the early sign of respiratory troubles. In the present study the association between obstructive changes and current smoking in both exposed and unexposed subjects was found not to be significant. Small airways changes were significantly associated with current smoking in exposed workers. Passive smoking was not significantly associated with obstructive changes and small airways changes in both tea workers and controls. The available evidence shows that smokers are at a high risk of

decreased FEV1 in both cross-sectional and longitudinal studies with a dose-dependent FEV1 decline ranging from 7–33 ml per year (28). The results from the studies on the relationship between passive smoking and lung function are inconsistent. Some cross-sectional studies showed a significant adverse effect on FEV1 or on the indices of small airways function or both (29). Longitudinal studies didn't demonstrate any effect of significance on the change in the lung function over time (22).

In conclusion, we found a high prevalence of chronic respiratory symptoms, as well as a significant airway limitation in the group of subjects aged 35–55 years working in conditions of exposure to respirable tea dust concentration with borderline values regarding the national standards with mean duration of exposure of 12 years and a large proportion of current smokers. The prevalence of chronic respiratory symptoms and small airways changes was significantly associated with duration of exposure and current smoking. Our study confirms the need for regular medical examinations in order to identify affected workers and thereby institute preventive measures. We also suggest a reevaluation of exposure limits in order to enable more appropriate protection. Finally, the importance of smoking cessation in this environment must be stressed. Tobacco control measures are necessary to prevent the interaction of smoking and workplace environment.

References

1. Dalphin JC. Respiratory pathology in the agricultural environment. Rev Prat 1998; 48: 1313-1318.
2. Strachan D. Early British studies of chronic respiratory disease and their current relevance. Eur Respir Mon 2000; 5: 23-45.
3. Karadzinska-Bislimovska J. Organic dust – exposure and respiratory effect. Mak med pregled 1997; 50: 132-134.
4. Zock JP, Sunyer J, Kogevinas M, Kromhout H, Burney P, Anto JM. Occupation, chronic bronchitis, and lung function in young adults. An international study. Am J Respir Crit Care Med 2001; 163: 1572-1577.
5. Janson C, Anto J, Burney P, Chinn S, de Marco R, Heinrich J, et al. The European Community Respiratory Health Survey: What are the main results so far? Eur Respir J 2001; 18: 598-611.
6. Slama K. Active smoking. Eur Respir Mon 2000; 5: 305-320.
7. Larson LA. Fitness, Health, and Work Capacity. International Standards for Assessment, International Committee for the Standardization of Physical Fitness. New York: Macmillan Publ. Co. 1974.
8. Minette A. Questionnaire of the European Community for Coal and Steel (ECSC) on respiratory symptoms. 1987 – updating of the 1962 and 1967 questionnaires for studying chronic bronchitis and emphysema. Eur Respir J 1989; 2: 165-177.
9. Burney P et al. Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Respiratory Health Survey (ECRHS). Eur Respir J 1996; 9: 687-695.
10. Pepys J. Skin testing. Br J Hosp Med 1975; 14: 412-417.
11. Quajner PhH, ed. Standardization of Lung Function Tests – 1993 Update. Report Working Party for the European Community for Steel and Coal. Official Statement of the European Rrespiratory Society. Eur Rrespir J 1993; 16 Suppl: 1-100.
12. Sterk PJ, Fabbri LM, Quanjer PhH, Cockroft DW, O'Byrne PM, Andersen SD, Juniper GF, Malo J-L. Airways Responsiveness. Standardized challenge testing with pharmacological, physical and sensitizing stimuli in adults. Report Working Party for the Standardization of Lung Function Tests. European Community for Steel and Coal. Official Statement of the European Respiratory Society. Eur Respir J 1993; 6: 58-83.
13. American Thoracic Society. Guidelines for Metacholine and Exercise Challenge Testing -1999. Am Respir Crit Care Med 2000; 161: 309-329.
14. Boezen HM, Schouten JP, Weiss ST. The Dutch hypothesis on chronic nonspecific lung disease. Eur Respir Mon 2000; 5: 37-48.
15. Kuchuk AA, Basanets A, Louhelainen K. Bronchopulmonary pathology in workers exposed to organic fodder dust. Ann Agric Environ Med 2000; 7: 17-23.
16. Tanaka H, Saikai T, Sugawara H, Takeya I, Tsunematsu K, Matsuura A, Abe S. Workplace-related chronic cough on a mushroom farm. Chest 2003; 123: 2160-2161.
17. Talini D, Monteverdi A, Benvenuti A, Petrozzino M, Di Pede F, Lemmi M, Carletti A, Macchioni P, Serretti N, Viegi G, Paggiaro P. Asthma-like symptoms, atopy, and bronchial responsiveness in furniture workers. Occup Environ Med 1998; 55: 786-791.
18. Zuskin E, Schachter EN, Kanceljak B, Mustajbegovic J, Witek T. Immunological and respiratory reactions in workers exposed to organic dust. Int Arch Environ Health 1994; 66: 317-324.
19. Gautrin D, Ghezzo H, Malo J-L. Rhinoconjunctivitis, bronchial responsiveness, and atopy as determinants for incident non-work-related asthma symptoms in apprentices exposed to high-molecular weight allergens. Allergy 2003; 58: 608-615.
20. Zuskin E, Mustajbegovic J, Schachter EN, Doko-Jelinic J. Respiratory function of textile workers employed in dyeing cotton and wool fibers. Am J Ind Med 1997; 31: 344-352.
21. Ulvestad B, Bakke B, Eduard W, Kongerud J, Lund MB. Cumulative exposure to dust causes accelerated decline in lung function in tunnel workers. Occup Environ Med 2001; 58: 663-669.
22. Jaakkola MS. Environmental tobacco smoke and respiratory diseases. Eur Respir Mon 2000; 5: 322-384.
23. Dimich-Ward H, Kennedy SM, Chan-Yeung M. Occupational exposures and chronic airways limitation. Can Respir J 1996; 3: 133-140.
24. Omland O, Sigsgaard T, Hjort C, Pedersen OF, Miller MR. Lung status in young Danish rurals: the effect of farming exposure on asthma-like symptoms and lung function. Eur Respir J 1999; 13: 31-37.
25. Omland O, Sigsgaard T, Pedersen OF, Miller MR. The shape of the maximum expiratory flow/volume curve reflects exposure in farming. Ann Agric Environ Med 2000; 7: 71-78.
26. Oxman AD, Muir DCF, Shannon HS, Stock SR, Hnizdo E, Lange HJ. Occupational dust exposure and chronic obstructive pulmonary disease. Am Rev Respir Dis 1993; 148: 38-48.
27. Wang XR, Pan LD, Zhang HX, Sun BX, Dai HL, Christiani DC. Lung function, airway reactivity, and atopy in newly hired female cotton textile workers. Arch Environ Health 2003; 58: 6-13.
28. Tashkin PD, Detels R, Simmons M, Liu H, Coulson AH, Sayre J, Rokaw S. The UCLA population studies of chronic obstructive respiratory disease: XI Impact of air pollution and smoking habit on annual change in forced expiratory volume in one second. Am J Respir Crit Care Med 1994; 149: 1209-1217.
29. Xu X, Li B. Exposure-response relationship between passive smoking and adult pulmonary function. Am J Respir Crit Care Med 1995; 151: 41-46.

HRONIČNI RESPIRATORNI SIMPTOMI I PLUĆNA FUNKCIJA KOD RADNIKA IZLOŽENIH PRAŠINI ČAJA: EFEKTI DUŽINE IZLOŽENOSTI I PUŠENJA

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Kratak sadržaj: *Brojne studije su pokazale da radno mesto, gde postoji izloženost organskoj prašini i pušenje mogu dovesti do hroničnih simptoma od strane respiratornog sistema i respiratornih smetnji kod predisponiranih individua. Preduzeta studija obuhvata 63 radnika (36 muškog i 27 ženskog pola, uzrasta 36-55, i radnim stažom od od 3-30 godina) i isti broj radnika iz administracije identičnog uzrasta i pola. Registrovani su u unapred pripremljeni upitnik hronični simptomi respiratornog sistema (hronični kašalj, iskašljavanje, dispneja 3-4 stepena, zviždanje sa dispnejom i stezanje u grudima). Sprovedeni su kožni prick testovi i spirometrijska ispitivanja. Merenja u radnoj sredini su preduzimana u toku rada smene.*

Prevalenca hroničnih respiratornih simptoma kod izloženih radnika bila je neznatno viša u poređenju sa kontrolom (44,8% prema 33,6%). Postoji statistički značajna razlika prevalence individualnih hroničnih respiratornih simptoma u slučaju iskašljavanja ($P<0,05$) i dispneje 3-4 stepena ($P<0,05$). Hronični respiratorni simptomi kod izloženih radnika značajno zavise od dužine ekspozicije ($P<0,05$) i pušenja ($P<0,05$, $P=0,011$), dok je veza hroničnih simptoma respiratornog sistema i pušenja kod kontrole nešto ispod granice statističke značajnosti ($P=0,056$). Vrednosi FVC, FEV1, FEV1/FVC% i pokazatelji malih disajnih puteva su kod izloženih radnika značajno niže. Promene na malim disajnim putevima kod eksponiranih radnika su strogo povezane sa dužinom ekspozicije ($P<0,05$) i pušenjem ($P<0,01$) i nema statistčki značajne povezanosti promena na malim disajnim putevima sa pušenjem kod kontrole.

Naši podaci ukazuju na interaktivni uticaj ekspozicije prašini čaja na radnom mestu i pušenja u razvoju hroničnih respiratornih simptoma i poremećaja plućne funkcije, koja se domianantno ogleda na nivou malih disajnih puteva.

Ključne reči: *Hronični respiratorni simptomi, dužina ekspozicije, mali disajni putevi, pušenje, ekspozicija prašini čaja*