

## RESPIRATORY SYMPTOMS AND CHRONIC BRONCHITIS IN AGRICULTURAL WORKERS

M. I. MIKOV

*Institute of Occupational Health, Faculty of Medicine, Novi Sad, Yugoslavia*

### ABSTRACT

In this study 471 persons from three agricultural estates and a control group of 219 persons were investigated. The group of agricultural workers consisted of 196 drivers of tractors and other vehicles, 113 stock workers, 162 maintenance workers and workers on other jobs. The control group consisted of the workers engaged in building, like concrete laying, metal works, and forestry workers. There were no essential differences between the groups with regard to diet, climate, housing and other socio-economic conditions.

The examination of each worker consisted of an interview based on the standard questionnaire for respiratory symptoms of the British Medical Research Council (1966), clinical examination, X-ray of the lungs and spirometric measurement of the ventilatory capacity. For diagnosing chronic bronchitis, the definition and diagnostic criteria of the MRC Commission for Aetiology of Chronic Bronchitis (1965) were applied.

The results obtained show a greater prevalence of chronic bronchitis in agricultural workers (15.3%) compared with 11.9% in the control group. This difference, however, is not significant. There are also differences in the prevalence of respiratory symptoms between agricultural workers and the workers in the control group: persistent coughing (17.5% and 21.9%), persistent coughing and sputum (13.2% and 9.1%), periods of extended coughing and sputum, or a pulmonary disease in the three preceding years (7.6% and 8.7%), dyspnoea of the 2<sup>nd</sup> to 4<sup>th</sup> degree (21.2% and 19.6%). These differences are not, however, statistically significant.

The results of this study show that the prevalence of respiratory symptoms and chronic bronchitis in both groups of workers is decidedly lower than the prevalence found earlier in marl miners, cement workers and in foundry workers. It is lower also if compared with the findings of other authors. This difference is due, among other things, to the air-pollution of the working environment of industrial workers, compared with agricultural workers who are not exposed or are only partially exposed to air pollution.

Intensive research work, especially in the past three decades, has shown that the aetiology of chronic bronchitis is very complex. Many epidemiological investigations in various population groups have revealed that tobacco smoking and air pollution in community and work environments play a specific role in the occurrence of chronic bronchitis, next to unfavourable socio-economic living conditions, infections of the respiratory system, inconvenient climatic factors, age, etc.<sup>2,4,5,6,8,10,12,15</sup>. Chronic bronchitis is a long lasting disease, that slowly but surely progresses, resulting in a decrease or loss of working capacity after a

certain period of time; therefore, it occupies a specific place in the morbidity of certain groups of workers.

Results of the epidemiological investigations in different groups of workers have shown that the prevalence of respiratory symptoms and chronic bronchitis is highest in workers exposed to very intense air pollution of the working environment, and far lower in the workers who are not exposed to such air pollution<sup>5,10,11,12,14</sup>. If the workers exposed to air pollution at places of work are smokers, the prevalence of respiratory symptoms and chronic bronchitis is likely to be higher. Our experience so far has shown that tobacco smoking and exposure of workers to air pollution of the working environment have a synergistic effect in the occurrence of respiratory symptoms and chronic bronchitis resulting in a high prevalence of respiratory symptoms and bronchitis in those workers<sup>10,11,12,13</sup>.

The prevalence of respiratory symptoms has been studied most frequently in miners and industrial workers and considerably less frequently in agricultural workers and woodmen. High values of bronchitis have been observed in miners, foundry, cement and other industrial workers exposed to intensive air pollution at places of work, especially in the group of smokers and ex-smokers whereas these values are markedly lower in non-smokers<sup>3,4,5,10,11,12,14</sup>. In agricultural workers the prevalence of respiratory symptoms and chronic bronchitis is remarkably lower than in industrial workers and miners<sup>4,5,8,17</sup>.

In order to study the prevalence of respiratory symptoms and chronic bronchitis the groups of agricultural and control workers have been tested by means of the standard questionnaire of the British Medical Research Council (1966)<sup>7</sup>.

#### SUBJECTS AND METHODS

A total of 471 male workers from three agricultural organizations (Group A) and a control group of 219 workers (Group B) were examined. The group of agricultural workers consisted of 113 cattle breeders, 196 tractor drivers and 162 workers engaged in the maintenance of agricultural machines, production and processing of feedstuffs and other activities. The control group consisted of the workers employed in the constructing of bridges and civil engineering (concrete workers, bricklayers, carpenters, fitters, locksmiths and others).

Cattle breeders work under unfavourable microclimatic conditions, especially in winter, are exposed to great physical effort pertaining to milking, feeding and cleaning of stables, ammonia vapours and unpleasant flavours. Tractor drivers are exposed to external atmospheric influences throughout the year and to dust 4–6 months on average during the year (depending on the moisture of soil) and exhaust gases. Some tractor drivers periodically spray plants with pesticides. In the subgroup of other agricultural workers some are permanently exposed to air pollution (workers in factories and mixing plants producing and processing feedstuffs), some periodically (blacksmiths, carpenters) and some very rarely (locksmiths, auto-mechanics, electricians, watchmen). The workers of the control group work out-of-doors in the open and are exposed to all external atmospheric influences but not to air pollution at places of work.

In respect to the geographical and climatic conditions, nutrition, housing and other socio-economic conditions of living there are no marked differences among agricultural workers and the controls. The examination of each worker included: a clinical examination with an interview by means of the standard questionnaire on respiratory symptoms accepted by the Commission for Aetiology of Chronic Bronchitis of the British Medical Research Council<sup>9</sup>, radiography of the lungs, ECG, spirographic examination of ventilatory capacity of the lungs, etc.

Radiography of the lungs was done not to establish the diagnosis of chronic bronchitis but rather to exclude diseases in which respiratory symptoms occur, such as: active tuberculosis, pneumoconiosis, malignant neoplasms and other.

Chronic bronchitis was diagnosed according to the definition and diagnostic criteria accepted by the British Medical Research Council and clinically dyspnoea has been classified into four grades, according to the instructions of the MRC<sup>7</sup>. The results obtained on the prevalence of respiratory symptoms and chronic bronchitis in the examined groups of workers have been classified by the smoking categories: non-smokers, ex-smokers and smokers in separate age groups (20-24 years, 25-34, 35-44, 45-54 and 55-64) and for all age groups together.

The tables of the Commission of the European Union for Coal and Steel have been used for the analysis of the spirographic measurements<sup>1</sup>.

### RESULTS

Table 1 surveys the examined groups of workers by age groups with the arithmetic mean of age. No significant differences are observed in the distribution of the examinees by age groups between the agricultural workers and the controls. The age group 35-44 years is found to be the most frequent in both groups of workers, whereas the age group 55-64 is the least frequent. No significant differences have been noted in the arithmetic mean of age between the agricultural workers (39.8 years old) and the controls (38.3).

TABLE 1  
Examined workers by age groups.

Age groups (years)	Agricultural workers			Control group		
	N	%	Mean age	N	%	Mean age
20-24	27	5.7	22.8	15	6.9	22.0
25-34	106	22.5	29.4	64	29.2	30.0
35-44	181	38.4	39.6	76	34.7	38.8
45-54	134	28.5	48.7	50	25.1	48.3
55-64	23	4.9	56.7	9	4.1	57.1
Total	471	100.0	39.8	219	100.0	38.3

Table 2 presents the prevalence of persistent cough, persistent cough and phlegm, periods of increased cough and phlegm, for the past three years and chronic bronchitis. As a rule, the prevalence of respiratory symptoms and bronchitis increases with the increased age in both groups of workers but there is no significant difference between the group of agricultural workers and the controls. No significant differences are observed in the prevalence of dyspnoea (grade II-IV) between the group of agricultural workers (21.2%) and the controls (19.6%).

TABLE 2  
Prevalence of some respiratory symptoms and chronic bronchitis by age groups in agricultural workers (Group A) and in control subjects (Group B).

Age groups (years)	N		Persistent cough		Persistent cough and phlegm		Periods of increased cough and phlegm for the past 3 years		Chronic bronchitis	
	A	B	A	B	A	B	A	B	A	B
20-24	27	15	-	-	-	-	-	-	-	-
25-34	106	64	7.6	7.8	3.8	4.7	2.8	3.1	7.6	4.7
35-44	181	76	18.8	15.8	13.3	13.2	6.6	9.2	13.8	15.8
45-54	134	55	24.6	45.5	18.7	12.7	11.2	14.5	22.4	12.7
55-64	23	9	39.1	66.7	39.1	44.4	26.1	22.2	39.1	44.4
Total	471	219	17.5	21.9	13.2	9.1	7.6	8.7	15.3	11.9

In respect to the differences in the conditions of work between separate occupations in the group of agricultural workers, the prevalence of chronic bronchitis is noted in the subgroups of those workers (cattle breeders, tractor drivers and other workers). The results obtained (Table 3) reveal the highest prevalence of bronchitis in cattle breeders (20.4%), followed by other workers (19.8%) and the lowest in tractor drivers (8.7%).

TABLE 3  
Prevalence of chronic bronchitis in subgroups of agricultural workers by age groups.

Subgroups of agricultural workers		Age groups					Total
		20-24	25-34	35-44	45-54	55-64	
Cattle breeders	No. of subjects examined	6	19	50	30	8	113
	No. with chronic bronchitis	-	1	9	8	5	23
Tractor drivers	No. of subjects examined	10	36	90	58	2	196
	No. with chronic bronchitis	-	2	7	8	-	17
Other workers	No. of subjects examined	11	51	41	46	13	162
	No. with chronic bronchitis	-	5	9	14	4	32

As it is known that smoking plays one of the most significant roles in the occurrence and higher distribution of chronic bronchitis, the prevalence has been analysed in separate smoking categories in the examined groups of workers. No significant difference in the prevalence of smokers between the group of agricultural workers and the controls is observed (60.9%:59.8%), whereas there are considerably more ex-smokers among agricultural workers (18.7%:12.3%) and remarkably fewer non-smokers (20.4%:27.9%).

Table 4 shows the relationship between the prevalence of chronic bronchitis and smoking category by age groups in agricultural workers (Group A) and the controls (Group B). From the table it is evident that the prevalence of bronchitis is highest in smokers in all age groups and considerably higher than in ex-smokers and non-smokers in the groups of agricultural and control workers.

TABLE 4  
Number of workers examined and number of workers with chronic bronchitis (in brackets) among agricultural workers (Group A) and among control subjects (Group B) according to smoking category and age.

Age groups	Non-smokers		Ex-smokers		Smokers		Total	
	A	B	A	B	A	B	A	B
20-24	6 (0)	8 (0)	2 (0)	1 (0)	19 (0)	6 (0)	27 (0)	15 (0)
25-34	18 (0)	25 (0)	15 (0)	6 (0)	73 (8)	33 (3)	106 (8)	64 (3)
35-44	40 (0)	16 (1)	30 (4)	11 (1)	111 (20)	49 (10)	181 (25)	76 (2)
45-54	25 (4)	11 (0)	35 (6)	9 (0)	74 (20)	35 (7)	134 (30)	55 (7)
55-64	7 (1)	1 (0)	6 (0)	0 (0)	10 (8)	8 (4)	23 (9)	9 (4)
Total	96 (6)	61 (1)	88 (10)	27 (1)	287 (55)	131 (24)	471 (72)	219 (26)

It is interesting to note that chronic bronchitis has not been found in non-smokers in the subgroups of tractor drivers and other agricultural workers (Table 5) but only in cattle breeders (21.4%). Chronic bronchitis is the most frequent in smokers in the subgroup of other workers (26.4%), followed by cattle breeders (20.9%), being least frequent in tractor drivers (11.4%).

TABLE 5  
Number of workers examined and number of workers with chronic bronchitis (in brackets) in the subgroups of agricultural workers according to smoking category.

Subgroup of agricultural workers	Non-smokers	Ex-smokers	Smokers	Total
Cattle breeders	28 (6)	18 (3)	67 (14)	113 (23)
Tractor drivers	43 (0)	39 (4)	114 (13)	196 (17)
Others	25 (0)	31 (4)	106 (28)	162 (32)

The results of the studies of ventilatory capacity in the group of agricultural workers and its subgroups as well as in the controls are presented in Table 6. From the table it is seen that the disturbance of pulmonary ventilation is considerably more frequent in control workers (27.4%) than in agricultural workers (17.0%). In the subgroups of agricultural workers the disturbance of pulmonary ventilation is found to be most frequent among other workers

TABLE 6  
Results of ventilatory capacity in the groups of agricultural workers and the controls. Number of subjects examined and number of subjects without or with ventilatory disturbance.

Group of workers	Subgroup or smoking category	N	Without ventilatory disturbance	With disturbance of pulmonary ventilation				
				Obstruc- tive	Obstructive- restrictive	Restrictive	Total	
Agricultural workers	Non-smokers	96	78	6	9	3	18	
	Ex-smokers	88	76	0	9	3	12	
	Smokers	287	237	6	37	7	50	
	Cattle breeders	113	92	5	14	2	21	
	Tractor drivers	196	172	5	15	4	24	
	Others	162	127	2	26	7	35	
	Total	471	391	12	55	13	80	
	Control group	Non-smokers	61	48	5	8	0	13
		Ex-smokers	27	19	2	5	1	8
		Smokers	131	92	9	26	4	39
Total		219	159	16	39	5	60	

(21.6%) and least frequent in tractor drivers (12.2%). In the control group a higher prevalence of the disturbance of pulmonary ventilation is found in smokers and ex-smokers (29.8% and 29.6%, respectively) than in non-smokers (21.3%), whereas in the group of agricultural workers it is vice versa (17.4% and 13.6% relative to 18.8%).

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