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AEROSOL ANALYSIS, RESPIRATORY FUNCTION AND SKIN SENSITIVITY TESTING IN WORKERS EXPOSED TO SOFT AND HARDWOOD DUST

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Ventilatory lung capacity (FVC, FEV_1, MEF_{50} and MEF_{75}) was measured before and after work shift in three groups of workers (356 in total) exposed to softwood (poplar, pine, mixed softwood, resp.) and in three groups (42 in total) exposed to hardwood dust (iroko, mahogany, okoume, resp.). The difference in levels of exposure to different types of wood dust was considerable; it was more expressed for total than for respirable particles.

Significant falls over work shift of all the ventilatory capacity measures except FVC were found in exposure to all softwoods. In hardwood dust exposure no acute effect was found on FEV_1 or FVC; significant decrease over shift was observed of MEF_{50} and MEF_{75} in mahogany exposure and of MEF_{75} in iroko exposure. The magnitude of acute falls was not wood type specific, but depended on exposure level irrespective of the type of wood.

No convincing evidence was found of chronic effects of the exposure to either soft or hardwood dust on ventilatory lung capacity.

Low frequencies of skin reaction to allergens prepared from the extracts of the dusts studied were observed.

There is exposure to airborne wood dust at all stages of wood processing. Exposure levels vary widely and there is still uncertainty about exposure limits particularly because of their dependence on the most important pathological end-point considered. The problem of health hazard evaluation in wood processing is further complicated by variable particle size distribution in various processes, many chemical compounds added at source or during the manufacturing process (fungicides, insecticides, glues, varnishes, fillers), by chemical changes due to heat produced by processes such as sanding, sawing and machining, and by additional exposure to microbiological agents.

There are two main groups of wood: softwoods derived from coniferous trees (*Gymnospermae*) and hardwoods derived from deciduous trees (*Angiospermae*) (1).

Wood processing has been associated with a variety of health effects the most important of which are effects on skin (2, 3), mutagenic and carcinogenic effects (4, 5), effects on the structure and function of the nasal mucosa (6 – 15), lung cancer (16 – 22), asthma (23 – 34), and increased prevalence of non-specific respiratory symptoms and/or decreased ventilatory lung function (35 – 46).

Half of the epidemiologic studies of respiratory effects published to date were on workers exposed to dust of Western red cedar (*Thuja plicata*) with reports on raised prevalence of respiratory symptoms, fall of FEV_1 over work shift and chronic decline of FEV_1 and/or mid-expiratory flow (43 – 46).

Chronic obstructive respiratory impairments in workers exposed to wood other than Western red cedar were reported in several published papers among which those by *Whitehead and co-workers* (37), *Goldsmith* (49), *Holness and co-workers* (41), and *Carosso and co-workers* (42) were epidemiologic studies on larger groups of workers suggesting increasing chronic reductions of respiratory function with increasing duration of exposure to wood dust. They reached the conclusion that specific wood dusts may present a specific occupational hazard and should non be regarded as a nuisance dust only.

In our early study (47), some ten years ago, on the effects of softwood dust on respiratory symptoms, ventilatory function, and frequency and severity of chronic non-specific respiratory disease in softwood workers, no difference was found in the prevalence of any respiratory symptom between the workers with longer and shorter length of exposure, nor was there any significant difference between the mean measured and normal predicted values in any of the measured ventilatory function tests irrespective of the length of exposure. However, a higher frequency and severity of chronic non-specific respiratory disease was found in workers employed in wood processing industry compared with those employed in total industry in the region of our study in the western part of Yugoslavia.

Because of the discrepancy between our results and those of the great majority of published epidemiologic papers on respiratory effects of exposure to wood dust, we examined, in addition, three groups of workers exposed to dust of softwood (canadian poplar, pine and mixed softwood, respectively) and three groups of workers exposed to dust of exotic hardwood (iroko, mahogany and okoume, respectively). Unfortunately,the latter three groups were very small because of the unavailability of larger groups of workers with pure exposure to one specific type of hardwood.

POPULATION AND METHODS

Population sample

The study population consisted of a total of 398 workers from six wood processing factories. The number of workers exposed to each type of wood dust and their mean, maximum and minimum lengths of exposure are presented in Table 1. The group exposed to softwood dust was large; a total of 356 workers were examined. However, although the total number of our workers engaged in the processing of exotic hardwood was over 150, only 42 of them were identified as having been exposed very

Table 1

Study population

Type of wood	No. of examinees	Length of exposure (years)		
		mean	max.	min.
Softwood				
Poplar	86	20	40	2
Pine	112	8	25	1
Mixed wood	158	11	32	1
Hardwood				
Iroko	9	5	9	0.5
Mahogany	17	4	28	0.1
Okoume	16	6	10	1

predominantly to hardwood dust; others had a history of exposure to both soft and hardwood and were excluded from our analysis.

Methods of environmental evaluation and spirometry

Airborne personal dust samples were collected on Millipore membrane filters with a pore size 0.8 μm, inserted in Millipore field monitors, at a flow rate of 2 litres per minute by Casella portable battery pumps. Personal respirable dust samples were collected using the same equipment with a 10 mm nylon cyclone. At locations where personal sampling interfered with the activities of the workers static samples were collected by locating the sampler at the nearest possible location to the workers' breathing zone. The dust samples collected on preweighted filters were desiccated and reweighted in the usual way.

Ventilatory function testing included the measurement of the forced vital capacity (FVC), the one-second forced expiratory volume (FEV_1), and the maximum expiratory flow rates at 50% (MEF_{50}) and 75% (MEF_{75}) of the control vital capacity. The FVC and FEV_1 were obtained from the forced expiratory spirograms recorded with Pulmonor spirometers (Jones Medical Instruments Co, Oakbrook, Ill, USA). The MEF_{50} and MEF_{75} were read from the maximum expiratory flow volume spirometers after *Peters, Mead and Van Ganse* (48) (Emmerson Co, Cambridge, Mass, USA). Three forced expiratory spirograms and three expiratory flow volume curves were recorded for each subject and the highest values were used as the result of the tests.

For the assessment of chronic effects of wood dust on ventilatory lung capacity the measures of ventilatory function were expressed as percentages of normal predicted values. The predicted values were calculated using our own prediction equations developed as separate equations for male and female smokers and non-smokers, as a function of body height, age and smoking habit on over 800 healthy examinees not exposed to air pollutants using the form of multiple linear regression analysis (49). In such a way all the measured values of ventilatory capacity were standardized for sex, age and smoking habit and it was therefore unnecessary to consider male and female, smoking and non-smoking examinees separately.

Statistics

Student's paired t-test was used for testing the significance of acute falls of ventilatory capacity measures over the work shift.

The lines in Figures 1 and 2, describing the dependence of the acute falls of ventilatory capacity measures over shift on the total and respirable dust concentration, were calculated by linear regression using the method of least squares after logarithmic transformation of the concentrations.

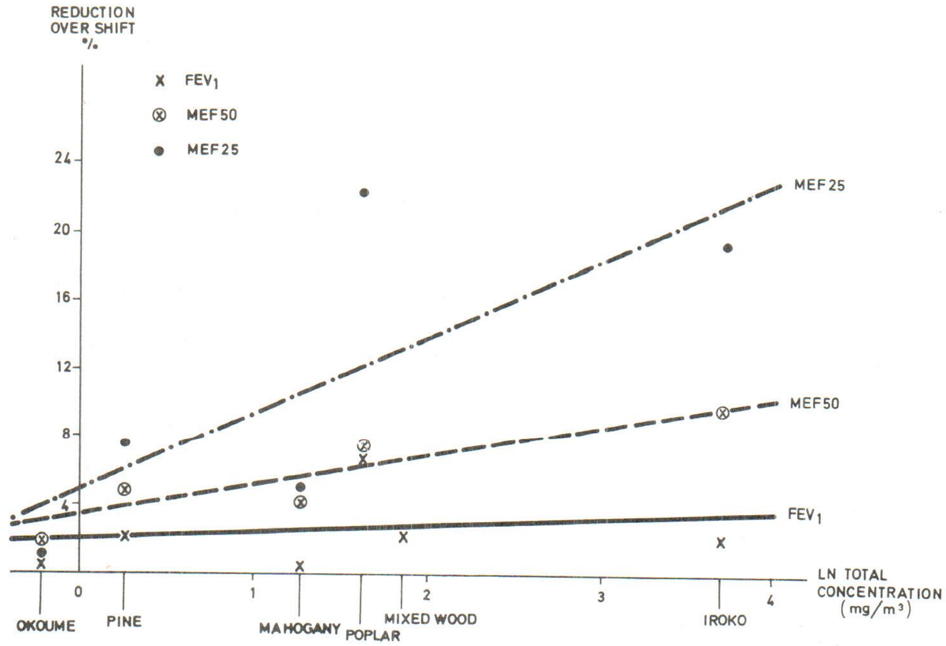

Figure 1 *Relative reduction of measures of ventilatory lung capacity over the work shift as a function of total airborne wood dust concentration*

Multivariate analyses of chronic effects were performed using four indices of ventilatory deficits (FVC, FEV_1, MEF_{50} and MEF_{75}) as response variables and length of exposure, total dust concentration, respirable dust concentration and their interactions as predictor variables. Ventilatory deficit is the difference between the measured and predicted normal value calculated by means of our prediction equations (49). The multivariate analysis in the form of multiple linear regressions and »step-wise« regressions were performed by means of computer programmes on a UNIVAC 1100 computer.

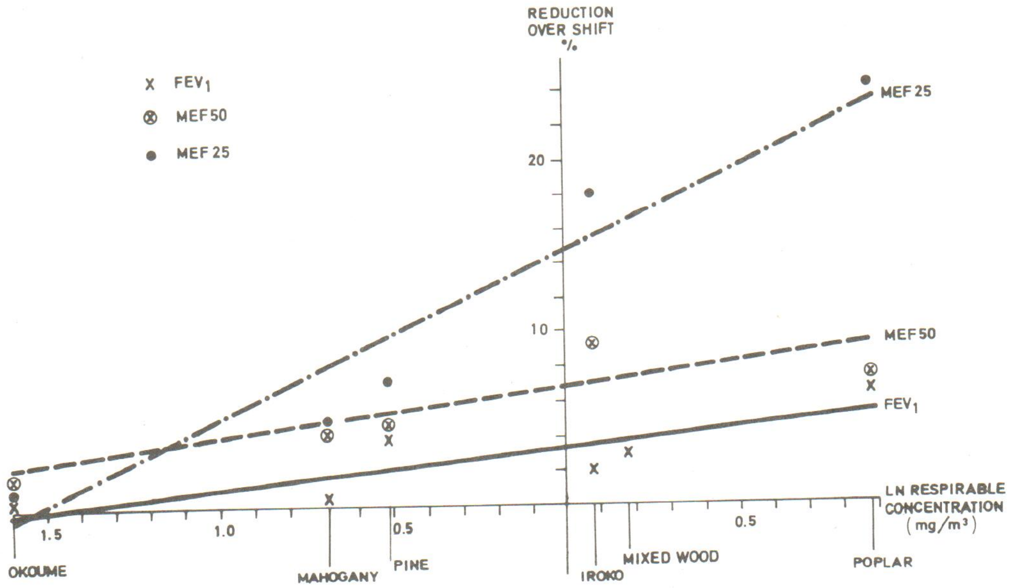

Figure 2 *Relative reduction of measures of ventilatory lung capacity over the work shift as a function of respirable airborne wood dust concentration*

RESULTS

The results of the determination of total and respirable airborne dust concentrations are presented in Table 2. The mean exposures to different types of wood dust differed a

Table 2

Total and respirable dust concentrations (mg/m³)

Type of wood	Concentration of total particles		Concentration of respirable particles	
	mean	S. D.	mean	S. D.
Poplar	5.1	3.2	2.4	1.8
Pine	1.3	0.9	0.6	0.4
Mixed softwood	6.5	2.8	1.2	0.7
Iroko	40.1	10.5	1.1	0.4
Mahogany	3.6	1.1	0.5	0.1
Okoume	0.8	0.1	0.2	0.03

Table 3

Mean relative reductions of ventilatory capacity measures over work shift

Type of wood		FEV_1				MEF_{50}				MEF_{75}			
		Before shift (ml)	After shift (ml)	%	t	Before shift (L/sec)	After shift (L/sec)	%	t	Before shift (L/sec)	After shift (L/sec)	%	t
Poplar	86	3850	3596	6.6	5.7*	6.4	5.9	7.5	6.2*	2.3	1.8	22.2	10.3*
Pine	112	3041	2974	2.2	3.2*	6.1	5.8	4.8	5.3*	2.9	2.7	7.5	6.2*
Mixed softwood	158	3596	3477	3.3	5.9*	not measured				not measured			
Iroko	9	3500	3427	2.1	1.5	5.2	4.7	9.6	3.1	1.9	1.5	19.3	3.9*
Mahogany	17	4550	4536	0.3	0.6	4.3	4.1	4.5	3.2*	2.0	1.9	5.0	3.3*
Okoume	16	3087	3068	0.6	0.9	5.5	5.6	+1.8	1.5	2.4	2.3	1.2	1.1

* $p < 0.01$

great deal among groups, particularly for total particles. The mean exposure to total particles of iroko was by far the highest.

The results of the measurement of ventilatory lung capacity before and after the work shift, the relative changes of lung function measures over the work shift and the corresponding t-values are presented in Table 3. The »t«s marked with an asterisk show the statistically significant falls ($P<0.01$) of ventilatory function over shift.

The results of measurement of FVC are not presented because the FVC changes over the work shift were inconsistent, small and all statistically insignificant.

The only significant falls of FEV_1 ($P<0.01$) were observed in exposure to dust of softwood (poplar, pine, mixed softwood), while there were no significant FEV_1 changes in any of the hardwood exposures. The drops over shift of MEF_{50} and MEF_{75} were greater than those of FEV_1 and statistically significant in exposure to softwood dust (poplar, pine). Both MEF_{50} and MEF_{75} were significantly decreased over the shift in mahogany exposure but not in iroko exposure, whilst both MEF_{50} and MEF_{75} were considerably decreased over the shift (9.6 and 19.3%, resp.). Only the fall of MEF_{75} was statistically significant. There was no change in exposure to the dust of okoume. Relative reductions of ventilatory capacity measures over the work shift as a function of

Table 4

Linear regression of ventilatory function measures (% of predicted) on duration of exposure to hardwood dust (years)

Type of wood	Test	N	Regression coefficient	t	p
Iroko	FVC	9	−0.92	−1.01	0.3453
	FEV_1	9	−3.46	−2.56	0.00378*
	MEF_{50}	9	−9.81	−5.74	0.0007*
	MEF_{75}	9	−8.81	−4.57	0.0026*
Mahogany	FVC	17	−0.63	−1.21	0.2437
	FEV_1	17	−1.23	−2.41	0.0290
	MEF_{50}	15	−1.21	−1.15	0.2723
	MEF_{75}	15	−1.20	−0.94	0.3653
Okoume	FVC	16	0.77	1.18	0.25.69
	FEV_1	16	0.90	1.28	0.2198
	MEF_{50}	16	−0.66	−0.24	0.8137
	MEF_{75}	16	−4.61	−1.14	0.2733
Hardwood combined	FVC	42	−0.47	−1.35	0.1045
	FEV_1	42	−1.00	−2.30	0.0267
	MEF_{50}	40	−1.55	−1.61	0.1144
	MEF_{75}	40	−2.09	−1.74	0.0895

* $p < 0.01$

total airborne dust concentrations disregarding the type of wood are presented in Figure 1. Relative reductions of ventilatory capacity measures over the work shift as a function of respirable airborne dust concentrations are presented in Figure 2. The relationships were linearized by using logarithms of airborne dust concentrations.

The figures show a consistent rank of the magnitude of changes over shift in the three ventilatory capacity tests measured. The exposure to wood dust caused the greatest fall over shift in MEF_{75} followed by MEF_{50} and only a slight fall in FEV_1. The relative fall of MEF_{75} depended much more on the level of airborne wood dust than the falls of the other two measures of ventilatory lung capacity.

In order to examine the possible chronic effects of wood dust exposure on ventilatory lung capacity, linear regression analyses of ventilatory function measures on duration of exposure to hardwood dust (no other possible predictor variable was considered) were carried out.

The only statistically significant regression coefficients were those of tests indicating changes in flow rates in iroko exposure, particularly MEF_{50} and MEF_{75}. No significant change in any of the ventilatory function measures was found in exposure to other types of hardwood or when all the workers exposed to hardwood dust were pooled in one group.

Table 5 shows the results of the same type of analysis of exposure to softwood dust. The majority of regression coefficients were insignificant ($P > 0.01$).

Table 5

Linear regression of ventilatory function measures (% of predicted) on duration of exposure to softwood dust (years)

Type of wood	Test	N	Regression coefficient	t	p
Poplar	FVC	88	−0.58	−3.52	0.0007*
	FEV_1	88	−0.61	−2.96	0.004*
	MEF_{50}	88	0.0007	0.0014	0.9989
	MEF_{75}	88	0.51	0.93	0.3550
Pine	FVC	112	0.02	0.15	0.8786
	FEV_1	112	−0.18	−1.12	0.2660
	MEF_{50}	66	−0.07	−0.14	0.8836
	MEF_{75}	66	−0.24	−0.48	0.6324
Mixed wood	FVC	158	−0.81	−4.07	0.000*
	FEV_1	158	−0.77	−2.91	0.0042*
	MEF_{50}			not measured	
	MEF_{75}				

* $p < 0.01$

Table 6

Skin reactivity (immediate) *

Type of dust	No. of examinees	Positive reactions									
		House dust		Moulds		A. fumigatus		Pollens		Dust extract	
		No.	%	No.	%	No.	%	No.	%	No.	%
Poplar	68	17	25.0	0	0	2	2.9	1	1.5	5	7.4
Pine	62	16	25.8	1	1.6	1	1.6	1	1.6	5	8.1
Mixed softwood dust	96	26	27.1	2	2.1	3	3.1	2	2.1	7	7.3
Iroko	9	1	11.1	0	0	0	0	0	0	1	11.1
Mahogany	17	2	11.8	0	0	0	0	1	5.9	2	11.8
Okoume	16	3	18.8	0	0	0	0	1	6.3	2	12.5

* No delayed reaction observed

The results of 93 multiple linear regression analyses, out of which 17 step-wise, performed to assess the significance of the relative contribution of each of the predictor variables (length of exposure, levels of exposure to total airborne dust and to respirable dust, products of length and level of exposure to total and respiratory dust) to the possible chronic deficits of the measures of ventilatory capacity, were inconsistent and highly insignificant.

The results of the skin reactivity testing are presented in Table 6. The examinees were tested with four standard inhalatory allergens: house dust, mould, A. fumigatus and pollens, and with specific extracts prepared from the airborne dusts collected at the work places of all the six groups of examinees.

No case of delayed reaction was observed. The frequency of positive immediate reactions to allergens prepared from dust extracts was slightly higher in groups of workers exposed to hardwood than in these exposed to softwood, but the frequencies were very low in comparison with those of positive reactions to some organic dust allergens found in some of our other studies (50–53).

DISCUSSION

The results of epidemiologic studies of respiratory effects among workers exposed to woods other than Western red cedar are not consistent. In comparison with a control group, *Brooks and co-workers* (35) found a significantly higher prevalence of respiratory symptoms in their 59 workers exposed to hemlock, Douglas fir and alder. The prevalence was over twice that among their unexposed controls but there was no FEV_1 change over work shift or association of chronic changes of FEV_1 with years of employment. *Al Zuhair and co-workers* (36) did not find any difference in the prevalence of respiratory symptoms in their 113 wood workers compared with that in a normal working population. They found significant drops of FEV_1 and FVC over shift in one of the two factories studied but no changes in MMFR, MEF_{50} or MEF_{75}. No dose-response relationship was observed between the level of exposure to airborne dust and changes of FEV_1 or FVC over shift. *Whitehead and co-workers* (37) studied 354 workers exposed to hardwood dust (mainly maple) and 220 workers exposed to dust of softwood (pine). They concluded that the results observed were consistent with the occurrence of double to triple prevalence of low pulmonary flow rates in workers exposed to medium or high levels of hardwood and double to quadruple prevalence in those exposed to high levels of pine dust compared to those in workers exposed to low levels. Analysing their results it is difficult to accept their conclusions; no convincing dose-response relationship between respiratory changes and cumulative dust exposures can be derived from their data and there was a lack of response among non-smokers. *Beckman and co-workers* (38), using logistic regression with maximum likelihood estimation, re-examined the results of *Whitehead and co-workers* (37) obtained on their pine furniture workers and found no association with years of exposure to pine wood dust. *Hedenstierna and co-workers* (39) observed a significant chronic decrement of FEV_1 and increase of closing volume and phase III% N_2/L in 24 non-smokers exposed to dust of pine; however, no significant correlation between lung function and duration of exposure was found. There was no acute change in ventilatory capacity when Monday morning values were compared with Wednesday or Thursday afternoon values. *Goldsmith* (40) found a significant correlation between peak flow and cumulative employment in wood dust jobs and with fraction of particles less than 10 μm in size in 55 workers predominantly exposed to dust of four hardwoods (oak, mahogany, andiroba, walnut). No acute change during the work shift was observed. *Holness and co-workers* (41) did not find a significant difference in the lung function of 48 wood workers exposed to dust of unspecified wood compared with 45 controls, but described a significant inverse relationship between FEV_1 and MEF_{75} and cumulative exposure using either respirable or total dust values, a finding that appears to be illogical. *Carosso and co-workers* (42) observed a chronic decrease of FEV_1 and MEF_{50} which was related to square of duration of exposure in their 35 workers exposed to unknown concentrations of dust of unspecified wood.

We found significant falls over work shift of all the measured tests of ventilatory lung capacity except FVC in exposure to poplar, pine and mixed softwood dust, the relative falls of expiratory flow rates being greater than those of FEV_1. Our results are different from those of *Brooks and co-workers* and *Hedenstierna and co-workers* who found no FEV_1 change over shift in exposure to softwood dust (35, 39). Our findings correspond partly to those of *Al Zuhair and co-workers* (36) who measured significant drops of FEV_1 over shift but no changes in MEF_{50} and MEF_{75}. They also found significant drops of FVC over shift which was not the case in our workers exposed to softwood. It would be difficult to accept that an organic dust is likely to cause an acute reduction of FVC while not causing any change in expiratory flows.

Exposure of our examinees to the dust of hardwood, whilst without effect on either FEV_1 or FVC, produced a significant decrease over the shift of both MEF_{50} and MEF_{75} in mahogany exposure and only of MEF_{75} in iroko exposure. *Goldsmith* (40) did not observe acute effects in his 55 workers exposed to dust of hardwood.

It is difficult to interpret our results of acute changes over work shift because of the considerable variation in the number of examinees among the groups examined. While the numbers are comparatively high in the groups of examinees exposed to softwood dust, the numbers of examinees in the groups exposed to the dust of exotic hardwood are considerably smaller. Some mean ventilatory capacity reductions measured are not statistically significant possibly because of very small N and not because of lack of effect of dust exposure on lung capacity. For example, the MEF_{50} reduction in iroko exposure, which is a considerable 9.6 per cent, is not statistically significant, while a much smaller reduction of 4.5 per cent in mahogany exposure is statistically significant because of the great difference in the number of examinees involved, namely nine in the former versus 17 in the latter.

Acute reductions over the work shift did not seem to depend much on the type of wood dust. Contrary to expectation, the reductions were not more emphasized in the exposure to hardwood compared to softwood dust. The acute reductions of ventilatory lung capacity depended on exposure level irrespective of the type of wood. In our case the greatest acute fall over the work shift, if the levels of exposure to total dust are considered, was in exposure to iroko followed by mixed softwood and poplar (Figure 1). If the exposure levels to respirable dust are considered, the greatest fall was found in the exposure to poplar, followed by mixed softwood (Figure 2).

The six groups of examinees differed greatly in their respective levels of dust exposure. Therefore, in order to assess the comparative short-term respiratory potency of each type of wood dust studied, the respective relative reductions of ventilatory lung capacity over work shift per unit concentration of each dust were calculated (Tables 7 and 8).

Considering the concentration of total wood dust, the greatest unit potency was that of pine, followed by poplar. The unit potencies of hardwood were lower than those of softwood dust irrespective of which of the ventilatory capacity measures was taken into consideration (Table 7). Considering the concentration of respirable dust, while pine and poplar were the most potent types of wood on the basis of the unit reduction of FEV_1, iroko and mahogany were found to be at least as potent regarding the falls of ventilatory expiratory flows (both MEF_{50} and MEF_{75}) (Table 8). However, it should be emphasized that some of the ventilatory capacity falls over shift were not statistically significant ($P > 0.05$), as shown in Table 3.

We did not find convincing evidence of chronic effects of the exposure to either hard- or softwood dust on ventilatory lung capacity. Trying to associate the changes of ventilatory function measures expressed as percentage of predicted with the duration of exposure to wood dust by linear regression analyses, the only statistically significant regression coefficients were those of FEV_1, MEF_{50} and MEF_{75} in iroko exposure and those of FVC and FEV_1 in poplar and mixed softwood exposures. Taking into consideration that the exposure level to iroko dust was by far the highest compared with all other levels, the finding in iroko exposure may well be the consequence of the exceptionally intense exposure to this dust which may have brought about chronic alterations of flow rates already after a comparatively short length of exposure rather than a sign of a specific potency of this exotic wood. It would be difficult to offer any reasonable interpretation of the significant FVC regression coefficients in poplar and mixed softwood exposures.

Our attempt to assess the relative contributions of length and levels of exposure to total and respirable airborne dust to the possible chronic deficits of the measures of ventilatory capacity by 93 multiple linear regression analyses gave inconsistent results and no significant contribution of any of the predictor variables considered.

Our findings agree with those presented in our previous paper published over ten years ago (47) as well as with the findings of *Brooks and co-workers* (35), *Beckman and co-workers* (38), and *Hedenstierna and co-workers* (39) who found no association of chronic changes of FEV_1 with years of employment. Our results do not agree with the findings of *Whitehead and co-workers* (37) who described an increasing prevalence of low pulmonary flow rates with increasing levels of dust exposure; their conclusions, however, are not convincing as they found no response among non-smokers and no dose-response relationship between respiratory changes and cumulative dust exposures. *Carosso and co-workers* (42) observed a chronic decrease of FEV_1 and MEF_{50} related to square of duration of exposure but in a very small group of workers and without

Table 7

Ventilatory function reduction over shift per unit of total dust concentration

	Type of wood					
	Poplar	Pine	Mixed softwood	Iroko	Mahogany	Okoume
Average concentration (mg/m^3)	5.1	1.3	6.5	40.1	3.6	0.8
Mean FEV_1 reduction (%)	6.6	2.2	3.3	2.1	0.3	0.6
FEV_1 red./unit. conc. (% per mg/m^3)	1.3	1.7	0.5	<0.1	<0.1	0.8
Mean MEF_{50} reduction (%)	7.5	4.8	not measured	9.6	4.5	no reduction
MEF_{50} red./unit. conc. (% per mg/m^3)	1.5	3.7	–	0.2	1.3	–
Mean MEF_{75} reduction (%)	22.2	7.5	not measured	19.3	5.0	1.2
MEF_{75} red./unit. conc. (% per mg/m^3)	4.4	5.8	–	0.5	1.4	1.5

Table 8

Ventilatory function reduction over shift per unit of respirable dust concentration

	Type of wood					
	Poplar	Pine	Mixed softwood	Iroko	Mahogany	Okoume
Average concentration (mg/m^3)	2.4	0.6	1.2	1.1	0.5	0.2
Mean FEV_1 reduction (%)	6.6	2.2	3.3	2.1	0.3	0.6
FEV_1 red./unit. conc. (% per mg/m^3)	2.8	3.7	2.8	1.9	0.6	3.0
Mean MEF_{50} reduction (%)	7.5	4.8	not measured	9.6	4.5	no reduction
MEF_{50} red./unit. conc. (% per mg/m^3)	3.1	8.0	—	8.7	9.0	—
Mean MEF_{75} reduction (%)	22.2	7.5	not measured	19.3	5.0	1.2
MEF_{75} red./unit. conc. (% per mg/m^3)	9.3	12.5	—	17.5	10.0	6.0

specifying either the type of dust or levels of exposure. *Holness and co-workers* (41) described a significant inverse relationship between the values of FEV_1 or MEF_{75} and cumulative exposure but no difference in the values of lung function of their exposed workers and controls,which findings are contradictory. *Goldsmith* (40), however, found a significant correlation between expiratory peak flow and duration of exposure in a small group of workers exposed to mixed hardwood dusts.

No evidence was obtained of either immediate or delayed skin reaction to allergens prepared from the extracts of the wood dusts studied.

CONCLUSIONS

Unlike the findings of some other epidemiologic studies, our findings do not suggest a chronic alteration of ventilatory lung function in exposure to airborne wood dust under exposure conditions studied. In addition, the observed significant acute falls of lung function measures over work shift do not seem to be a specific response to the dust of a specific type of wood but rather a general response to inhaled airborne particles dependent on their concentrations and/or their biological activity.

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Sažetak

ANALIZA EKSPOZICIJE, RESPIRATORNA FUNKCIJA I KOŽNA PREOSJETLJIVOST U RADNIKA IZLOŽENIH PRAŠINI MEKOG I TVRDOG DRVA

Izmjereni su testovi ventilacijske funkcije pluća (FVK, FEV_1, MEP_{50} i MEP_{75}) prije i nakon radne smjene u tri skupine radnika (ukupno 365) izloženih prašini mekog drva (topola, crnogorica i miješano meko drvo) i u tri skupine radnika (ukupno 42) izloženih prašini tvrdog drva (iroko, mahagonij i okume). Razine izloženosti prašinama različitih tipova drva znatno su se razlikovale, više za ukupne nego za respirabilne aerogene čestice.

Utvrđeni su značajni akutni padovi svih testova ventilacijske funkcije pluća tijekom radne smjene osim FVK uz ekspoziciju prašini svih mekih drva. Pri ekspoziciji prašini tvrdog drva nisu nađene akutne promjene niti FEV_1 niti FVK; utvrđeni su samo značajni akutni padovi vrijednosti MEP_{50} i MEP_{75} uz ekspoziciju prašini mahagonija i MEP_{75} u radnika izloženih prašini iroka. Akutne promjene ventilacijske funkcije nisu bile specifične za pojedinu vrstu drva, nego su ovisile o razini ekspozicije bez obzira na vrstu drva.

Nisu utvrđeni uvjerljivi pokazatelji kroničnih učinaka izloženosti prašini bilo mekog bilo tvrdog drva na ventilacijsku funkciju pluća.

Testiranje kožne preosjetljivosti alergenima pripravljenim iz prašine drva dalo je nisku prevalenciju pozitivnih kožnih reakcija.

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