

TABLE I : FVC, FEV₁ & PEFR/min in relation to the duration of exposure in Rice and Saw mill workers.

Duration	Mill workers	Number	Average Age	FVC	FEV ₁	PEFR/min
1 year	Rice	18	21.6±2.4	3.45±0.39	2.19±0.27	202.95±18.88
	Saw	14	20.9±2.0	3.36±0.28	2.19±0.18	190.79±11.97
1-5 year	Rice	15	30.88±3.6	3.38±0.23	2.17±0.20	215.6±61.57
	Saw	19	30.42±3.76	3.089±0.16	2.093±0.16	222.0±21.87
More than 5 years	Rice	23	42.87±4.8	3.17±0.39	1.64±0.24	170.5±18.78
	Saw	38	43.13±4.2	2.69±0.121	1.54±0.11	141.97±9.94

Each subject was asked to exhale into the spirometer as forcibly as possible after maximum inspiration. Each test was repeated 3 times and highest reading was taken for calculation.

Statistical significance was calculated by using the paired 't' test.

RESULTS

The parameters studied were FVC, FEV₁ and PEFR/min. They were analysed by comparing them with the controls, rice mill and saw mill workers together and regrouping them according to their duration of exposure and comparing among themselves and also with the controls.

Fig. 1 shows the overall comparison between the controls with rice mill and saw mill workers. It clearly shows that the FVC is significantly reduced in saw mill workers when compared with the controls ($P < 0.05$) and also rice mill workers

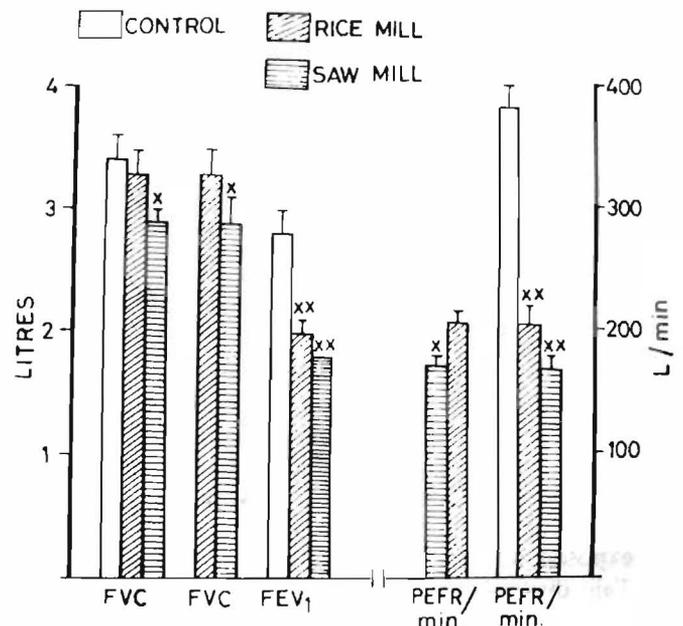


Fig. 1 : Comparison of FVC, FEV₁ and PEFR/min. in control, Rice and Saw mill workers.
x = $P < 0.05$, xx = $P < 0.001$

TABLE II : Comparison of FVC, FEV₁ & PEFR/min of Rice and Saw mill workers with controls.

* = $P < 0.05$ ** = $P < 0.001$

	Number	FVC	FEV ₁	PEFR/min
Control	68	3.43±0.21	2.84±0.23	383.3±17.6
Rice-mill workers	56	3.32±0.19	1.98±0.14**	211.3±11.5**
Saw mill workers	71	2.93±0.1*	1.79±0.08**	172.9±9.29**

* = $P < 0.05$

** = $P < 0.001$

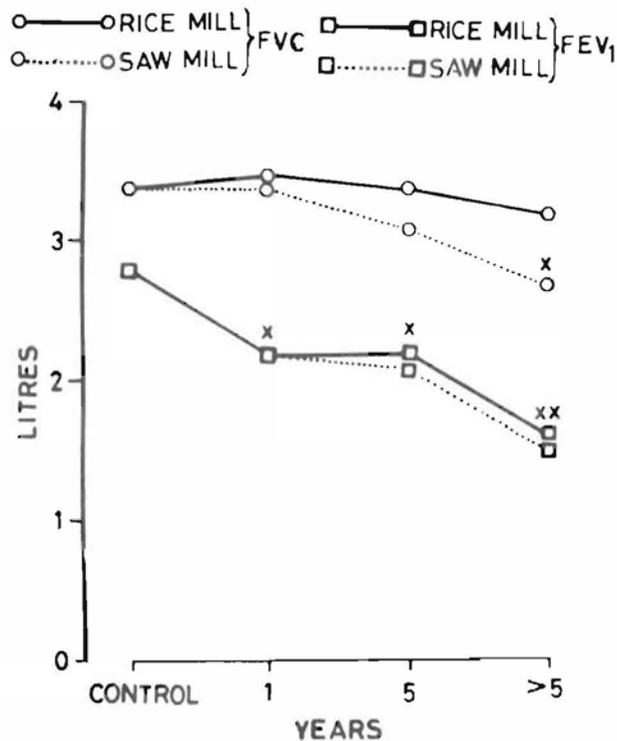


Fig. 2 : Comparison of FVC & FEV₁ in both mill workers with controls according to the duration of exposure to dust.
x = P < 0.05; xx = P < 0.001

(P < 0.05). But the rice mill workers showed no significant change with the controls. On the other hand the FEV₁ and PEFR/min are markedly reduced (P < 0.001) in both rice mill and saw mill workers when compared with the controls. It may be noted that the reduction in PEFR/min in saw mill workers is also significantly when compared with the rice mill workers.

Fig. 2 and 3 illustrate the comparison of FVC, FEV₁ and PEFR/min in both the mill workers according to the duration of exposure with the controls.

In Fig. 2 the FVC shows significant reduction in saw mill workers only after 5 years of exposure, whereas FEV₁ is reduced in both the workers within a year which was further reduced after 5 years. The Fig. 3 shows PEFR/min is highly reduced

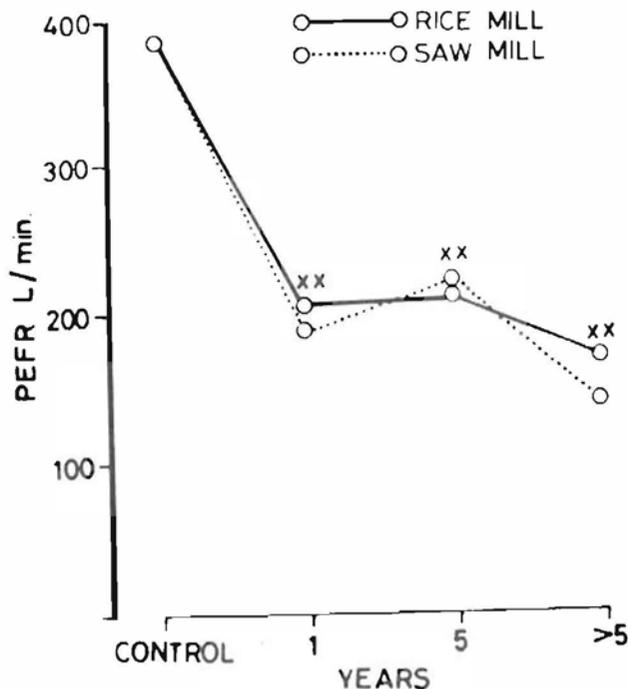


Fig. 3 : Comparison of PEFR/min. in both mill workers with controls, according to the duration of exposure to dust.
x = P < 0.05; xx = P < 0.001

(P < 0.001) in both the mill workers within a year which remains so even after 5 years.

DISCUSSION

Our results show that FVC is not significantly reduced in rice mill workers whereas saw mill workers show a significant reduction (P < 0.05) when compared with controls and rice mill workers. This shows that saw dust causes much more damage to the bronchi and the elastic component of the alveoli, resulting in a restrictive type of lung impairment. However, Singh et al, found significant reduction in FVC in rice mill workers also. But the other investigators (2) found no significant reduction in FVC in cotton spinners. On the other hand, in our study a significant reduction in FVC is seen only in saw mill workers after 5 years of exposure.

FEV₁ shows a (P < 0.05) significant reduction in both mill workers within a year of exposure,

which is further reduced after 5 years. This shows that exposure to both rice and saw dust causes obstructive pulmonary impairment early (within a year) which further increases after 5 years of exposure. This may be due to the release of Air-borne endotoxin which may cause inflammatory reaction in bronch-pulmonary system (11, 12).

PEFR/min shows a highly significantly fall in both mill workers when compared to controls the fall being more in saw mill workers which shows a significant reduction even when compared to rice mill workers. PEFr/min shows a highly significantly fall ($P < 0.001$) within a year in both mill workers which remains so even after 5 years which

shows that endurance of respiratory muscles is highly affected at an early date.

A significant restrictive pulmonary impairment is seen only in saw mill workers after 5 years of exposure as indicated by a significantly reduction in FVC, whereas obstructive type of lung impairment is seen in both mill workers within a year which could be due to the air-borne endotoxin causing bronchospasm at an early stage which increases with further exposure.

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REFERENCES

1. Gupta KC, Kulkarni PS, Byssinosis in textile industry of Ahmadabad. *Ind J Chest Dis* 1963; 5:135-40.
2. Singh SH, Gupta HL, Gandhi A, Rai UC. A study of lung function abnormalities in workers of cotton spinning shops. *Ind J Physiol Pharmacol* 1986; Vol. 30:79-84.
3. Hankinson JL, Roger RB, Morgan WKC. Maximal respiratory flows in coal miners. *Am Rev Res Dis* 1977; 116: 175-80.
4. Elkarim, Mohammed A, Awao Q, Mohammed et al: Respiratory and Allergic disorders in workers exposed to grain and flour dusts. *Arch Environ Health* 1986; 41 : 297-301.
5. Viegi G, Paggiaro PL, Begliomini E, Vaggetti E, Pasletti P, Giluntini C. Respiratory effects of occupational exposure to Tobacco dust. *Br J Ind Med* 1986; 43 : 802-8.
6. McCarthy PE, Cockerof AE, McDermott M. Lung function after exposure to Barely dust. *Br J Ind Med* 1985; 42 : 106-10.
7. Damodar D, Agarwal, Sharma PN. Changes in ventilatory capacities due to talc dust. *Ind J Chest Dis & Allied Sci* 1983 25 : 21-24.
8. Pepys J. Hypersensitivity disease of the lungs due to fungi and organic dusts. Monographs in allergy. Vol. 4, eds. Kallos P, Hask M, Inderbirzen TM, Miescher PA, Walksman BH. PP. 1-147, Basel: Karger S, 1969.
9. Dosman JA, Cotton DJ, Graham BL, L1 KYR, Froh F, Barnett GD. Chronic bronchitis and decreased forced expiratory flow rates in life time on smoking grain. *Am Rev Respir Dis* 1980; 121 : 11-16.
10. Chan Yeung, Wong MR, MaClean L. Respiratory abnormalities among grain elevator workers. *Chest* 1979; 75 : 461-67.
11. Singh SK, Nishith SD, Tandon GS, Shukla N. Some observation on pulmonary function tests in Rice mill workers. *Ind J Physiol Pharmacol* 1988; Vol. 32 : 152-57.
12. Olenchoch, SA, Christiani DC, Mull JC, Yie Shen, Pie Lian LU. Airborne endotoxins in a rice production commune in the people's Republic of China. *J Toxicol Environ Health* 1984; 13 : 545-51.