# A COMPARATIVE STUDY OF LUNG FUNCTIONS IN RICE MILL AND SAW MILL WORKERS

## M. RAMESH BHAT\* AND C. RAMASWAMY

Department of Physiology, Kasturba Medical College, Mangalore - 575 001 (D.K.)

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**Abstract**: A lung function study was carried out to determine the relative effect of rice husk and saw dust on mill workers. The study consisted of 195 subjects of which 56 rice mill workers, 71 saw mill workers and 68 controls of similar age, sex and socio-economic condition.

FVC was significantly reduced in saw-mill workers compared to both the controls and rice mill workers. Both  $FEV_1$  and PEFR/min were significantly reduced in both mill workers compared to controls. The fall in PEFR/min in saw mill workers was also significant when compared to rice mill workers.

FVC was reduced after 5 years of exposure only in saw mill workers.  $FEV_1$  was reduced within a year which was further reduced after 5 years in both mill workers. PEFR/min was highly reduced within a year remained so even after 5 years.

Key words:

lung function tests

saw mill workers

**FVC** 

FEV<sub>1</sub>

PEFR/min rice mill workers

## INTRODUCTION

Early recognition of altered lung functions will be great clinical, social and preventive significance in the Industry workers who are constantly exposed to various air-borne pollutions. Reduction in lung functions is reported in cotton workers (1, 2), coal miners (3); grain and flour mill workers (4); workers exposed to tobacco dust (5), barely dust (6) and Talc dust (7).

Exposure to grain dust can produce Farmer's lung (8); Grain furr syndrome (6), chronic bronchitis (9) or Asthma (10). Lung function studies in rice mill workers have showed a decline in lung functions related to the duration of exposure to rice husk dust (11). The same authors also observed that obstructive pulmonary impairment is more than restrictive impairment in rice mill workers.

The present study has been undertaken to study the relative effect of rice husk and saw dust

on mill workers by studying thier lung function in Mangalore and also the existence of lung disease in them.

#### **METHODS**

The present study was carried out in a total of 195 subjects out of which 56 were rice mill workers, 71 were saw mill workers and 68 were control subjects of the same sex, age and socio-economic status. In each subject, age, height, weight and duration of exposure to rice dust or saw dust were recorded.

On the basis of duration of exposure, both rice mill and saw mill workers were classified into 3 groups (Table I)

The lung function study was carried out using Morgans spirocheck portable spirometer. The parameters studied were FVC, FEV<sub>1</sub> PEFR/min. All the tests were performed in the standing posture.

<sup>\*</sup>Corresponding Author

Duration	Mill workers	Number	Average Age	FVC	FEV <sub>1</sub>	PEFR/min
Lyans	Rice	18	21.6±2.4	3.45±0.39	2.19±0.27	202.95±18.88
1 year	Saw	14	20.9±2.0	3.36±0.28	2.19±0.18	190.79±11.97
1.5.000	Rice	15	30.88±3.6	3.38±0.23	2.17±0.20	215.6±61.57
1-5 year	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

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

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, FEV<sub>1</sub> and PEFR/min. They were analysed by compairing them with the controls, rice mill and saw mill workers together and regrouping them according to their duration of exposure and compairing 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

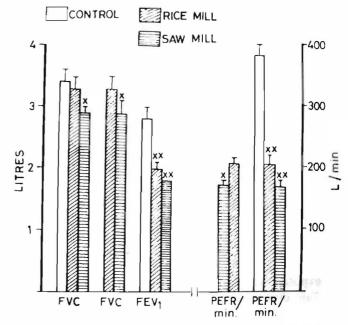


Fig. 1: Comparison of FVC, FEV<sub>1</sub> and PEFR/min. in control, Rice and Saw mill workers.

x = P < 0.05, xx = P < 0.001

TABLE II: Comaprison of FVC, FEV, & PEFR/min of Rice and Saw mill workers with controls.  $^{\bullet} = P < 0.05$   $^{\bullet \bullet} = P < 0.001$ 

	'Number	FVC	FEV <sub>1</sub>	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**

<sup>\* =</sup> P < 0.05

 $<sup>^{**} =</sup> P < 0.001$ 

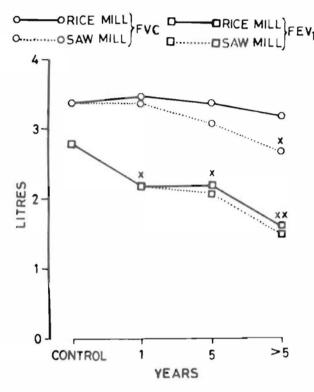


Fig. 2: Comparison of FVC & FEV<sub>1</sub> in both mill workers with controls according to the duration of exposure to dust.

x = P < 0.05; xx = P < 0.001

(P < 0.05). But the rice mill workers showed to significant change with the controls. On the other hand the  $FEV_1$  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, FEV<sub>1</sub> 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 FEV<sub>1</sub> 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

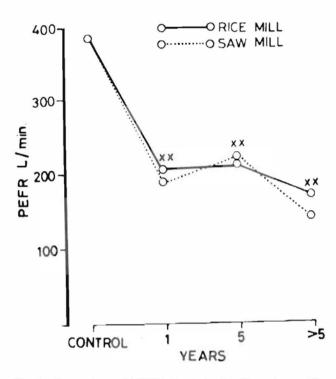


Fig. 3: Comparison of PEFR/min. in both mill workers with controls, according to the duratioan of exposure to dust.
x = P < 0.05; xx = P < 0.001</p>

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

# DISCUSSION

Our results shows 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.

 $FEV_1$  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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