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A study of Respiratory disorders in rice mill workers of the Mahaboobnagar and to compare with the control group from same district

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ABSTRACT

Agricultural respiratory diseases are also an important public health problem and the affected population is large and the respiratory diseases due to exposure to rice mill dust are at least, in theory, preventable globally. Agriculture is overwhelmingly the dominant occupation far eclipsing, mining and service industries and plays a fundamental role in the economy and daily existence of populations of developing countries representing both occupations and life style for entire families. Rice mills subjects the respiratory system to many different exposures such as dusts, bacteria, endotoxins, spores, chemicals etc in work place.A study was designed to find out the airborne microflora of the work environment of rice mills where workers are occupationally exposed to this environmental flora with a special reference to isolation and identification of aflatoxin positive Aspergills strain from the work environment. The study covered altogether three rice mills located at Bawla town in Ahmedabad district (India). Of all the isolates, 27.39 were Aspergillus of which 6.64; were A.flavus. quantitative evaluation showed the maximum number of isolates recovered from work place ($p<0.01$) when compared to (office).Strains of A. flavus were sub cultured onto various qualitative media for identification of toxigenic strain, but none of the strains showed positive result indicating that all the eight strains were non-toxigenic.

Keywords: Respiratory disorder, grain dust, occupational and environmental disorder, spirometry, lung function testing, air pollution, chronic bronchitis.

Introduction

Damage to the lungs by dust or fumes or noxious substances inhaled by workers of certain specific occupations is known as occupational lung disease. So far many variety of occupational lung diseases[1,3] are recognised by law and their number is growing. There are probably hundred million people worldwide exposed to hazardous dusts in course their work in agriculture, extractive industries, rice mills, food processing etc. can all leading to rice dust [2] exposure."Dust" is a term loosely applied to solid particles predominantly larger than colloidal and capable of temporary suspension in air or other gases.

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Derivation from larger masses through the application of physical force is usually implied. Dust is defined according to [ISO-4225-ISO-1994] as "small solid particles, conventionally taken as those particles below 75microns in diameter which settles out on their own weight but which may remain suspended for some time and which are projected in to air by natural forces such as wind, volcanic eruptions, mechanical or manmade processes such as crushing, grinding, de-husking, bagging, sweeping etc.[IUPPC 1990] "glossary of Atmospheric Chemistry terms". The term "pneumoconiosis" was redefined by IV industrial conference of experts (ILO) in 1971 as "accumulation of dust in lungs and tissue reactions due to its presence" [2,3] agricultural work environment holds the potential for exposure to many agents that may cause respiratory diseases. However relatively few

epidemiologic data are available addressing pulmonary infections in context of the agricultural work environment. It is beyond the scope to include all agriculturally related infectious diseases[1] that may have a pulmonary component. Paddy milling being likelihood many Indian farming communities this study has been conducted to study the effect of occupational exposure of rice mill environmental dust [2,3] on respiratory health. There are about 48 rice mills in Mahaboobnagar. Most of them carry out rice milling on crude machinery emitting large amount of rice dust into the environment. Workers rarely use protective measures during the process.Of grain lifting, milling, drying, emptying the bags, drooping from hoofer to weight stations etc where large amount of dust is released in to the environment of the mill[3]. Thus workers are potentially exposed to rice mill dust [2] which is a heterogeneous substance that contains a number of contaminants [6] including silica, fungi, bacterial end toxins, aflatoxins,[11] mammalian debris and certain chemical additives such as pesticides and herbicides. This environment dust [6,8] is a hazardous substance with respiratory sensitivity and workers exposed have been reported to exhibit a variety of clinical manifestation like asthma, chronic obstructive airway diseases[7], conjunctivitis, allergy, wheeze and febrile reactions etc.

Aim and objectives To estimate the prevalence and pattern of respiratory diseases[1] among the rice mill workers of Mahaboobnagar district, Telangana.

To enumerate the sociodemographic details of above study population in same setting.

To evaluate the effect of environmental rice dust [2] on rice mill workers lung function parameters [4,5] and to compare the same with the control group.

To provide the health education accordingly to reduce the respiratory morbidity among the same population.

Material and methods: The present cross sectional analytical community based study was undertaken at various rice mills operating in Mahaboobnagar district of Telangana state for the period of 8 months from October 2014 to May 2015.The questionnaire for the present study was taken from British medical Research Council and the same was used for the collection of the data in 50 rice mill employees, from two different rice mills.

Study Design: A cross- sectional and analytical community based study.

Study Universe: Mahaboob Nagar is a town and municipal corporation. The district has population of more than 40 lakhs of which 10.57% is urban , males constitute 51% and females 49%. Mahaboobnagar has an average literacy rate of 74%, male literacy is 80%, and female literacy is 67%.

Study population: Group 1. Study population was about 50 employees working in rice mills.

Group 2. Control population selected from the offices about 50 employees. Then we conduct physical examination , sputum examination & PFT to estimate the respiratory morbidity among both groups[4,5].

Results and statistical analysis

Lung functions of the workers was analysed using spirometer(4,5) and significant decline in FVC, PEFR FEV1,FEF & 25%-75% were observed as compared to expected values and the finding are shown in tables below.

Table 1: Distribution of study groups (Exposure & Control) in relation to the H/O exposure to tobacco smoke

H/O exposure to tobacco smoke	Exposure group in %	Control group in %	Total (n=100)
Active smoking	30(48.38) (60.00)	32(51.61) (64.00)	62(100) (62.00)
Passive smoking	9 (47.36) (18.00)	10(52.63) (20.00)	19 (100) (19.00)
Both	10(65.00) (20.00)	7 (35.00) (14.00)	17 (100) (17.00)
No Exposure	11(64.70) (22.00)	8 (35.30) (16.00)	19 (100) (19.00)

About 60% of the exposure group and 64% of control group was found to be smokers and 18% of the exposure group and 20% of the control group was found to have H/O of passive smoking among the total study population.

Table 2: Distribution of study population as per the presence of respiratory morbidity (Illness) in the study population

Respiratory morbidity	Exposure group	Control group	Total
Present	26(61.90) (52.00)	16(38.62) (32.00)	42 (100) (100)
Absent	24 (41.37) (48.00)	34 (58.63) (68.00)	58 (100) (56.00)
Total	50 (50) (100)	50 (50) (100)	100 (100) (100)

In the present study about 52% of exposure group and 32% of control group are found to be suffering from respiratory morbidity(3,8). This observed difference in the prevalence of respiratory morbidity among exposure group to control group was statistically significant (chi-square test value=4.11, P<0.04, at 95% confidence interval) and Odds ratio =2.3 i.e., among the exposure group, the respiratory morbidity was 2.3 times higher than control group.

Table 3: Distribution of study population according to the prevalence of respiratory morbidity in relation to their smoking habit

Smoking (Active and Passive)	Respiratory morbidity		Total
	Active	Passive	
Exposed group	26 (66.67) (61.90)	13 (33.33) (33.33)	39 (100) (48.15)
Control group	16 (42.86) (28.10)	26 (54.14) (66.67)	42 (100) (51.85)
Total	42 (51.85) (100)	39 (48.15) (100)	81 (100) (100)

The present study reveals that the prevalence of respiratory morbidity among exposure group who are also smokers was 66.67% whereas among control group who were smokers it was lesser than exposure group (42.86%). This observed difference (23.80%) was statistically significant (chi-square test =6.61, P<0.01 at 95% confidence intervals) and Odds ratio =3.25 i.e., among the smokers the respiratory morbidity was 3.25 times irrespective of their study group.

Table 4: Distribution of respiratory illness in relation to the duration of exposure to rice dust

Duration of exposure to rice dust (years)	Respiratory illness		Total
	Exposure	Control	
<5	4 (44.44) (15.38)	5 (66.56) (31.25)	9 (100) (21.42)
5-10	4 (66.67) (15.38)	2 (33.33) (12.50)	6 (100) (14.85)
15-20	5 (71.42) (19.23)	2 (28.57) (12.50)	7 (100) (16.67)
>20	13 (65.00) (50.00)	7(35.00) (43.75)	20 (100) (47.62)
Total	26 (61.90) (100)	16 (38.62) (100)	42 100) (100)

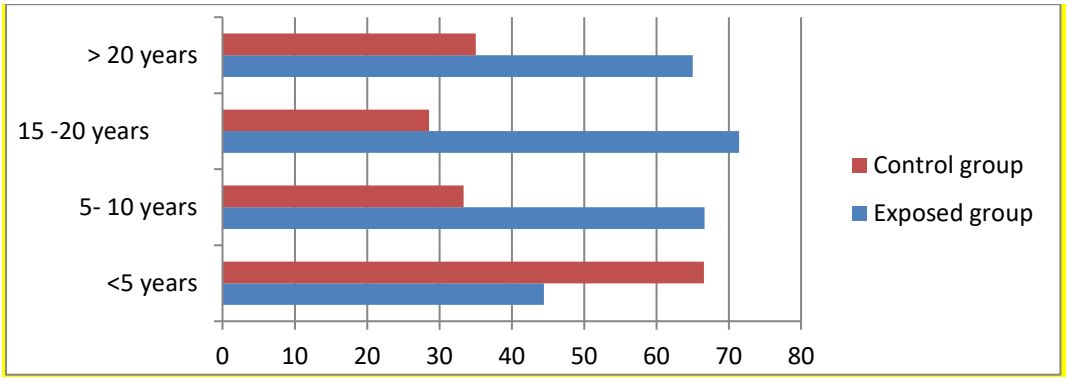

Fig 1: Distribution of Respiratory illness in % in relation to the duration of exposure to Rice dust in years

Among the exposure group it was observed that as the duration of exposure increases the prevalence of the respiratory morbidity also increases i.e. for the population who are having less than 5 years exposure are having only 15.38% morbidity where as those who are having more than 20yrs of exposure it was 50% and in control group also same was observed but less than exposure group. This increase in respiratory morbidity in control group may be because of decreased immunity due to advancing age.

Table 5: Distribution of various symptoms among the study population (Exposure and Control groups)

Symptoms	Rice millers (Exposure group)	Control group	Total
Irritant cough with expectoration	16 (88.89)	2(11.11)	18 (100)
Irritant cough without expectoration	12 (75)	4 (25)	16 (100)
Eye irritation	3(60)	2(20)	5(100)
Nasal cataarh	4(50)	4(40)	8(100)
Pruritus	1(100)	0(0)	1(100)
Rashes	2(66.7)	1(33.3)	3(100)
Tightness of chest	2(66.7)	1(33.3)	3(100)
Chronic cough or expectoration>2yrs	5(83.3)	1(16.67)	6(100)
expectoration =or>3 months	3(60)	2(40)	5(100)
Chronic asthma	3(75)	1(25)	4(100)
SOB of grade 2 or higher	3(37.5)	5(62.5)	8(100)

In the study 88.89% of the rice millers were having irritant cough with expectoration where as among controls it was only 11.11%,followed by chronic cough >2yrs (83.33%), rashes (66.67%) and chest tightness (66.67%).

Table 6: Distribution of various Respiratory morbidities in relation to the duration of exposure to rice dust

Duration of exposure to rice dust(yrs)	Type of respiratory symptoms				
	Morning cough with expectoration	Morning cough without expectoration	Cough on exert ion	SOB on exert ion	SOB on rest
<5	2(10)	1(16.67)	2(20)	2(9.52)	0
5-10	2(10)	1(16.67)	3(30)	4(19.6)	1 (16.67)
15-20	6(30)	1(16.66)	3(30)	6(28.57	2(33.33
>20yrs	10(50)	3(50)	3(30)	9(42.85	3(5)
Total	20(100)	6(100)	11(100	21(100	6(100)

In the present study the most common respiratory symptom that was elicited was SOB on exertion followed by cough with expectoration and cough on exertion

Table 7: Distribution of Respiratory illness in relation to the site of working of the exposure group

Site of working	Exposure group- respiratory illness		Total (n=26)
	Present(n=26)	Absent(n=24)	
Pouring the grains into the grinding machine	1(50)	1(50)	2(100)
Loading & unloading	1(100)	0	1(100)
Sweeping & cleaning	7(87.5)	1(12.5)	8(100)

Filling of the bags with rice grains	3(60)	2(40)	5(100)	
Packing & branding Mill machine operator	1(100)	0	1(100)	
	0	1(100)	1(100)	
Dealing with husk (filling &packing etc)	5(71.42)	2(28.58)	7(100)	
Boiler & mill machine operator	0(100)	0(100)	0(100)	0(100)
Manager / supervisors	1(100)	0	1(100)	

In the study shows that the prevalence of respiratory morbidity was high among the employees who were involved in sweeping &cleaning the rice mill (87.5%), followed by people dealing with milling products (71.42%), filling the grains and packing (60%) and pouring the rice grains in to the machine(50%).

Table 8 : Relationship between each Respiratory function parameters and age , duration of employement and smoking

Respiratory parameters	Age (yrs)	Duration (years)	Smoking Yes/No 't' test
FEV1	F=16.67 P<0.001(S)	F=38.75 P<0.0001(S)	tvalue=3.75 P<0.05(S)
FVC	F=13.22 P<0.001(S)	F=13.52 P<0.001(S)	t value=23 P<0.001(S)
FEV1/ FVC	F=2.2 P<0.05(S)	F=4.3 P<0.05(S)	t value=3.17 P<0.85(S)

Anova test results between FEF, FVC, FEV1 before bronchodilatation among the study population (Rice mill workers)F value=9.21 (the table F value is 2.6, $p<0.05$, significant at 95% confidence intervals, degree of freedom 147)

Discussion

The present study reveals that the prevalence of respiratory morbidity among exposure group who are also smokers was 66.67% where as among control group who were smokers it was lesser than exposure group (42.15%).The present study confirms the findings and suggest that rice mill environmental dust adversely affects lung function parameters as shown in Tables 5,6,7,8 and causes restrictive and obstructive patterns of lung function [4,5] impairment which is associated with dose-effect of years of exposure to rice mill dust. The present study shows that the prevalence of respiratory morbidity[8,10] was high among the employees who were involved in sweeping &cleaning the rice mill (87.5%) followed by people dealing with milling (71.42%), filling the grains and packing (60%) and pouring the rice grains in to the machine (50%).In the study 88.89% of the rice millers were having irritant cough with expectoration , followed by chronic cough >2yrs (83.33%),[7] rashes (66.67%) and chest tightness 66.67%). Thus overall results observed in this study are clinically and statistical significant in correlation with (various clinical signs, symptoms, haematological and radiological changes in rice mill workers) with other studies done on rice mill workers.

Conclusion

The present cross–sectional case control and analytical study was undertaken at two rice mills working in Mahaboobnagar district of Telangana for the period of 8 months from October 2014 to May 2015 and the present study results were:Among the exposure group about 6% population were >60yrs of age where as total study population of that age group was 3%. And

maximum was in 31-50yrs of age; most of the families usually depend up on these people for there surviving. If this group was affected by ill health then the whole family will be affected. The study shows that among the total study population about 60% of them were of male gender and 40% female and 66% of study population was of lower than lower socio-economic class and 56% of exposure group were illiterates and 60% were smokers and only 20% of the control group were passive smokers and there is no significant difference in smoking habits of control and study population.In the present study about 52% of the exposure group and 32% of the control group are found to be suffering from the respiratory and allergic disorders [10,11]. This observed difference in the prevalence of respiratory morbidity among exposure group to control group was statistically significant chi-square test value =4.11, p <0.04, at 95% confidence interval and Odds ratio=2.3 i.e., among the exposed group the respiratory morbidity was 2.3 times higher than the control group. Among the exposure group it was observed that as the duration of exposure is increasing the prevalence of the respiratory morbidity is also increasing i.e. for population who are having less than 5hrs exposure are having only15.38% morbidity where as those who are having more than 20yrs of exposure it was 50%,and in control group it was less than exposure group (43.75%).

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