Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/a5j3w679

A CROSS-SECTIONAL STUDY OF MORBIDITY PROFILE AND THEIR ASSOCIATION AMONG RICE MILL WORKERS IN KARIMNAGAR MANDAL, TELANGANA, INDIA

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Abstract

Introduction: Rice mill workers are potentially exposed to dusts and synthetic chemicals that may have adverse effects on their health. Workers often adopt awkward postures while load handling which in-turn leads to musculoskeletal morbidities and reduced quality of life. Hence, this study was conducted with the following objectives.

Objectives: To study the (1) socio demographic profile; (2) morbidity profile and (3) their association in rice mill workers.

Materials and Methods: This was a cross-sectional, observational study conducted among rice mill workers in Karimnagar mandal between September 1st 2018 and December 31st 2018 after obtaining Institutional Ethics Committee approval.

Results: Out of a total of 273 rice mill workers, majority were males (73.63 %), rural residents (65.57%), belonged to Low socio-economic status (65.57%) and have worked in rice mills for > 10yrs (45.06%). Major proportion of them were Coolies (44.68%) followed by Helpers (19.06%). Most of them experienced respiratory morbidities (46.89%) followed by musculoskeletal complaints (45.79%) with cough (34.8%) being the major respiratory manifestation. Around 20.51% of participants had allergic conjunctivitis and 6.23% subjects showed contact dermatitis. Majority of the participants (80.22%) were normotensives. Increased duration of work in rice mill was associated with statistically significant increased manifestation of respiratory ($p< 0.0001$) and musculoskeletal ($p=0.0003$) morbidities as well as hypertension ($p=0.0028$).

Conclusion: There is potential risk for development of respiratory and musculoskeletal morbidities with increasing exposure to dust in rice mills emphasizing the need for creating awareness through effective health education programs and periodic medical examinations to improve their health and safety.

Keywords: Rice mill workers; Occupational health hazards; Respiratory and musculoskeletal morbidities

Introduction

Rice mill industry is the oldest and largest agro-based industry. Rice mill workers are potentially exposed to organic and inorganic dusts and synthetic chemicals that may have adverse effects on their health. Grain dust has a long history of association with diseases like bronchial asthma and its adverse effects on various organs such as eyes, nose, skin, lung and the airways are also reported. Rice husk is known to have high silica content which may lead to pulmonary disease resembling asbestosis with pleural thickening, fibrosis and possibly bronchogenic carcinoma [1].

Load handling, i.e., lifting and carrying heavy load of grain filled sacs is the major job component of rice mill workers. Often, as part of their job, workers adopt awkward postures which in-turn leads to physiological strain and musculoskeletal problems. Globally, development of musculoskeletal disorders is the most common work-related injuries to occur and are caused by heavy lifting and performing tasks that require repetitive motions [2].

With direct or indirect exposure to the dust at different places of work in the rice mill, there is depletion of health status of rice mill workers. A large amount of dust from the rice milling process not only affects workers in the rice mill but also the residents in nearby areas. Breathing dust polluted air every day reduces the quality of life for a whole local community [3].

Labor shortage is another major limitation in view of migration of poor from rural to urban localities. These disturbances may disturb the regular work pattern which may in-turn effects the gross production of most needed commodity (rice) of the state. Moreover, the data of ergonomic study on grain handling workers in our state is scarce [4]. Hence, this study was conducted with the following objectives: 1. To study the socio demographic profile; 2. To study the morbidity profile and 3. To study their association in the rice mill workers in Karimnagar mandal.

Materials and Methods

This was a cross-sectional, observational study conducted among rice mill workers in Karimnagar mandal between September 1st 2018 and December 31st 2018.

Institutional Ethics Committee approval was obtained before the start of the study. The purpose of the study was clearly explained to the study subjects and consent was taken prior to the data collection. A good rapport was developed with study subjects and strict confidentiality was assured.

Inclusion Criteria: All the permanent rice mill workers of different posts (Supervisors, Clerks, Operators, Coolies and helpers etc.) in the rice mills of Karimnagar mandal, who are willing to participate in the study are included.

Exclusion Criteria: Workers who refused to give consent and contract workers are excluded from the study.

The data was collected by a semi-structured pre-validated questionnaire which includes details such as Socio demographic profile and brief occupational history etc. The general clinical examination details such as anthropometric measurements and vitals are tabulated as per the study proforma.

Statistical Analysis:

Statistical analysis was done using Microsoft Xcel and Quick statistics calculators. All the categorical variables were presented as percentages. A Chi square test was performed to determine the statistical significance ($P < 0.05$).

Results

A total of 284 permanent rice mill workers consented and were enrolled into study from 20 rice mills. However, 11 workers were not available for complete data collection, after repeated attempts to interview, and are excluded from data analysis.

Majority of the study participants (73.63 %) were males. Most of the study subjects (36.26%) belonged to the age group of 38-47 years followed by 28-37 years (31.13%) (Table 1). In this study,

65.57% of the rice mill workers were rural residents. Majority of both male (54.98%) and female (77.78%) participants in this study were having BMI <23 kg/m^2.

Age Group	Males	Females	Total
	n (%)	n (%)	n (%)
18-27	40 (19.9)	10 (13.89)	50 (18.31)
28-37	62 (30.85)	23 (31.95)	85 (31.13)
38-47	68 (33.83)	31 (43.05)	99 (36.26)
>=48	31 (15.42)	08 (11.11)	39 (14.3)
Total	**201 (100)**	**72 (100)**	**273 (100)**

Table 1. Demographic Distribution of study subjects.

Among the study participants, 33.67% were illiterates, 15.38% completed primary school, 19.78% completed secondary school education and 16.12% are diploma holders. Based on Modified BG Prasad's Socio-Economic Scale, majority (65.57%) of the subjects belonged to Low socio-economic status.

Major proportion of the rice mill workers were Coolies (44.68%) followed by Helpers (19.06%) and Operators (16.13%) (Table 2). Majority of the workers in this study have worked in the rice mills (Occupational History) for more than 10yrs (45.06%). Among the study participants, 45.42% consumed alcohol and 32.6% had habit of smoking. The common ailments complained by the workers during the study interview were generalized weakness (45.89%), easy fatigability (21.18%) and headache (17.06%).

Designation (Type of work)	n (%)	Morbidity n (%)
Supervisors	17 (6.22)	3 (2.4)
Clerks	17 (6.22)	2 (1.6)
Operators	44 (16.13)	11 (8.8)
Weighers	21 (7.69)	7 (5.6)
Coolies	122 (44.68)	86 (68.8)
Helpers	52 (19.06)	16 (12.8)
Total	**273 (100)**	**125 (100)**

Table 2. Distribution of study subjects based on their Job Profile & Musculoskeletal Morbidities.

Most of the rice mill workers in this study experienced respiratory morbidities (46.89%) followed by musculoskeletal complaints (45.79%).

Cough (34.8%) was the major respiratory manifestation among the study participants with majority (70.53%) having productive cough and acute (<3weeks) in course. Other symptoms like breathlessness and chest tightness (Occupational asthma) are expressed by 23.81% and 6.96% of the study participants respectively. About 8.79% participants had allergic rhinitis.

Majority of the musculoskeletal morbidities were experienced by coolies (68.8%) followed by helpers (12.8%) and operators (8.8%) (Table 2).

The common ocular symptoms presented by the rice mill workers during the study were itching (48.72%), watering (31.87%) and redness (25.28%). Around 20.51% of participants had allergic conjunctivitis.

Localized rash (12.45%), irritation of skin (10.26%) and itching of skin (17.22%) were the common skin manifestations prevailed in this study subjects. Contact dermatitis was present in 6.23% of the subjects.

Majority of the study participants (80.22%) were Normotensives. Each 8.79% of study participants had pre-Hypertension and Grade I Hypertension (HTN) and 2.2% had Grade II HTN.

Increased duration of work in rice mill was associated with statistically significant increased

manifestation of respiratory (p< 0.0001) and musculoskeletal (p=0.0003) morbidities in rice mill workers (**Table 3**). There was statistically significant association between HTN and duration of work in rice mills (p=0.0028).

Duration	**Subjects n**	**Respiratory n (%)**	**Musculo-skeletal n (%)**	**Allergic Conjunctivitis n (%)**	**Contact Dermatitis n (%)**
<5 yrs	71	15 (21.12)	21 (29.58)	18 (25.35)	7 (9.86)
5-10 yrs	79	25 (31.65)	32 (40.51)	14 (17.72)	4 (5.06)
> 10 yrs	123	88 (71.55)	72 (58.54)	24 (19.52)	6 (4.88)
Total	**273**	**128 (46.89)**	**125 (45.79)**	**56 (20.51)**	**17 (6.23)**
Chi square df = 2		**56.32**	**16.46**	**1.4732**	**2.171**
P – value		**<0.0001**	**0.0003**	**0.4788**	**0.3378**

Table 3. Association of Morbidities with Duration of work.

Discussion

This study among 273 rice mill workers reveals that almost half of the participants had respiratory manifestations and musculoskeletal morbidities. Also, there is statistically significant association of increased work duration with increased morbidities. One-third of the study participants complained of cough which is acute in onset. A little less than three-quarters of the subjects experienced productive cough. Other symptoms of occupational asthma like breathlessness and chest tightness are expressed by about one-quarter of study participants. Allergic rhinitis is manifested in less than one-tenth of the study subjects.

Almost three-quarters of the participants with musculoskeletal morbidities complained low back pain and knees pain. Two-thirds of these musculoskeletal morbidities are experienced by coolies followed by helpers and operators accounting to about one-tenth of the morbidities.

Around three-quarters of the study participants are males and about one-third of the participants each belonged to age group of 38-47 years and 28-37 years. Almost two-thirds of the participants in this study are from rural area and belonged to low socio-economic status. A little more than half of the male participants and around three-quarters of the female participants in this study are having normal BMI. Only one-third of the study participants are illiterates and around one-fifth of participants each completed primary school and secondary school education. A little more than one-tenth of the subjects are diploma holders. Nearly half of the rice mill workers are coolies. Almost half of the study participants had habit of alcohol consumption and one-third are smokers. Nearly half of the workers in this study have worked in the rice mills for a duration greater than 10 years.

In this study, a little more than two-fifths of participants had common ailments like generalized weakness whereas one-fifth of participants complained easy fatigability and headache. Other common ocular manifestations like allergic conjunctivitis, skin disorders such as contact dermatitis are prevailing among one-fifth and one-tenth of the participants respectively. Almost four-fifths of the study participants are normotensives with only a little less than one-tenth of participants recorded elevated blood pressure readings. HTN also showed statistically significant association with increased duration of work in rice mill.

In a larger study of 390 Canadian Cotton grain workers, Graham Li et al. [5], also reported a significant excess incidence of respiratory symptoms among grain workers despite total dust concentrations are generally below 10mg/m3. Similarly, the prevalence of respiratory morbidities was reported to be high among the workers in the study done by Prakash S et al in south India [6]. These findings are similar to our present study and can be attributed to occupational exposure to dust and smoking habits among the rice mill workers.

A study done by Pradhan et al. [7], found that high percentage of musculoskeletal complains were significantly associated with rice mill workers. They also reported that the workers suffered low back and knee joint pain due to carrying heavy loads of rice bags more than their weight and due to repetitive bending at the knee to load the sacs in awkward postures [7]. In study done by Samanta

and Chatterjee [8], most of the activities of the workers were in the category of moderate to very heavy. The above findings are in concordance to the present study.

Razlan M et al. [1], stated that the rice husk dust exposure may be responsible for the irritant effects which manifest acutely as irritant cough with or without phlegm, kerato-conjunctival irritation and inflammation, and pterygium formation. [1]. The present study also noted the similar ocular manifestations. However, Prakash S et al. [6], reported that though chronic irritant effects are seen predominantly in the eyes, cases of occupational asthma are probably found in hypersensitive individuals.

In the present study, majority of the participants are non-smokers and still had respiratory manifestations. Similarly, several other studies, (Rankin et al. [9]; Graham, Li et al. [5] observed symptoms of chronic bronchitis more frequently among grain handlers, including those who have never smoked. And also, Graham, Li et al. [5] observed increase in chronic bronchitis, i.e.; cough and wheezing in non-smoking workers. In contrast the study by Backlake et al. [10], Dosman et al. [11] and Broder et al. [12] suggested that the effects of grain dust and smoking are additive, if not synergistic.

Majority of our study participants, predominantly females are in the normal BMI category (BMI 18.4 - 25 kg/m^2) as per World Health Organization. Similarly, a study done by Chandan K. Pradhan et.al. [7], showed the normal category of BMI among the workers in food grain depot and rice mill. However, around one-tenth of workers in depot and mill were in the category of chronic energy deficiency I (BMI < 17.0 – 18.4 kg/m^2) and another one-tenth of workers were overweight (BMI > 25 kg/m^2). As such majority of the present study participants despite from low socio-economic class are nutritionally balanced.

In the present study there is statistically significant association of increased duration of work in rice mill and respiratory and musculoskeletal manifestations. Similarly, a case control study done by H H Lim et.al. [13], observed a significantly greater proportion of the rice millers suffered symptoms of occupational asthma with symptoms like chronic cough exceeding two years of duration after starting work in the rice mills. These findings are in agreement with those of the study by Meo et al. [14], in which a significant reduction of forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), peak expiratory flow (PEF) and maximal voluntary ventilation (MVV) was found among the workers who worked more than 5–8 years. Also, the study of Musa et al. [1] showed significant decrease in FEV1 and FVC among the workers who worked for more than 11 years. Prakash S et al. [6] also observed the association between the duration of the work and the respiratory morbidities were statistically significant. Rankin et al. [9] concluded that chronic grain dust exposure results in chronic obstructive pulmonary disease. In contrast, Broder I et al. [12] have generally not found decrements in pulmonary function associated with long-term exposure to grain dust.

Conclusion

There is potential risk for development of respiratory, musculoskeletal morbidities and HTN with increasing occupational exposure to dust in rice mills. Hence, there is a need for creating awareness against unhealthy habits such as smoking and alcohol consumption through effective health education programs and periodic medical examinations which aid to improve the health and safety of the rice mill workers.

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