OCCUPATIONAL HEALTH HAZARDS OF WORKERS ENGAGED IN THRESHING OF MUSTARD CROP

M. Mehta,* S.Gandhi * and N. Pruthi **

** Sr. Scientist Deptt of FRM*

*** Ret. Scientist Deptt of TAD*

COHS CCS HAU Hisar, Haryana , India

Harvesting of mustard is commonly done in the month of April. After cutting crop, farmers hire the thresher and work continuously day & night to complete the threshing process. Agriculture, being a family occupation, most of the family members including women, are involved in performing this activity. During threshing lots of dust is generated and farmers are exposed to high levels of organic dust during this work causing health hazards. The present study was carried out to assess the occupational health hazards in threshing of mustard crop. Fifteen worker engaged in threshing of mustard crop were selected. Environmental conditions and occupational health hazards in threshing of mustard crop were assessed using interview schedule, observation and use of equipments. Inappropriate environmental conditions put unnecessary strain on the worker. Results revealed that during the activity temperature increased from 36.7^{o}C to 44.1^{o}C and humidity decreased from 42.3 % to 24.2 %, putting thermal stress on the worker. The carbon dioxide level during the threshing activity was 380 ppm, which was quite higher than recommended level. The particulate matter rose from 80 µg/m^{3} to 160 µg/m^{3} making the conditions terrible for the workers. Cuts and abrasions were observed due to pricking of dry straw while collecting and lifting the crop bundles for feeding into chute of the thresher. Cent percent respondents reported irritation in eyes (3.0) followed by throat (2.93), nose & ears (2.8 each). Body discomfort in different parts depicted that during threshing severe to very severe discomfort was in wrists (4.8), ankle/feet (4.7), hands (4.5) and shoulders (4.3). Overall discomfort score on 10 point scale was 8.2 for threshing activity interpreting that respondents felt this activity as very heavy activity & they reported quite high level of discomfort during the activity.

INTRODUCTION

Harvesting of mustard is commonly done in the month of April. After cutting crop, farmers hire the thresher and work continuously to complete the threshing process. Agriculture, being a family occupation, most of the family members including women, is involved in performing this activity.

In harvesting season, farmers are exposed to high levels of organic dust during threshing of crops leading to many health hazards. Grain dust inhalation may induce respiratory diseases including chronic bronchitis, granulomatous pneumonitis and toxic pneumonitis which finally

may lead to decreased lung function (Swan & Crook 1998). With combine harvester, situation goes even much worse. As volume of dust generated is so high that even people living in nearby area are affected and breathing problem cases increase during the harvesting season. Studies reveal that respiratory diseases due to organic dust, dust mites, molds and other organic antigens, are also common in the developing countries during these kinds of activities that cause chronic health hazards to the workers. No doubt many farmers have been using indigenous techniques to protect themselves during threshing operation i.e. covering their face and head by using a cloth but its efficacy is very limited. Farmers working in such environment without well-protected clothing suffer from many health hazards resulting in the reduction of work which needs through investigation. Hence in the light of the above a study was conducted to assess the health hazards of workers during threshing of mustard crop.

METHODOLOGY

The present study was conducted on fifteen farm workers engaged in threshing of mustard crop were selected.

The experiment was conducted for one hour and their observations were recorded. Environmental parameters viz. temperature, humidity, particulate matter (PM_4) and carbon dioxide (CO_2) were assessed using air quality monitor during the threshing of mustard.

Data were collected on occupational health hazards of threshing operations using interview schedule and observation to study their health problems, musculo-skeletal discomfort and overall discomfort score. Health problems of various body parts were recorded using observation sheet on 3 point continuum ranging from never (1) to frequently (3). Musculo-skeletal discomfort were studied using human body map (Corlette, et.al. 1976) to identify incidences of problems in different parts of the body on a five point scale ranging from very severe pain (5) to very mild pain (1). For the assessment of overall discomfort rating, a psycho-physical rating scale at 10 point continuum, 0 being the lowest point showing no discomfort and 10 being the uppermost point showing extreme discomfort was used (Corlette, et.al. 1976).

RESULTS

Results of Occupational health hazards of workers in threshing have been presented in two aspects:

- Environmental parameters
- Health hazards

Environmental parameters

Various environmental parameters like temperature, humidity, carbon dioxide (CO_2), and particulate matter (PM_4) were assessed during the threshing of mustard (Table 1). The activity was started early in the morning and continued for 5-6 hours.

***Temperature*:** Temperature was measured before, during and at the end of activity. In the morning the temperature was 17.3^{o}C, as the day passed the temperature increased thus making the conditions difficult to work. During the activity it was 36.7^{o}C and at the end it reached up to 44.1^{o}C. There was 154.91% increase in the temperature at the end of the day (Fig 1).

***Humidity*:** As the temperature increases there was decrease in the humidity level. Initially humidity was 42.3 % and decreased to 24.2 % at the end of the activity making the environment uncomfortable to work (Fig 2). At the end of activity the humidity decreased by 42.79%.

Particulate matter: The particulate matter before, during and at the end of the threshing activity were 80 μg/m^3, 133 μg/m^3 and 160 μg/m^3 respectively(Fig 3). As the duration of activity increased the contents of particulate matter also increased by 100% making the condition terrible for the workers. Thus resulting in cough, irritation etc. Moreover, while working, the work environment was uncomfortable due to thermal stress as heat stroke was also observed which worsened the situation & caused headache to majority of the respondents.

Carbon dioxide (CO_2):The carbon dioxide level during the threshing activity was 380 ppm against the recommended level of 300-350 ppm.

HEALTH HAZARDS FACED BY WORKERS IN MUSTARD THRESHING

A hazard in relation to occupational safety and health is defined as '*a potential source of harm or adverse health effect on a person or persons'.* The terms Hazard and Risk are often used interchangeably. Agriculture is one of the most hazardous sectors in both the developing and industrialized countries. It is ranked as one of the three most hazardous industries together with mining and construction. The ILO estimates that up to 170,000 agricultural workers are killed each year. This means that workers in agriculture run at least twice the risk of dying on the job as compared with workers in other sectors. Agricultural mortality rates have remained consistently high in the last decade, while in most other sectors fatal accident rates have decreased. Millions of agricultural workers are seriously injured in workplace accidents with agricultural machinery or poisoned by pesticides and other agrochemicals. In fact, due to the widespread under-reporting of deaths, injuries and occupational diseases in agriculture, the sector is probably even more dangerous than the official figures suggest. (ILO 2003)

Cuts and abrasions were observed due to pricking of dry straw while collecting and lifting the crop bundles for feeding into chute of the thresher. Table 2 depicts that cent percent respondents reported irritation in eyes (M.S-3.0) and followed by throat (MS-2.93), nose & ears (M.S-2.8 each). Respondents reported these problems as common & occurring mostly to the respondents during threshing.

Other problems reported by respondents were headache (MS -2.6), heatstroke (MS-2.53), cuts and abrasion (MS -2.47), breathing problems (MS-2.27), skin allergies (MS-1.87), cough (MS-1.47), hearing problem (MS-1.33) and nausea (MS-1.27). Pandey et.al. (2010) found various health problems reported by farmers during threshing activity were skin irritation and allergies (50%); cuts, wounds and injuries (48%); chest congestion and breathing problem (58%); Body ache was another common problem found to occur frequently (68%). The other problems were of sunstroke, physical tiredness and bite of insects and poisonous animals. Threshing and sowing manually were found as second most hazardous operations as they cause four types of health hazards and showed the participation of both male and female farmers jointly in higher percentage i.e. 15 and 25 per cent, respectively.

MUSCULO-SKELETAL DISCOMFORT DURING THRESHING

Body discomfort in different parts depicted that during threshing severe to very severe discomfort was in wrists (4.8), ankle/feet (4.7), hands (4.5) and shoulders (4.3) (Table 3). The level of chute of thresher was quite high so workers have to keep their hand in raised position for a long time, hence resulting in very severe discomfort. Moderate to severe discomfort was reported in lower arms (3.9), upper back (3.6) upper arms (3.4) and legs (3.4). This was mainly due to lifting and fetching of mustard bundles for collecting near the thresher site. They were handling over the bundle each weighing about 25 kg to the worker standing near the feeding chute of the thresher during the experiment. While doing this activity, they adopted unnatural body postures comprising bending, lifting weight standing with shoulders and arms stretching upwards for holding bundle as head load & releasing it by throwing this head load at the collection site of thresher. During the process, they put strain on wrists, ankles, feet, shoulders, arms, upper back & neck leading to various musculo-skeletal discomforts. Gandhi et.al.(2012) found that in wheat threshing the body discomfort in different parts were severe to very severe discomfort was in wrists,ankle/feet (4.7 each), hands (4.6) and shoulders (4.5). Moderate to severe discomfort was reported in lower arms (3.8), upper back (3.6) upper arms (3.4) and legs (3.4)

OVERALL DISCOMFORT SCORE

Results reveal that overall discomforts score on 10 point scale was 8.2 for threshing activity interpreting that respondents felt this activity as very heavy activity & they reported quite high level of discomfort during the activity. Badodiya et.al. (2013) reported that most of the tribal farm women (44.17%) were frequently facing health hazards in operation of agricultural activities whereas 34.17 per cent were facing sometimes and 21.66 per cent were facing rarely. Similar findings were also reported by Cordes and Foster(1988) and Aktar et al (2009).

CONCLUSION

During threshing of mustard crop, occupational health hazards faced by workers were mainly due to heat and organic dust. They reported health problems viz. irritation in throat, nose, eyes, and ears. The environment was very dusty consisting of organic matter along with high thermal stress which made the environment suffocating and it was difficult to stand even while collecting data during the experiment.

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Table 1: Environment condition during mustard threshing

	Before	**During**	**End**	**Percent change**
Temperature (^{o}c)	17.3	36.7	44.1	154.91↑
Humidity (%)	42.3	33.8	24.2	42.79↓
Particulate Matter (μg/m^{3})	80	133	160	100 ↑

Table 2: Health problem faced by workers in mustard threshing (n=15)

Health Problems	Mean score	Rank
Irritation in eyes	3.0	I
Irritation in nose	2.80	III
Irritation in throat	2.93	II
Irritation in ear	2.80	III
Headache	2.60	IV
Breathing problem	2.27	VIII
Coughing	1.47	X
Nausea	1.27	XII
Hearing problem	1.33	XI
Sunburns	2.33	VII
Heat stroke	2.53	V
Cuts/Abrasion	2.47	VI
Skin allergies	1.87	IX

Table 3: Musculo skeletal discomfort faced by workers in mustard threshing n=15

Body parts	Mean score	Rank
Wrist	4.8	I
Knees	2.7	IX
Hand	4.5	III
Thighs	2.6	X
Lower arm	3.8	V
Elbow	1.8	XII
Upper arm	3.4	VII
Neck	1.9	XI
Ankle/feet	4.7	II
Shoulder	4.3	IV
Upper back	3.6	VI
Legs	3.4	VII
Lower back	3.1	VIII

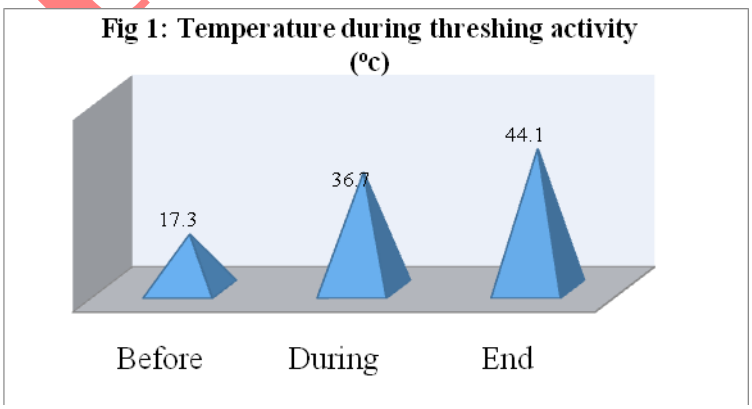


Fig 2: Humidity during threshing activity (%)

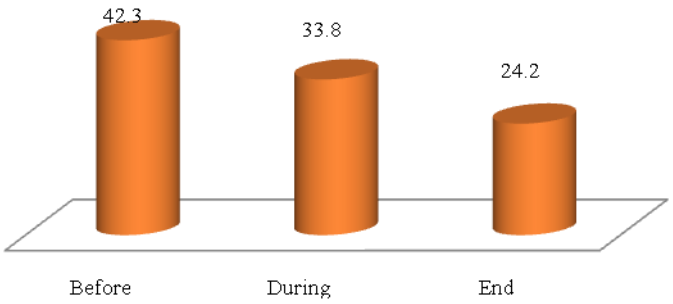
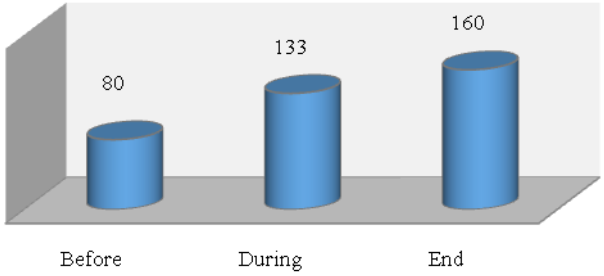


Fig 3:Particulate matter during threshing activity (mg/m3)



Workers engaged in mustard threshing