An evaluation of musculoskeletal disorder and socioeconomic status of farmers in West Bangal, India

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ABSTRACT

Rice cultivation contains several tasks and workers were compelled to adopt some harmful and awkward posture during performing those tasks. These type repetitive jobs may be related to occupational health hazards like musculoskeletal disorder (MSD). In the present investigation different MSD related problems of the workers have been assessed and also identify the socioeconomic status of the farmers considering the issues of community health development. In this connection a simple and easily applicable questionnaire technique has been apply in the agricultural field during performing rice cultivation tasks. The results showed that a large number of workers could not complete their primary education (33.0% to 43.0%) and remained below the poverty line (91.3%). From the MSD assessment lower back problem was prevalent (48.8%) among the workers when all rice cultivation tasks were consider together, but it was extremely prevalent in reaping job (92.0%) and transplantation job (84.0%). It was concluded that MSD among the workers might be related to the stressful work posture, long duration jobs, nature of jobs and use of ill-fitted hand tools. So, some free-hand exercise, proper work-rest scheduled and awareness program may be helpful for reducing the MSD and proper handling of hand tools.

Keywords: Literacy level, economic status, msd, low back pain, agricultural workers.

INTRODUCTION

In Indian agriculture human workforce contributes substantially for crop production. A large portion of Indian population lives in villages. They maintain their livelihood depending on agriculture. In West Bengal state a large number of people including male and females are engaged in different types of agricultural jobs, of which rice cultivation takes the major share. They expend a great extent of their physiological cost for crop production. The rice is the main crop in this state. The socioeconomic condition of the agricultural workers depends on the cultivation. The agricultural workers and their family members remain busy for crop production, processing of food grain and selling them through the year.

Rice cultivation involves in various processes like preparation of land, sowing of seeds, uprooting of seedlings, transplantation of seedlings, weeding, reaping, binding of straw bundle, carrying of straw bundle, threshing of straw bundle and collection of crop. Some of the postures, which were taken by them, were very harmful. But they were compelled to adopt those postures during work for a long time. During preparation of land, the male workers only do ploughing. They adopt a bent posture and they are required to walk continuously in the muddy field. The male workers work in kneeling posture during uprooting job, whereas, female workers take squatting posture for the same. During transplantation the workers adopt strongly bent posture in the muddy field for a long time. But during weeding and reaping both male and female workers adopt both bent and squat postures. Standing for a long time with frequently wrist movement of the workers required during binding and threshing operation of straw bundle. In all the tasks of rice cultivation are repetitive in nature. Repetitive may be related to musculoskeletal disorders (MSD). The workers change their posture very frequently and they suffered for musculoskeletal disorder during performing their job. In a previous study, Goa and Coworkers[1] were able to show that operators of VDT data entry work suffered from fatigue and increased stress. VDT workers, especially those who perform highly repetitive tasks, have reported pain and discomfort associated with the performance of their job.[2] In another study rapid upper limb assessment (RULA) was a survey method created for use in ergonomic investigations of workplaces that report job-related upper limb disorders.[3] Smith *et al*. reported that the job content might be important factor for increased occupational stress and health complaints.[4]

In the present investigation efforts have been made to identify the socioeconomic status and to assess the musculoskeletal disorder (MSD) of the agricultural workers considering issues of community health development.

MATERIALS AND METHOD

Subjects: This investigation was carried out on agricultural workers only. The subject was selected from different villages of Purba and Paschim Medinipur Districts in West Bengal, India. A 400 subjects (200 male

and 200 female) were included in this study. The age range of the subjects was 19-65 years. The subjects were selected at random when they were working in different agricultural fields. All subjects volunteered for this investigation.

Evaluation of socioeconomic status: The socioeconomic status of workers was evaluated by modified Kuppuswami scale method.[5] From the response of the subjects each question quoted against their score and finally summated score is compared with the graded chart of social status.

Evaluation of educational status: *T*he educational level of the subjects was evaluated by questionnaire technique also. The subjects were grouped to illiterate, primary educated, secondary educated etc.

Evaluation of musculoskeletal disorder: The musculoskeletal disorder (MSD) which was evaluated in different tasks, viz., uprooting of seedlings, transplantation, reaping, binding of straw bundle and threshing were evaluated by questionnaire technique, some of the disorder were assessed by direct observation method. A simple and easily applicable questionnaire was prepared for evaluating MSD and socioeconomic status of agricultural workers. The full questionnaire is shown in the box (at the end of paper).

RESULTS

The educational level (Table-1) of the workers was very low. About 33.0% of the workers were semiliterate, this is they were able to sign their names and about 42.9% of the workers were above primary level. In the present study it was noted that about 18.3% of the workers remained in the lower socioeconomic category (Table-2). About 47.8% workers belong to upper lower category and about 26.3% of them belong to lower middle category.

The lower back problem (Fig.1.) was prevalent (48.8%) among the workers when all rice cultivation tasks were considered together and it was followed by wrist-hand (46.6%) problems and pain in lower extremities (28.8%). It was observed results that about 8.0% to 20.0% of workers reported headache during performing all type of tasks (Table-3). The eye (60.0%) and nose (32.0%) problems were also prevalent among the workers. However, such problems were noted only in threshing job.

The lower back disorder was found in all types of rice cultivation tasks (Table-3), but it was extremely prevalent in reaping job where 92.0% of the workers reported highly stressful condition, it was followed by transplantation (84.0%) and uprooting operation (72.0%). The results (Table-3) showed that the wrist-hand was affected 56.0% of workers during binding tasks. In case of uprooting of the seedling it was observed that about 52.0% of the workers suffered from shoulder strain.

DISCUSSION

The socioeconomic status of a person or a population is determined by several factors. In the present study this status of the agricultural workers was expressed by terms of literacy level and economic condition. In their childhood they were compelled to leave school before completing primary education. Some of them were literate but most of them could not complete their school education due to poor economic condition. They were obliged to do agricultural work to run their family. Due to low educational level the workers were not aware about the occupational diseases and their treatment or remedial measures.

The economic condition of the agricultural workers was also very poor. A large number of workers remained below the poverty line due to the number of family members higher than the normal status. The low socioeconomic status of the agricultural workers may be related to their health and nutrition. This may one of the reasons for the occurrence of occupational hazards.

Different kinds of job related problems were prevalent among the agricultural workers who were engaged in rice cultivation. Headache may be caused due to exposure to the high environmental temperature and continuous bending the head and neck during work. During threshing dust particles were entered into the eyes and nose, as the workers did not use any personal protective device. They had burning sensation, reddening and watering in the eyes. They also reported irritation in the nose and frequent sneezing.

The workers suffered from lower back problems might be due to adopting strongly bent posture for a long period during performing reaping, transplantation and uprooting operation. Frequently twisting of the waist was also noted in those cases and mainly male workers compelled to adopt an awkward kneeling posture during performing uprooting task. Berkson *et al*.[6] reported that physical effort, especially when it was sustained for long periods or was carried out in awkward stooping postures, did appear to result in significantly higher proportions of disc diseases, but not with the less definitive forms of back pain. Marras and Mirka[7] have established that the risk of low back disorder (LBD) is increased as a function of lateral and twisting motions of trunk, trunk flexion angle and external moment.

Binding of straws bundle was associated with varied type of hand movement at their wrist joints. There was dorsiflexion, ventriflexion, twisting and lateral movement during performing that job. Those movements were found to occur frequently and repetitively. This might be the cause of wrist pain among the workers during bundling of straws. It was noted that during uprooting the workers pull the seedling forcefully, which imposed a

jerk in their shoulder joint as well as in the shoulder muscles, which might be the cause of shoulder pain among the workers. It was also associated with repetitive movements of arms. Hagberg[8,9] indicated that an experimental task of repetitive arm elevation caused shoulder complaints tenderness in the region of the descending part of the trapezium muscles among patients with shoulder pain.

The upper leg of the workers had problem in threshing (72.0%) jobs, which might be due to continuous standing posture during threshing. A high percentage of workers reported knee-ankle pain during uprooting (54.0%) and transplantation (60.0%) tasks. It was obvious because the jobs were performed in inappropriate kneeling and bending posture respectively. It was found that there was flexion or extension in ankle joint during these jobs. Similar findings were also noted from the study of Michelson and Helgemo.[10] Markolf *et al*.[11] reported that due to imposition of static load on knee joints during continuous bent posture the subjects might feel pain in the lower extremities.

It appeared from the above results that the types of physical stress, work posture and methods of doing the job were associated with the musculoskeletal disorders. The relationship between physical work factors and MSD among forestry employees was noted by Vik *et al*.[12] Nag *et al*.[13] showed that about 68.0% of the women complained of back pain at long-term sewing work.

The occurrence of MSD among the agricultural workers might be related to the work posture, duration of jobs, and use of ill-fitted hand tools. Low back pain was the main problem during performing the different rice cultivation tasks. It was important cause of sickness and absenteeism. Occupational hazards might cause permanent changes in the discs, apophyseal joint, ligaments and other structures of the musculoskeletal system. Due to poor economic condition the workers were deprived of proper nutrition and could not avail suitable treatment for different health problems. Thus musculoskeletal disorders became intensified. The following may be helpful for reducing the low back pain and problems of dust particles:

1. Low back pain and upper leg disorder might be reduced primarily by maintain proper work-rest scheduled during performing different rice cultivation tasks.
2. Relief from low back pain can be obtained by lying in the supine position, grasping the knees and then squeezing the thighs against the chest for about five seconds and obtained other types of exercise.
3. The conservative treatment of low back pain ultimately rests and proper education.
4. Acute-severe low back pain problems respond to bed rest.
5. For avoiding the dust particles they should use low cost musk and sunglass during performing threshing jobs. As an alternative workers may use cloth piece covering the nose and mouth.
6. Awareness program for educating the workers regarding ill effects of adopting awkward work posture and about family planning.

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Questionnaire for Evaluating Musculoskeletal Disorders and Socioeconomic Status for Agricultural Workers

No : Date :
Name of the subject:
Age and sex:
Length of service:
Name of the tasks:
(Please put '√' mark and write proper word in appropriate place for your answer)
1. Do you feel any difficulties in your body during work? Yes/No
   If yes, which part(s) of your body affected most? ……..
2. Do you feel neck ache (Pain in neck) during work? Yes/No
3. Do you feel back ache (Pain in the back) during work? Yes/No
   If yes, state the name: Upper back/Lower back
4. Do you feel any problem in your hand during work? Yes/No
   If yes, state the name of parts being affected: Fingers/Palm/Wrist joint/Lower arm /Elbow joint/upper arm/Shoulder joint
   State the type of problem(s) ……..
5. Do you feel any problem in your leg during work? Yes/No
   If yes, state the name of part(s) being affected: Lower leg (Feet/ankle joint/knee joint)/ Upper leg (Hip joint/Buttock)
6. Do you feel any problem in your eyes/ nose during work? Yes/No
   If yes, state the name and types of problem(s) ……
7. Do you feel head ache during work? Yes/No
8. Do you feel any problem other than state above? Yes/No
   If yes, state the type of problem(s) …….
9. How many times you have got the agricultural job in a year? Months……Days……
10. What was the daily wages for that job? Rupees …….
11. Are you engaged in other type of job? Yes/No
    If yes, State the type of job(s) ……..
    How many days you have done that job? ……
    What was the daily wages for that job? Rupees …….
12. Have you any agricultural field of your own? Yes/No
    If yes, what was the annual income from that land? Rupees ……
13. How many members do you have in your family? No. of the members ……
14. Are you literate? Yes/No
    If yes, state your level of literacy: Below primary (Semi literate) /Above primary / Above secondary (10^{th})/ Above higher secondary (10+2)

Table-1: Educational statuses of agricultural workers

Illiterate	Literate		
	Semi literate	Above primary level	Above secondary level
19.1%	33.3%	42.9%	4.8%

Table-2: Average annual income and socio-economic status of the agricultural workers. (Values showing the percentage of total subjects)

Per capita Annual income (Indian Rs.) Mean ±SD (Range Rs.)	Socioeconomic status			
	Upper Middle	Lower middle	Upper lower	Lower
3847.42 ± 1189.50 (2000/- to 8000/-)	8.8%	26.3%	46.8%	18.3%

Table-3: Percentage (%) of agricultural workers reported MSD in different parts of the body during performing different rice cultivation tasks

Affected body parts	Rice cultivation tasks				
	Uprooting of seedling	Transplantation	Reaping	Binding of straws	Threshing
Head	8.0	16.0	20.0	8.0	8.0
Neck	8.0	12.0	16.0	0.0	0.0
Eyes	0.0	0.0	0.0	0.0	60.0
Nose	0.0	0.0	0.0	0.0	32.0
Lower back	72.0	84.0	92.0	20.0	16.0
Shoulder	52.0	0.0	8.0	4.0	32.0
Wrist/Hand	32.0	52.0	48.0	56.0	44.0
Upper leg	12.0	4.0	52.0	4.0	72.0
Knee/Ankle	54.0	60.0	24.0	4.0	0.0

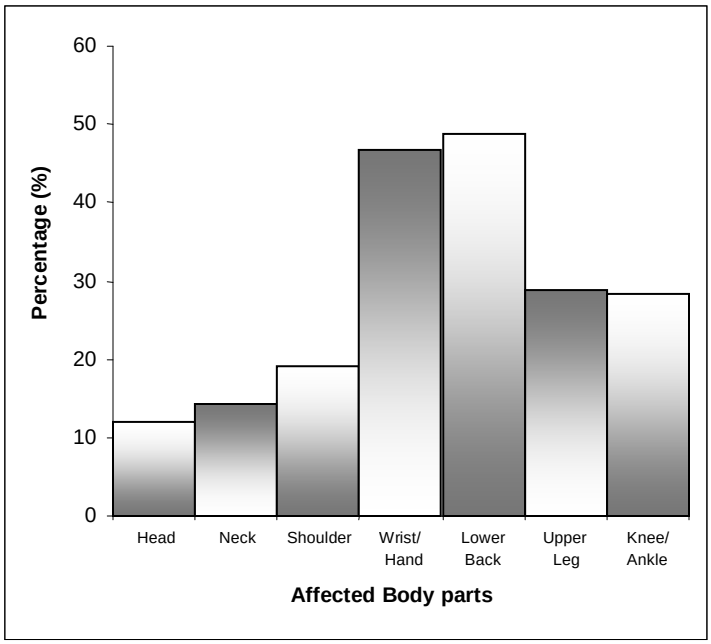

Fig. 1. Percentage of Agricultural workers reported MSD in different parts of the body during performing rice cultivation tasks together.