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Prevalence of Musculoskeletal Problems among Sugarcane Workers in Uttar Pradesh

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Abstract— *Agricultural work in both developed and in developing countries continues to be one of the most hazardous occupations. India is primarily an agrarian economy as farming is one of the most important occupations in the country. Many risk factors are associated with the development of musculoskeletal disorders are common in agricultural tasks. Thus in the present study an attempt has been made to analyze the prevalence of MSDs among sugarcane workers of Bareilly District, UP. A total sample size of 60 farm workers was taken for data using purposive and random sampling without replacement. Due to long working hours, awkward body postures, repetitive work and physical load there exist a high prevalence of physiological discomforts among sugarcane workers engaged in sugarcane sowing and harvesting both the activities are associated with MSD most dominated in neck,upperarm and low back . The above investigation revealed that the workers suffered from pain and discomforts more in neck ,upper arm,and low back.*

Keywords— Musculoskeletal disorders, posture, discomfort, pain.

I. INTRODUCTION

Agricultural work in both developed and in developing countries continues to be one of the most hazardous occupations**.** India is primarily an agrarian economy as farming is one of the most important occupations in the country. It is generally perceived as a healthy outdoor occupation. However number of studies have classified farming as a risky and hazardous job . Because of the nature of farm work, farm workers are at particular risk of developing musculoskeletal disorder, besides a large number of other health problems. Agriculture ranks among the most hazardous industries. Farmers are at very high risk for fatal and non-fatal injuries; and farming is one of the few industries in which family members (who often share the work and live on the premises) are also at risk for fatal and non-fatal injuries **(NIOSH 2013**).

Most of the sugarcane production activities describe a wide range of inflammatory and degenerative diseases and disorders that result in pain and functional impairment and may affect the body's soft tissues, including damage to tendons, tendon sheaths, muscles and nerves of the hands, arms, wrists, elbows, shoulders, neck, back, knee and legs which are produced due to awkward posture of farm workers.

OSHA (Occupational Safety and Health Administration) define ergonomics as "the science of fitting the task to the worker. When there is a mismatch between the physical requirements of the job and physical capacity of the worker, work related Musculoskeletal Disorders (MSDs) result. Workers who repeat the same motion throughout their workday, who do their work in an awkward position, who use a great deal of force to perform their jobs, who repeatedly lift heavy objects or who feel a combination of these risk factors are most likely to develop work related musculoskeletal Disorders (WMSDs)."

The musculoskeletal problems are considered to be the most prevalent and pricey of all work related injuries. Musculoskeletal problems start as minor aches and pain, but when left unaddressed can result in serious injuries that can be permanently disabling. In addition, these painful injuries take long recovery periods and chances are that severely injured worker may never be able to return to their jobs. The present study was planned with the following objectives-

- To assess the physical characteristics of the workers engaged in sugarcane production system.
- To assess the prevalence of MSD among workers.

II. MATERIAL AND METHOD

The present study was carried out in four villages of Bareilly district of Uttar Pradesh to assess work postures. A total sample size of 60 farm workers (40 from harvesting and 20 from sowing) was taken for experimental data using Purposive and Random sampling without replacement .To assess MSDs of farm workers questionnaire developed by FRM component of AICRIP Homescience was used .Postural discomfort analysis questionnaire was used to assess musculoskeletal disorders among farm workers.

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Postural Discomfort Analysis Questionnaire

The postural discomfort analysis questionnaire was used to find out the discomforts of different body parts. The questionnaire was given to each subject and was asked to put the mark on the line, ranging from 0-10 (known as VAS scale), with 0 meaning 'no discomfort' and 10 meaning 'severe discomfort'. This data was then being analyzed. Mean and SD values were determined, validated by **Corlett and Bishop (1976) and Huskisson (1983).**

III. RESULTS AND DISCUSSION

Work related musculoskeletal discomforts of the workers were assessed using Postural discomfort analysis questionnaire. Responses of 60 workers were analyzed.

Table 1. depicts the physical characteristics of the respondents selected for ergonomic experiments to carryout the identified drudgery prone activity of sugarcane production system i.e sowing. The mean age and SD values of the respondents was 33.35 ± 7.70 years and height166.75 ± 5.03 cms. The mean body weight was 58.75 ± 6.24 kgs. The computation of Body Mass Index (BMI) revealed that the average BMI was 21.10 ±1.66 per cent and almost all the respondents fell in the normal range.

Table.1: Physical characteristics of the subjects involved in sowing activity of sugarcane.

n=20

S.No.	Physical characteristics	*Mean ± S. D.*
1	Age (yrs)	33.35 ± 7.70
2	Height (cm)	166.75 ± 5.03
3	Weight (kg)	58.75 ± 6.24
4	BMI	21.10 ±1.66

Table.2: Physical characteristics of the subjects involved in harvesting activity of sugarcane.

N=40

S.No.	Physical characteristics	*Mean ± S. D.*
1	Age (yrs)	36.08 ± 7.86
2	Height (cm)	168.5 ± 5.10
3	Weight (kg)	58.06 ± 8.44
4	BMI	20.43 ±2.64

The mean age and SD values of the respondents who were involved in harvesting activity was 36.08 ± 7.86 years and height 1.68 ± 0.05 cms. The mean body weight was 58.06 ± 8.45 kgs. The computation of Body Mass Index (BMI) revealed that the average BMI was 20.43 ± 2.64 per cent and almost all the respondents fell in the normal range.

Table.3: specific pain symptoms in different body parts of the respondents in sowing of sugarcane by traditional method.

Body parts	Frequency(%)
Neck	17(85)
Shoulder	16(80)
Upper arm	18(90)
Elbow	-
Lower arm	16(80)
Wrist	17(85)
Palm	6(30)
Fingers	7(35)
Chest	5(25)
Abdomen	-
Upper back	2(10)
Lower back	17(85)
Hips	-
Upper legs	18(90)
Lower legs	18(90)
Ankles	6(30)
Feet	11(55)

In sowing activity most farm workers reported pain in upper leg, lower leg, upper arm ,neck, shoulder and low back.

Table.4: specific pain symptoms in different body parts of the respondents in Harvesting of Sugarcane

Body parts	frequency	percentage
Neck	30	75
Shoulder	34	85
Upper arm	35	87.5
Elbow	11	27.5
Lower arm	23	57.5
Wrist	34	85
Palm	19	47.5
Fingers	21	52.5
Chest	6	15
Abdomen	-	-
Upper back	17	42.5
Lower back	36	90
Hips	5	12.5
Upper legs	37	92.5
Lower legs	28	70
Ankles	21	52.5
Feet	9	22.5

In harvesting activity pain in upper leg, neck, shoulder ,low back ,upper arm,and wrist was reported from more than 80 percent workers.

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Postural Discomfort Analysis (VAS scale)

The postural discomfort analysis questionnaire was used to find out the discomforts of different body parts during the vegetable pre-harvesting activities. The questionnaire was given to each subject and was asked to put the mark on the line, which was then being analyzed. The descriptive (mean and SD values) were determined for VAS (Visual Analogue Scale) validated by **Corlett and Bishop (1976) and Huskisson (1983).** Similar work was reported by **Newel (2003)**. She conducted studies to find out the comparison of instantaneous and cumulative loads of the low, back and neck in orthodontists. She applied the VAS scale ranging from 0-10, with 0 meaning 'no discomfort' and 10 meaning 'severe discomfort'. Her individual values ranged between 0.6-9. The neck had the highest mean value 2.6, with shoulder and lower back closest behind at the 2.3 and 1.6 respectively. The mean and SD results of the postural discomfort questionnaire were analyzed and found among respondents.

The results depict (table 5) that the mean value was highest during sowing in the neck i.e. 7.11 followed by legs (7.0), thighs (6.75), lower back (6.75), shoulder(6.66),upper arm(6.60), lower arms(5.37) , mid back (5.25)and upper back(5). The pain and discomfort in neck was highest due to lifting and forceful action. They work in standing and bending position for 8 hours per day with a rest in between for 1 hour. This is the reason for pain in legs ,thighs ,lower back and other body parts.

Table.5: Postural Discomfort among the respondents engaged in sowing of sugarcane (VAS Scale)

Body parts	Traditional method (n=20) (Mean±SD)
Neck	7.11±0.92
Shoulder	6.66±0.84
Upper back	5±1.53
Upper arm	6.61±0.68
Mid back	5.25±0.5
Lower arms	5.37±1.58
Low back	6.75±3.02
Buttocks	-
Thighs	6.75±1.01
Legs	7.0±0.85

Table.6 depicts) that the mean value was highest during harvesting in the upper arm i.e. 6.74 followed by low back (6.63), leg (6.37), thighs (6.01), lower arm (6.0), shoulder (5.81), mid back (5.45), upper back(5.16),and neck(5.1). In harvesting activity pain and discomfort in was highest in upper arm and low back because hands are most active organs while working thus overwork by these lead to pain and low back pain may be due to the frequent standing and bending while doing harvesting for 8 hours a day. Lower part of the back bears the weight of the upper body plus any weight that is carried and it also twists and bends more than the upper back causes low back pain.

Table.6: Postural Discomfort among the respondents engaged in Harvesting of sugarcane (VAS Scale)

Body parts	(Mean±SD)
Neck	5.1±1.18
Shoulder	5.81±1.10
Upper back	5.16±0.61
Upper arm	6.74±1.01
Mid back	5.45±0.82
Lower arms	6±0.90
Low back	6.63±1.07
Buttocks	-
Thighs	6.01±1.10
Legs	6.37±0.86

Hence the above investigation revealed that the workers suffered from pain and discomforts more in neck ,upper arm, low back, mid back, upper back, etc. These discomforts were due to bending and standing postures adopted by them at work place. Finally it can be concluded that the continuous maintaining of static posture and repetitive movements were the main reason for discomfort in these parts. **Toomingas *et al.* (2002)** conducted a study which revealed that eighty six per cent female and sixty eight per cent male reported for musculoskeletal problems, especially pain in neck and shoulder regions. **Tripathi and Kwatra (2016)** found that Due to long working hours, awkward body postures, repetitive work and physical load there exist a high prevalence of physiological discomforts among farm workers. Highest Postural load factor was reported during manual transplanting and land preparation activities for which workers have adopted Bending and Semi Bending postures respectively.

IV. CONCLUSION

Farm workers suffer from multiple musculoskeletal problems that are caused by over use or misuse of muscles, bones and nerves and significantly impair their activities of daily living. High incidence of pain as reported by farm workers in various body parts viz. neck, shoulder, elbow, wrist, mid back and low back, knee and calf muscles in overburdened rural workers indicates that farm workers are at continuous health risk. The erroneous habit of not mentioning about musculoskeletal problems at the right time, or "having learned to live with pain"

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makes them susceptible to high health risks, as left unaddressed, musculoskeletal disorders that comprise of over many diseases and syndromes and are usually progressive and associated with pain, result in lifelong pain and permanent disability giving rise to enormous health care expenditure and loss of work. The fact that is required to be ascertained before the farm workers is that when they suffer from musculoskeletal problems although their physical health is principally impinged on, but their mental, economic and social functions are also impaired, thus affecting the quality of life of not only the farm workers themselves, but their families as well.

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