

Mechanical, Musculoskeletal Health Issues, and Morbidity Profile in Agricultural Workers: A Holistic Perspective

Shivashankari Pandirajan¹, Saurabh RamBihariLal Shrivastava², Muthukumar T³

Received on: 28 March 2022; Accepted on: 06 June 2022; Published on: 18 August 2022

ABSTRACT

The agricultural business employs a majority of the Indian population, but little attention is paid to their health requirements. The morbidities that develop in agricultural workers provide particular health challenges. The purpose of this review article is to narrate various health issues among agricultural workers, especially mechanical, biological, and musculoskeletal hazards. An extensive search of all materials related to the topic was done for 6 months in PubMed, WHO website, and Google Scholar search engines. Overall, 30 articles focusing on the different aspects of health hazards of agricultural workers were selected and analyzed. The agricultural workers tend to have multiple morbidities including a history of falls, low back ache, knee pain, and injuries due to animal bites. Poor health-seeking behavior and healthcare utilization were also common among agricultural workers. Health issues of agriculture workers are varied in nature like mechanical, physical, chemical, biological, psychosocial illness, etc. To address the health problems of the agricultural workers, a multifaceted strategy is required.

Keywords: Agricultural workers, Health hazards, Morbidity.

SBV Journal of Basic, Clinical and Applied Health Science (2022); 10.5005/jp-journals-10082-03142

INTRODUCTION

Occupational health has progressed from a single disciplined, risk-focused goal to a multidisciplinary, broad-based strategy that takes into account a person's physical, mental, and social well-being, as well as their overall health and personal growth.¹

According to the World Health Organization, between 68 and 157 million new cases of work-related disorders are diagnosed each year. Nearly 10% of the population suffers from long-term disability, with 0.5–1% dying.²

Previously it was limited only to industries but now perspectives on occupational health cover a wide range of occupations, including trading and marketable companies, service exchanges, forestry, and agriculture, as well as the topics of industrial sanitation, industrial illnesses, and industrial calamities, toxicology associated with special threats, industrial recovery, and work-related psychology.³

India is the second largest agriculture-producing country next to China; around 65% of the people were engaged in agricultural activities either directly or indirectly. Agriculture has some features that put workers well-being and health at risk, such as exposure to unauthorized pesticides, organic produces, animals, long working times, etc. People also live in rural areas where healthcare activities are relatively less when compared to urban areas. Occupational health among farmers is relatively a new concept and very minimal studies have been done related to health hazards among agricultural workers.

The purpose of this review article is to narrate various health issues among agricultural workers especially mechanical and musculoskeletal hazards.

METHODOLOGY

An extensive search of all materials related to the topic was done using the keywords, viz., agricultural workers, morbidity profile, health hazards for 6 months in PubMed, WHO website, and Google Scholar search engines. Relevant documents, reports, and

^{1,2}Department of Community Medicine, Shri Sathya Sai Medical College and Research Institute, Chengalpattu, Tamil Nadu, India

³Department of Community Medicine, Bhaarith Medical College and Hospital, Selaiyur, Tamil Nadu, India

Corresponding Author: Shivashankari Pandirajan, Department of Community Medicine, Shri Sathya Sai Medical College and Research Institute, Chengalpattu, Tamil Nadu, India, Phone: +91 7299647655, e-mail: shivashankariram@gmail.com

How to cite this article: Pandirajan S, Shrivastava SR, Muthukumar T. Mechanical, Musculoskeletal Health Issues, and Morbidity Profile in Agricultural Workers: A Holistic Perspective. *J Basic Clin Appl Health Sci* 2022;5(4):88–91.

Source of support: Nil

Conflict of interest: Dr. Saurabh RamBihariLal Shrivastava is an editorial board member & excluded from the standard peer-review process.

original research articles focusing on different aspects of health of agricultural workers were included in this narrative review. Overall 52 articles were identified on the topic including original research articles, technical reports, etc. Among these, 17 articles were excluded as they did not fit the scope of this review and 11 were excluded as full length articles were not available for review. Thus, a total of 24 articles were selected based upon the suitability of the current review objectives and analyzed. These identified technical reports, and other forms of research articles were then re-grouped into different sections, namely, mechanical hazards, musculoskeletal problems, and morbidities among agricultural workers.

MECHANICAL HEALTH HAZARDS AFFECTING AGRICULTURAL WORKERS

A cross-sectional study was conducted by Manwani and Pandey in Pravara Rural Hospital located in Ahmednagar district of western Maharashtra, India. The goal was to determine the scope of

agricultural-related mechanical health risks. The bulk of mechanical dangers was caused by equipment/instrument-related injuries followed by animal injuries.⁴

Das⁵ conducted a study to estimate the agricultural work-related injuries among the farmers in West Bengal, India. Hand tools, farm machinery, and other external causes of agricultural injury were the most common spade and sickles were the most commonly implicated tools in hand injuries. The most affected body parts are the fingers of both limbs, followed by the foot, ankle, hand, wrist, and lower back.

A community-based cross-sectional study was conducted by Bhattarai et al.⁶ in a rural village in eastern Nepal, farmers experienced 69% of all work-related injuries. Cuts (79.7%), puncture wounds (11.3%), and lacerations were the most common injuries among farmers (7.5%). The most common injuries were caused by hand tools; followed by sliding at work, sharp equipment, animals, and falls from great heights. Upper limb injuries accounted for 67% of all injuries, with fingers being the most involved portion (43%). The respondents' average number of years working in agriculture was 23.6–13.6 years. Farmers' age and working experience were found to be strongly related to the incidence of injuries among them.

Dimich-Ward et al.⁷ used data from the Canadian Agricultural Injury Surveillance Program (CAISP), which covered farm work-related fatalities for all Canadian provinces from 1990 to 1996. Roll-over (32%) and run-over (45%) were the most common mechanical mechanisms for fatal injuries in males and females, respectively. Agricultural machinery injuries requiring hospitalization followed a similar pattern, with males over the age of 60 being injured at a higher rate. For nonmachinery hospitalizations, the male:female ratio was on average 3:1. Males were more likely to be struck by or caught against an object, but females were more likely to be injured by animals. They concluded that gender is a crucial aspect to consider when interpreting agricultural injuries, both fatal and nonfatal.

Kumar et al.⁸ conducted epidemiological research in two phases, each lasting 1 year, in 9 and 30 villages in two northern Indian states. In tractor-related incidents, investigations were conducted to ascertain the primary elements, the activities involved, and the degree of injuries for agricultural and nonfarming activities. A total of 76 cases were reported, with 5 fatalities and 71 nonfatal injuries. Tractor-related injuries in India have been discovered to be considerably different from those recorded in highly industrialized countries. Nonfarming activities were responsible for 54% of tractor-related injuries in the first phase and 49% in the second phase. Only 1 and 6% of the total injuries recorded in both phases were tractor-related. Collisions were a common source of tractor-related injuries. Passengers on trucks or trailers were injured in 28 and 40% of the cases, respectively, in two phases.

Nag et al.⁹ steered a study to estimate human energy expenditure in agricultural manufacture activities, analyze task harshness, tools, and machines, and develop the foundation for reorganizing work and work techniques. Tractor accidents (overturning, falling off the tractor, etc.) were the most common (27.7%), followed by thresher (14.6%), sprayer/duster (12.2%), sugarcane crusher (8.1%), and chaff cutter (7.8%) accidents on average throughout the four areas.

MUSCULOSKELETAL DISORDERS AFFECTING THE FARMERS

An epidemiological survey was conducted by Gupta et al.¹⁰ among 300 farmers of Kanpur rural district, aged between 20 and 70 years.

Lower back pain (60%), knee pain (39%), shoulder pain (22%), and neck pain (10%) are the four most common musculoskeletal disorders afflicting Kanpur-Rural farmers, according to descriptive analysis of data. A higher % age of respondents indicated chronic affection lasting nearly a year as compared to those who were afflicted for around a week.

A cross-sectional study was conducted by Mishra et al.¹¹ among 296 homemakers from rural areas of Barabanki district in Uttar Pradesh to assess the magnitude of MSP among rural homemakers and to identify its modifiable risk factors. MSP was found to be prevalent in 40.9% of homemakers.

Vasanth et al.¹² did a cross-sectional study among 195 pluckers in a tea plantation in Anamalai, Tamil Nadu, India, aged 18–60 years, using simple random sampling to determine the prevalence, patterns, and concerns related to job-related musculoskeletal illnesses. 83.6% of participants experienced musculoskeletal discomfort in the previous year, and 78.5% reported it in the previous week. In the previous year, the shoulder was the most common site (59%), while the lower back was the most common site in the previous 7 days.

A population-based study of occupational exposures and health among 759 farm laborers hired in California was undertaken by Xiao et al.¹³ Chronic pain was linked to advancing age and feminine sex. Men who drive tractors or other heavy farm equipment for more than 60 hours/week have a higher chance of developing chronic hip discomfort. Kneeling or crawling for more than 35 hours/week was associated with substantial back pain and knee discomfort in women.¹³

The cross-sectional study was conducted by Inbaraj et al.¹⁴ among 310 brick kiln workers in unorganized brick kiln industries in villages of Vellore district of Tamil Nadu. Squatting was the most prevalent work posture (67%), followed by standing (14%). The majority of workers (87%, $n = 269$) said they were experiencing pain right now, with 51% ($n = 158$) reporting pain at work. Chronic low backache (LBA) (prevalence 59%) and acute LBA (prevalence 33%) were the most prevalent, followed by chronic knee pain (prevalence 59%). The severity of the discomfort was similarly connected with job discontent. Long-term brick kiln employees who maintain a precise posture for extended periods of time suffer from severe musculoskeletal pain that interferes with everyday activities and lowers job satisfaction.

A study conducted by Tarique et al., in Kanpur, states that the most prevalent musculoskeletal disorder is low back pain (60%), followed by Knee pain, shoulder pain, Neck pain.

MORBIDITY PROFILE OF AGRICULTURAL WORKERS

Rajesh et al.¹⁵ conducted a cross-sectional study among 400 agricultural laborers aged 16–60 years who lived in a subcenter area of the PHC in the rural field practice region of the Medical College in South India. Morbidities affecting the oral cavity were the most common (62%) among agricultural workers, followed by the musculoskeletal system (21.7%) and respiratory system (21.7%) morbidities (19%). Morbidities of the oral cavity, musculoskeletal system, respiratory system, anemia, and animal attacks were substantially linked with increasing age, gender, and poor educational status.

In a research report, Durairaj and Murugan¹⁶ found that a considerable number of salt workers are exposed to salt and are experiencing occupational health concerns such as ocular

symptoms, dermatological symptoms such as headache, giddiness, dyspnea, muscle, and joint pains. Ophthalmic disorders were the most common, possibly as a result of irritation from direct sunlight and the glare generated by salt crystals in the brine.

Under the auspices of the Urban Health Training Centre (UHTC), Department of Community Medicine, SSMC, Tumkur, Shashikala et al.¹⁷ did a cross-sectional investigation among 75 workers in three rice mills in an urban area. The data revealed that 42.66% of the subjects had respiratory morbidity, with 10.66% having a PEFR of less than 200 L/minute.

Halesha et al.¹⁸ did a retrospective, descriptive analysis using secondary data to identify the epidemiology, arrival delays, clinical characteristics, complications, and outcome of snakebites observed at a tertiary care hospital in southern India. Of 180 snake bites, there were 108 cases of viper bites with hematotoxic manifestations and 74 cases of elapid bites with neuromuscular manifestations. Males between the ages of 20 and 40 made up the majority of the victims (60.5%). The majority of the bite victims are from rural areas (81.1%), and the majority of the bites occur during the day (70.5%), mostly on the lower limbs (67.2%). The months of July and September were the busiest in terms of instances. The majority of the victims were agricultural employees (54.4%) and plantation workers (30.5%), indicating that snake bites were a serious working concern.

Kole et al.¹⁹ conducted a prospective observational study from January 2010 to December 2011 at the Infectious Diseases Hospital, Beliaghata, Kolkata, India. A total of 282 tetanus cases were screened and closely observed from January 2010 to December 2011. The bulk of the study participants were tetanus-unvaccinated or tetanus-incompletely vaccinated, with an average age of 31.15 years (14.26). The majority of the patients were farmers (140, 49.64%) and children (102, 36.17%). Thorn/pinprick was the most prevalent source of infection in 129 cases (45.7%), followed by cut/lacerated injury in 83 cases (29.4%), and ear infection in 47 cases (16.7%), with specific injury not detected/remembered in 42 cases (14.8%). The average hospital stay was 17.2 days (4.7 days), with autonomic nervous system dysfunction being the most common complication. A total of 58 patients (20.6%) died; the majority of them died from sepsis caused by aspiration pneumonia, respiratory failure, or heart issues.

Bakhsh et al.²⁰ conducted a study in which the data were collected from the Vehari district of Pakistani Punjab. The respondents who harvested BT cotton were compared to those who harvested non-BT cotton in terms of health dangers and associated health costs. The study found that 61% of cotton pickers from BT cotton households reported one or more pesticide health effects during picking season, compared to 66% of non-BT cotton households. Skin difficulties, headaches, cough, flu/fever, eye irritation, and restlessness were among the health effects; however, the % age of non-BT cotton households experiencing these effects was significantly higher. For non-BT cotton and BT cotton households, the health cost of pesticide use in cotton was US\$ 5.74 and 2.91 per season, respectively. The cost of health was highly connected to education, picking in BT cotton fields, and preventive actions.

According to Sigsgaard et al.,²¹ animal husbandry is linked to exposure to organic dust containing allergens and microbiological matter including alive bacteria and viruses, endotoxins, and other variables such as irritating gases like ammonia and disinfectants. Specific agents/risk factors for asthma, rhinitis, chronic bronchitis,

COPD, and lower FEV1 have been discovered. Published research on dust and endotoxin exposure in livestock farmers reveals no downward trajectory in exposure over the previous 30 years, implying that these workers are still overexposed and at risk of respiratory disease. Avoiding further exposure to causative agents is recommended in cases of occupational asthma and rhinitis; however, this may not be possible in agriculture, owing to socioeconomic reasons.

The cross-sectional study was conducted by Jyoti et al.²² in Yettingudda, Narendra, and Hebballi villages of Dharwad district among 90 respondents to elicit information on health problems among farm workers. Sweating, soiling of the face, feet, and hair were common issues for cereal crop agricultural employees when preparing the ground. The laborers experienced soiling of feet, perspiration, headaches, and skin allergies in his hands while weeding and fertilizer application tasks. Hands developed skin allergies as a result of the toxins in fertilizer.

Sudha et al.²³ showed that skin allergy was the most common problem faced by dal mill workers during de-husking, cleaning, sieving, drying, packaging, loading, and unloading in a study on "Occupational health hazards of faced by the dal mill workers." The dal mill workers also experienced skin burning, eye discomfort, and itching as a result of the high sunshine and heat produced by the equipment.

CONCLUSION

Almost all agricultural workers have suffered from some forms of morbidities. Morbidity connected to musculoskeletal injuries, electrical risks, injuries from sharp instruments, heat-associated stress, and skin morbidity affects more than three-quarters of agricultural laborers. Because agriculture is so important to the country's economy, the health of agricultural workers must be preserved, and this remains a top concern for the government.

REFERENCES

1. Protocol P155—protocol of 2002 to the occupational safety and health convention. 1981. Available from: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:P155.
2. Manwani VK, Pandey S. An epidemiological study of mechanical health hazards amongst agricultural workers in rural India. *Int J Occup Saf Health* 2016;4(2):19–23. DOI: 10.3126/ijosh.v4i2.10304.
3. Park K. Park's textbook of preventive and social medicine. 24th ed. Banarsidas Bhanot Publishers; 2017.
4. Occupational health problems in agriculture: fourth report of the joint ILO/WHO committee on occupational health. Geneva: World Health Organization; 1962. Report No: 4.
5. Das B. Agricultural work related injuries among the farmers of West Bengal, India. *Int J Inj Contr Saf Promot* 2014;21(3):205–215. DOI: 10.1080/17457300.2013.792287.
6. Bhattarai D, Singh SB, Baral D, Sah RB, Budhathoki SS, Pokharel PK. Work-related injuries among farmers: a cross-sectional study from rural Nepal. *J Occup Med Toxicol Lond Engl* 2016;11:48. PMID: PMC5080695.
7. Dimich-Ward H, Guernsey J, Pickett W, Rennie D, Hartling L, Brison R. Gender differences in the occurrence of farm related injuries. *Occup Environ Med* 2004;61(1):52–56. PMID: 14691273.
8. Kumar A, Mohan D, Mahajan P. Studies on tractor related injuries in northern India. *Accid Anal Prev* 1998;30(1):53–60. DOI: 10.1016/S0001-4575(97)00061-4.
9. Nag PK, Nag A. Drudgery, accidents and injuries in Indian agriculture. *Ind Health* 2004;42(2):149–162. DOI: 10.2486/indhealth.42.149.

10. Gupta G, Tarique. Prevalence of musculoskeletal disorders in farmers of Kanpur-rural, India. *J Community Med Health Educ* 2013;3(7):249. DOI: 10.4172/2161-0711.1000249.
11. Mishra M, Srivastava A, Srivastava V. Prevalence and risk of musculoskeletal pain in rural homemakers of North India. *Med J Dr Patil Univ* 2017;10(2):138–142. DOI: 10.4103/0975-2870.202092.
12. Vasanth D, Ramesh N, Fathima FN, Fernandez R, Jennifer S, Joseph B. Prevalence, pattern, and factors associated with work-related musculoskeletal disorders among pluckers in a tea plantation in Tamil Nadu, India. *Indian J Occup Environ Med* 2015;19(3):167–170. DOI: 10.4103/0019-5278.173992.
13. Xiao H, McCurdy SA, Stoecklin-Marais MT, Li C-S, Schenker MB. Agricultural work and chronic musculoskeletal pain among Latino farm workers: the MICASA study. *Am J Ind Med* 2013;56(2):216–225. DOI: 10.1002/ajim.22118.
14. Inbaraj LR, Haebbar OJ, Saj F, Dawson S, Paul P, Prabhakar AKP, et al. Prevalence of musculoskeletal disorders among brick kiln workers in rural Southern India. *Indian J Occup Environ Med* 2013;17(2):71–75. DOI: 10.4103/0019-5278.123170.
15. Shivaswamy M, Mallapur M. A cross-sectional study of morbidity pattern of rural agricultural workers in South India. *Int J Curr Res Rev* 2012;4(24):43.
16. Riccò M, Vezzosi L, Mezzoiuso AG. Occupational eye injury in the agricultural settings: a retrospective study from North-Eastern Italy. *Acta Bio Medica Atenei Parm* 2019;90(4):457–467. DOI: 10.23750/abm.v90i4.7602.
17. Prakash S, Manjunatha S, Shashikala C. Morbidity patterns among rice mill workers: a cross sectional study. *Indian J Occup Environ Med* 2010;14(3):91–93. DOI: 10.4103/0019-5278.75696.
18. Halesha BR, Harshavardhan L, Lokesh AJ, Channaveerappa PK, Venkatesh KB. A study on the clinico-epidemiological profile and the outcome of snake bite victims in a tertiary care centre in southern India. *J Clin Diagn Res* 2013;7(1):122–126. DOI: 10.7860/JCDR/2012/4842.2685.
19. Kole AK, Roy R, Kole DC. Tetanus: still a public health problem in India—observations in an infectious diseases hospital in Kolkata. *WHO South-East Asia J Public Health* 2013;2(3):184–186. DOI: 10.4103/2224-3151.206766.
20. Bakhsh K, Ahmad N, Kamran MA, Hassan S, Abbas Q, Saeed R, et al. Occupational hazards and health cost of women cotton pickers in Pakistani Punjab. *BMC Public Health* 2016;16(1):961. PMID: PMC5020534.
21. Sigsgaard T, Basinas I, Doekes G, de Blay F, Folletti I, Heederik D, et al. Respiratory diseases and allergy in farmers working with livestock: a EAACI position paper. *Clin Transl Allergy* 2020;10:29. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7336421/>.
22. Vastrad JV, Kotur R, Byadgi SA. Occupational health hazards of agricultural laborers. *J Hum Ecol* 2014;48(3):423–429. DOI: 10.1080/09709274.2014.11906813.
23. Sudha B, Rupali R, Sangeeta S. Occupational hazards faced by spinning mill workers. *Asian J Home Sci* 2014;9(2):572–575. DOI: 10.15740/HAS/AJHS/9.2/572-575.