



Occupational Health Hazards in Paddy Cultivation Practices in the Coastal Region of Andhra Pradesh

**Leela Krishna Chaithanya^{a++}, Prathibha Joshi. P^{b#},
Sukanya Barua^{a†*}, Sangeetha. V^{a#} and Satyapriya^{a‡}**

^a *Division of Agricultural Extension, ICAR-IARI, New Delhi – 110012, India.*

^b *CATAT, ICAR-IARI, New Delhi – 110012, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/jsrr/2024/v30i72161>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/119054>

Original Research Article

Received: 20/04/2024

Accepted: 22/06/2024

Published: 25/06/2024

ABSTRACT

India is one of the largest producers of rice and ranks second in the world in production. All the cultivation practices in paddy are done manually by the farm labour due to various reasons such as lack of money, small land holding size, lack of awareness on improved tools, high operational cost of machinery, etc. Cultivation practices involved so much drudgery which results in the various work-related health hazards, and ultimately reducing the efficiency and productivity of work. So, address the above issue the present study was planned in the East and West Godavari districts of Andhra Pradesh. 60 females and 60 males constitute the study based on the specific practices done by the males and females. Two blocks were selected from each district in which 30 samples (15 males and 15 females) were taken from each by using simple random sampling method which

⁺⁺ *Ph.D. Research Scholar;*

[#] *Sr. Scientist;*

[†] *Scientist (Sr. Scale);*

[‡] *Principal Scientist & Head;*

^{*}*Corresponding author: E-mail: sukanya.iari@gmail.com;*

Cite as: Chaithanya, Leela Krishna, Prathibha Joshi. P, Sukanya Barua, Sangeetha. V, and Satyapriya. 2024. "Occupational Health Hazards in Paddy Cultivation Practices in the Coastal Region of Andhra Pradesh". *Journal of Scientific Research and Reports* 30 (7):456-63. <https://doi.org/10.9734/jsrr/2024/v30i72161>.

constitutes 120 sample size from four blocks. The study followed ex post facto research design. Pregnant women, lactating mothers, old age people, people with hyper tension, diabetes, heart diseases were excluded in the study. The study included the farmers who are in age group 20-40 years, physically fit for doing farming, and at least 3 years farming experience. A structured interview schedule has been prepared with the consent and construct the validity with the experts to assess the work-related health hazards and assigned mean ranks by using SPSS Software. Results found that in land preparation pain in the body (2.87), in irrigation tingling/ numbness in hand got the highest weighted mean (2.17), in manure and fertilizer application pain in the body (2.58), in pesticidal spray irritation in eyes/blurred vision (2.82), in threshing pain in the body (2.77), in load carrying pain in the body (2.82) has got the highest weighted mean which were the male- specific activities. Whereas in uprooting (2.83), transplanting (2.97), weeding (2.97), harvesting (3.00), and winnowing (2.37) tingling/numbness in hand have got highest weighted mean which were the female-specific activities. If they continue to work manually, they may face serious health problems which finally affect various factors such as the efficiency of work, productivity of work, the standard of living, healthy life, etc...So, it was suggested that they could go for the improved tools that are easily available and can reduce the drudgery to some extent.

Keywords: Health hazards; drudgery; work efficiency; productivity of work.

1. INTRODUCTION

India is one of the largest producers of rice and ranks second in the world in production. It is the staple food for the major part of Asia and the rest of the world population. Almost all cultivation practices in paddy were done manually by the farmers. Drudgery is termed for hard work, monotony, time consuming, use of traditional tools with inappropriate working posture in field [1]. They are adopting awkward postures as well as highly repetitive movements which results in physical strain. As a result, work related health hazards are coming into the picture which ultimately reducing the productivity of the work and efficiency of the farmer [2,3]. To address the above issues the present study entitled 'Assessing occupational health hazards in paddy cultivation practices in coastal region of Andhra Pradesh' was planned.

Bhushan *et.al.*, [4] found in their study that most of the respondents were using traditional tools and implements for a long time. These traditional tools and implements cause many health hazards among women due to a lack of knowledge and information, as they take body-related pain as a normal part of work. Generally, Indian women feel more work for a long time without rest and perform many roles in society and family. This drudgery or fatigue results in feeling tired, sleepiness, physical or mental stress, exhaustion, and pain in body parts. So, it is often said that each one of the farm women suffers from drudgery while performing various activities. Reported that women working in agriculture usually have to make do with archaic

tools or a lack of proper tools at all which can also be unsafe, hazardous, and unhealthy was reported by Tripathi *et al.* 2021.

Chakraborty *et.al.*, [5] conducted a study to find out the present status and awareness of 120 farm women about drudgery reduction technologies in Rajgarh district, Madhya Pradesh. Findings revealed that most of the farm women were of middle age and illiterate. The trend of nuclear type of families existed which were of medium size. Most of the farm women belonged to the OBC category having annual family income of less than Rs 1,00,000 as the majority were marginal farmers with small size of herds. Very few of them (10.00 percent) had complete Pucca houses. Maximum participation of farm women was found in animal dung collection and its disposal (90.50 percent) followed by picking of vegetables (88.50 percent), storage (85.00 percent), manual harvesting (82.00 percent), weeding (80.00 percent) and drying and cleaning of grains (80.00 percent). Among all the activities, manual harvesting was considered a drudgery-prone operation/difficult-to-perform activity by 66 percent of respondents followed by weeding (63.00 percent), threshing (60.00 percent), picking of vegetables (44.00 percent) and thinning (43.00 percent). The majority (82.50 percent) of farm women had a low level of awareness about drudgery-reducing tools and implements. Choobineh *et. al.*, [6] observed that Rice cultivation is associated with Gender disparities and the occurrence of musculoskeletal disorders among rice farmers by recognizing the wide range of ergonomic risk factors. As per the

current study, most of the respondents that are 99 percent face the problem of pain in different regions of the body, including the low back (93.8 percent), shoulder (60.9 percent), hand (53.6 percent), and knee (80.9 percent), as a result of abnormal posture (99 percent) and excessive repetitive job (95 percent) over the period. twin groups of rice farmers experienced the most difficulty during operations such as excavating (87.7 percent), planting seeds (82.7 percent), hauling crops (99 percent), and harvesting (90.9 percent). Farmers were also exposed to extreme physiological and temperature stress, which ceased their capability to carry out their other daily activities.

2. MATERIALS AND METHODS

2.1 Data Description

Present study was conducted in Andhra Pradesh in which we have selected two districts namely

East Godavari and West Godavari because these two districts are contributing to 50 percent of production of paddy and two blocks were selected randomly from each district. 30 samples were taken from each block in which 15 male and 15 females were in the age group between 20-40 years were selected randomly Thus, the total sample size constitutes to 120 from four blocks of the two districts. Sample excluded the pregnant women, lactating women, and old age people who are above 50. The male farmers who have hyper tension, diabetes, heart problem was not included in the study. The sample has been selected in such a way that the population should have BMI (Body Mass Index), CC(Calf-Circumference), MUAC (Mid-upper Arm Circumference), and percent body fat values in the normal range. This is because to get the physically fit sample for credible results. The study followed ex post facto research design.

Table 1. Parameters, their measurement, and normal range of values

S.No	Parameters	Definition	Normal range	Measured tool
1	BMI (Body Mass Index)	It is an approximate measure of whether someone is over- or underweight, calculated by dividing their weight in kilograms by the square of their height in meters.	18.5 to 24.9 for both males and females.	Measuring tape and weighing machine
2	CC (Calf Circumference)	It was measured as the maximum horizontal distance around the left calf as the subject stood upright.	26.0cm to 29.9cm for males 25.0 to 28.3 cm for females.	Measuring tape
3	MUAC (Mid-upper Arm Circumference)	MUAC was measured at the midway point between the olecranon process of the ulna and the acromion process of the scapula.	22.9cm to 25.6cm for males 22.8 to 25.4 cm for females.	Measuring tape
4	Percent body fat	It was estimated with the help of biceps measurement, triceps measurement, Subscapular measurement, and Supra-iliac measurements of a body.	8 to 19 percent for males 21 to 32 percent for females.	Skin fold callipers

Table 2. Frequency and scores for the occupational health hazards

Frequency	Score
Frequently	3
Sometimes	2
Rare	1
Never	0

2.2 Occupational Health Hazards

Various occupational health hazards have been noticed among the farmers separately among the men and women in the paddy cultivation practices in which men are doing Land preparation, Irrigation, Manure, fertilizer application, Pesticidal spray, Threshing, and Load carrying activities and women are doing Uprooting, Transplanting, Weeding, Winnowing, and Harvesting. A structured interview schedule was prepared with the informed consent and construct the validity with the experts. The pilot study was done at the research location and the interview schedule was refined as per the results obtained from the pilot study. The participants were interviewed about any kind of health hazards affecting different body parts during every activity associated with paddy cultivation. The frequency and percentage of occupational health hazards faced by the farmers have been assessed with help of scores given by farmers from 3 (Frequently) to 1 (Rare) by asking the extent of exposure to the specific hazard in the

paddy cultivation. Weighted mean and ranks were assigned appropriately.

3. RESULTS

3.1 Physiological Parameters

The Table 3 mentioned that all the physiological parameter values for the respondents found to be in the normal range which indicated that they are fit for doing the cultivation practices.

3.2 Work Related Health Hazards

The Table 4 clearly mentioned that in Land preparation pain in the body, fatigue have got the highest weighted mean; in Irrigation tingling or numbness in hand; In Manure and Fertiliser application pain in body, fatigue; In Pesticidal spray irritation in eyes/ blurred vision; In Threshing pain in the body, fatigue; In Load carrying pain in the body, fatigue have got the highest weighted mean respectively.

Table 3. Values of various physiological parameters

S. No	Parameter	Mean value	Standard Deviation
1	BMI (Body Mass Index)	24.5 (M&F)	±2.5(M&F)
2	CC (Calf-Circumference)	28.2cm (M) 26.95cm (F)	±2.9 (M) ±2.85(F)
3	MUAC (Mid Upper Arm Circumference)	24.65cm (M) 23.75cm (F)	±3.15(M) ±2.95(F)
4	Percent Body Fat (Biceps, Triceps, Subscapular, and supra iliac measurements)	13% (M) 23.5% (F)	±3.0(M) ±1.5(F)

*M= Male and F= Female

Table 4. Showing the weighted mean and ranks for different health hazards in male-dominated activities in paddy cultivation (N=60)

Activities	Land preparation		Irrigation		Manure and fertilizer application	
	WM	Rank	WM	Rank	WM	Rank
Skin irritation and Allergy	1.32	VIII	0.15	VII	2.22	IV
Irritation in eyes/ blurred vision	1.20	IX	0.00	VIII	2.03	VIII

Activities	Land preparation		Irrigation		Manure and fertilizer application	
	WM	Rank	WM	Rank	WM	Rank
Poisoning	0.00		0.00	VIII	2.20	V
Cut/ wounds and bruises injuries	2.53	IV	0.73	VI	0.27	XI
Breathing problems and congestion	2.43	V	0.00	VIII	1.62	X
Pain in the body, fatigue	2.87	I	1.48	IV	2.58	I
Tingling / Numbness in hand	2.72	II	2.17	I	2.48	II
Biting of insects	1.53	VII	2.00	II	2.10	VII
Slip, Trip, and Fall	2.22	VI	1.13	V	1.78	IX
Chemical Hazards	0.00	X	0.00	VIII	2.47	III
Dehydration and Heat Stress	2.57	III	1.63	II	2.18	VI

*WM= weighted mean

contd....

Activities	Pesticidal spray		Threshing		Load carrying	
	WM	Rank	WM	Rank	WM	Rank
Skin irritation and Allergy	2.48	III	2.18	IV	0.00	V
Irritation in eyes/ blurred vision	2.82	I	2.25	III	0.00	V
Poisoning	2.47	IV	0.00	IX	0.00	V
Cut/ wounds and bruises injuries	0.85	X	0.00	IX	0.00	V
Breathing problems and congestion	2.55	II	1.98	V	0.00	V
Pain in the body, fatigue	2.55	II	2.77	I	2.82	I
Tingling / Numbness in hand	2.43	VI	2.58	II	2.75	II
Biting of insects	1.60	IX	1.17	VII	0.00	V
Slip, Trip, and Fall	1.83	VIII	0.08	VIII	1.55	IV
Chemical Hazards	2.45	V	0.00	IX	0.00	V
Dehydration and Heat Stress	1.95	VII	1.95	VI	1.87	III

*WM= weighted mean

Table 5. Showing the weighted mean and ranks for different health hazards in female-dominated activities in paddy cultivation (N=60)

Activities	Uprooting		Transplanting		Weeding	
	WM	Rank	WM	Rank	WM	Rank
Skin irritation and Allergy	0.55	VI	2.32	IV	2.33	IV
Irritation in eyes/ blurred vision	0.00	VII	0.00	VIII	0.00	VIII
Poisoning	0.00	VII	0.00	VIII	0.00	VIII
Cut/ wounds and bruises injuries	1.73	V	1.77	V	1.88	VII
Breathing problems and congestion	0.00	VII	0.00	VIII	0.00	VIII
Pain in the body, fatigue	2.48	III	2.87	II	2.85	II
Tingling / Numbness in hand	2.83	I	2.97	I	3.00	I

Activities	Uprooting		Transplanting		Weeding	
	WM	Rank	WM	Rank	WM	Rank
Biting of insects	2.23	IV	1.67	VI	1.95	V
Slip, Trip, and Fall	2.23	IV	1.35	VII	1.92	VI
Chemical Hazards	0.00	VII	0.00	VIII	0.00	VIII
Dehydration and Heat Stress	2.55	II	2.45	III	2.55	III

*WM= weighted mean

contd...

Activities	Harvesting		Winnowing	
	WM	Rank	WM	Rank
Skin irritation and Allergy	2.20	V	0.00	VII
Irritation in eyes/ blurred vision	1.52	VII	2.35	II
Poisoning	0.00	IX	0.00	VII
Cut/ wounds and bruises injuries	2.55	III	0.00	VII
Breathing problems and congestion	0.00	IX	2.12	III
Pain in the body, fatigue	2.88	II	1.62	V
Tingling / Numbness in hand	3.00	I	2.37	I
Biting of insects	2.37	IV	0.00	VII
Slip, Trip, and Fall	0.17	VIII	1.60	VI
Chemical Hazards	0.00	IX	0.00	VII
Dehydration and Heat Stress	1.98	VI	1.88	IV

*WM= weighted mean

The Table 5 clearly mentioned that in all the female specific activities, viz, Uprooting, Transplanting, Weeding, Harvesting, and Winnowing Tingling/ Numbness in the hand have got the highest weighted mean.

4. DISCUSSION

As the present study was aimed to know the work-related health hazards that farmers are facing, the results clearly showed that pain the body/fatigue in the majority of the male specific activities is persistent. Likewise in female specific activities tingling/numbness in hand was prominent because majorly upper limb was involved in the activity.

Gangopadhyay *et.al.*, [7] also suggested that working in a squatting and awkward posture for a prolonged period may lead to musculoskeletal disorders especially low back pain among the different groups of workers. In rice cultivation, Manual rice transplanting is a high labor-demanding operation and is directly associated with human drudgery. By working in awkward postures during a particular agricultural activity rice farmers suffer from pain in different parts of their body, especially in the lower back, knee, ankle, feet, and shoulder regions [8]. The most significant injuries experienced by the farmers are contact and exposure to the chemical fertilisers, soil and dust, contamination of bacteria, etc [9]. Sulaiman et al., [10] in their

study reported that farmers are aware of the health risks associated with pesticide usage and that they had experienced symptoms like nausea, diarrhoea, skin irritation, and dizziness, which lasted on average of three days. Surprisingly, opinions on whether pesticides were to blame for their health issues were virtually evenly split, and a significant portion of respondents did not seek medical attention [11-14].

Limitation of the study is selecting the correct sample population with no significant health problems previously with farming experience of at least 3 years [15,16]. Old age people, pregnant women, people with chronic health problems should be excluded for the study. Though we are identifying the potential risks as a result of manual practices farmers will not adopt the improved tools available with an ease due to various social, economic, cultural issues [17,18].

5. CONCLUSION

All the cultivation practices in paddy were doing manually which results in the various occupational/ work related health hazards. Due to these hazards productivity and efficiency of workers is greatly reducing which ultimately resulting in the low standard of living, malnutrition, decreased access to the credit, etc. If the scientists or extension personnels from KVKs, State departments officials can arrange

some mass campaigns regarding the work-related health hazards to make aware of the disadvantages of manual practices, it can be useful for the farmers to adopt the improved tools available for the paddy cultivation.

CONFERENCE DISCLAIMER

Some part of this manuscript was previously presented in the conference: 2nd LIST 169 abstracts Mobilization 11th Seminar 2024 dated 5th -7th March, 2024 in New Delhi, India, Web Link of the proceeding: <https://mobilization.org.in/>

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Sridhar G, Rao BS, Patil DV, Rao SS. Impact of women empowerment through drudgery reduction in agriculture operation trainings during 12th five-year plan period in BCT-Krishi Vigyan Kendra (KVK), Visakhapatnam District. *International Journal of Innovative Research in Science, Engineering and Technology*. 2015;4(7): 5299-5312.
2. Kalita M, Borah R, Bhattacharyya N. Development of scale for assessing occupational health hazards in post harvest activities (OHHPA Scale). In *International Conference of the Indian Society of Ergonomics*. Cham: Springer International Publishing. 2021, Dec 8;653-660.
3. Tonchoy P, Singkaew P, Pudpong P, Auttama N. Work-related hazards and perceived confined-space health risk: understanding the correlation with mental workload among farmers in northern

4. Thailand's shallow wells. *Journal of agromedicine*. 2024, Jul 2;29(3):461-76.
4. Bhushan KB, Misra KD, Tirkey UT, Jain G, Goswami AK. Awareness about drudgery reducing farm tools and implements by women farm workers in Gujarat, India. *Indian Research Journal of Extension Education*. 2016;16(3):89-92.
5. Chakraborty S, Singh K, Singh L, Kumravat B. Status and awareness of farm women about drudgery reducing technologies in Rajgarh district, Madhya Pradesh. *Journal of Farm Science*; 2022, March 21. DOI:10.5958/2250-0499.2022.00030.1
6. Choobineh A, Hosseini M, Lahmi M, Jazani RK, Shahnava H. Musculoskeletal problems in Iranian hand-woven carpet industry: Guidelines for workstation design. *Applied ergonomics*. 2007;38(5): 617-624.
7. Gangopadhyay S, Das B, Das T, Ghoshal G, Ghosh T. An ergonomics study on posture-related discomfort and occupational-related disorders among stonecutters of West Bengal, India. *International Journal of Occupational Safety and Ergonomics*. 2010;16(1):69-79.
8. Das B, Gangopadhyay S. An ergonomics evaluation of posture related discomfort and occupational health problems among rice farmers. *Occupational Ergonomics*. 2011;10(1-2):25-38.
9. Satapathy S. Risk factor in agricultural sector: prioritizing indian agricultural risk factor by MAUT Method. In *Soft Computing Methods for System Dependability*. IGI Global. 2020;249-263.
10. Sulaiman SKB, Ibrahim Y, Jeffrey MS. Evaluating the perception of farmers towards pesticides and the health effect of pesticides: A cross-sectional study in the oil palm plantations of Papar, Malaysia. *Interdisciplinary Toxicology*. 2019;12(1):15-25.
11. Badodiya SK, Gour CL, Chourasia K, Singh S. Analytical study on occupational health hazards among tribal farm women in operations of different agricultural activities. *International Journal of Extension Education*. 2014;10: 115-119.
12. Crawford JO. The nordic musculoskeletal questionnaire. *Occupational Medicine*. 2007; 57(4):300-301.
13. Durnin JV, Womersley JVGA. Body fat assessed from total body density and its

- estimation from skinfold thickness: Measurements on 481 men and women aged from 16 to 72 years. *British Journal of Nutrition*. 1974;32(1):77-97.
14. Garrow JS, Webster J. Quetelet's index (W/H²) as a measure of fatness. *International Journal of Obesity*. 1985;9(2):147-153.
 15. Joshi P, Kumar A, Bisht K, Singh OP. Ergonomics assessment of drudgery in wheat production system. *Indian Journal of Extension Education*. 2020;56(4):155-159.
 16. Nag PK, Sebastian NC, Mavlankar MG. Occupational workload of Indian agricultural workers. *Ergonomics*. 1980; 23(2):91-102.
 17. Surabhi S, Santosh A, Sarita S, Ahlawat TR, Alok G. Drudgery reduction of farm women through improved tools. *International Journal of Agriculture Sciences*; 2016. ISSN, 0975-3710.
 18. Van Tonder E, Mace L, Steenkamp L, Tydeman-Edwards R, Gerber K, Friskin D. Mid-upper arm circumference (MUAC) as a feasible tool in detecting adult malnutrition. *South African Journal of Clinical Nutrition*. 2019;32(4): 93-98.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/119054>