



# Assessment of Knowledge and Practice of Safety measures by the Agricultural workers using pesticide in Loharsi Gram Panchayat of Durg District, Chhattisgarh: One-year Pilot Study



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<sup>1</sup>Shrimanta Kumar Dash, <sup>2</sup>Pankaj Suresh Ghormade, <sup>3</sup>Bedanta Sarma



<sup>1</sup>Professor, Professor & Head, Department of Forensic Medicine and Toxicology, All India Institute of Medical Sciences (AIIMS), Mangalagiri (Andhra Pradesh), India.

<sup>3</sup>Senior Resident, <sup>2</sup>Assistant Professor, Department of Forensic Medicine and Toxicology All India Institute of Medical Sciences (AIIMS), Raipur (Chhattisgarh), India.

## ARTICLE INFO

**#Corresponding Author:** Senior Resident, Dept. of Forensic Medicine and Toxicology All India Institute of Medical Sciences (AIIMS), Raipur (Chhattisgarh), India. Email ID : [bedantanalbari@gmail.com](mailto:bedantanalbari@gmail.com), Phone number: 7898594016/7002513141

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## ABSTRACT

Agricultural crop output is causally linked to use of Pesticide in developing countries like India. Hence, they are being increasingly and injudiciously used by the Indian farmers without having adequate knowledge of the pesticide and safety measures while its use in the fields. Cases of accidental pesticide poisoning and its other health ailments amongst farmer are regularly reported from different parts of the country. Lack of proper knowledge about use of Personal Protective Equipment (PPE) while handling the pesticides seems to be the root cause of problems as highlighted.

**Aims:** The aim of the study was to assess the knowledge of pesticides, their use and adoption of safety measures amongst the target farmers.

**Materials and methods:** This is a cross-sectional questionnaire-based pilot study in the Loharsi village of the state of Chhattisgarh over a period of one year. The target population was approached, and all the information was noted in a specially designed questionnaire.

**Results:** Most of the farmers were adult male (82.52%) having formal education. About 61.17 % participants lack basic knowledge about pesticide and their harmful effect on the health. Only 18 (28.57%) respondents were found using mask and goggles as PPE. We noticed ignorance on the part of agricultural workers regarding disposal of pesticide after its use and other safety measures. 86.41% respondents experienced self-limiting of symptoms during and after sprinkling pesticides in the field.

**Conclusion:** The study highlights the issue of lack of awareness amongst the agricultural workers regarding use of PPE. Hence, in this regards proper training and awareness programmes for target population are need of hour in easily preventable fatalities due to improper handling of pesticides.

## INTRODUCTION

Pesticides are becoming a major component of present-day farming and agricultural industry. They are being used extensively to increase crop production all over the world.<sup>[1,2]</sup> Hence, along with productivity, they are also causing ill health in the population creating a global health problem. Every year many people die following intentional or accidental exposure to such insecticides. Most common victim of accidental exposure of pesticides are the handlers i.e. farmers causing both acute and chronic complications amongst them especially in developing countries like India.<sup>[3]</sup> Repeated exposure has been linked to other health related problems, such as polyneuropathy, dermatitis, behavioral abnormalities, carcinoma etc.<sup>[4]</sup> Farmers are practicing unsafe measure of storage and disposal of insecticides as a result of lack of knowledge and practice regarding safety handling of those. They are misusing insecticides and relatively have low knowledge about safety labels.<sup>[5,6,7,8]</sup> Illiteracy and lack of awareness on the extent to which pesticides represent a hazard have been considered the most important barrier for adopting personal protective equipment (PPE) among such farmers.<sup>[9,10]</sup> Moreover, farmers in developing countries usually get pesticide information from local vendors and fellow farmers who are not oriented enough about risks.<sup>[11]</sup> In year 2017, at Yavatmal region of Maharashtra 32 farmers died post exposure to insecticide while engaged in spraying activities in their farms. In spite of all such ill effects, farm workers in developing countries are continuously using the pesticides in increasing quantities because of lack of alternatives to pesticides; ignorance of the sustainability of pesticides use and weak enforcement of regulations and laws on pesticide use.<sup>[12,13,14]</sup> Studies depicting safety measures, while handling pesticides in the farms have not been documented in this region which is predominantly an agrarian belt. Hence, we conducted this study with the principal aim of understanding farmers' knowledge and practice of handling, storage and disposal of pesticides. This will not only identify exposure situations and knowledge gap; but also assist upliftment of educational as well as policy recommendation.

## AIMS AND OBJECTIVES

Following were the aims and objectives of the study:

1. To assess the knowledge and awareness of commonly used pesticides among farmers.

2. To evaluate the safe practice adopted by farmers while handling pesticides.
3. To find out preventive strategy for minimizing pesticide related ill health among farmers.

## MATERIALS AND METHODS

This was a one year cross sectional pilot study with adopted methodology that includes research approach, target area and population, sampling size and technique, study tools and data analysis. Clearance from institutional ethics committee was taken before commencement of the study.

**Research approach:** Survey method was adopted to extract data from the target population, based on proposed objectives.

**Target area and Population:** The area where the study was conducted is Loharsi Gram Panchayat of Durg district Chhattisgarh. It is located 30 kms from the State capital Raipur.

**Inclusion criteria :** All agricultural workers working in open and closed fields (greenhouse) and involved in farm activities like preparing, handling, and spraying of pesticide.

**Exclusion Criteria:** All events and cases of suicidal and homicidal agricultural related poisoning.

**Sampling size and technique:** The technique of stratified random sampling was used to obtain cross-sectional data for this study.

**Study tool:** A specially designed questionnaire has been prepared to extract data from the participants containing both closed and open-ended questions. Questions are framed in local language in such a manner that they can understand it easily. Answers were filled up by the investigator as narrated by the farmer. A pre-testing was carried out and necessary modifications were made to validate questionnaire.

**Statistical analysis:** All data after extraction are arranged and presented in tabulated form; analyzed and compared with those done by other authors in different geographical locations.

## RESULTS

In the present study total number of participants were 103, out of which 85 (82.52%) were male and 18

(17.48%) female with a male-female ratio of 4.72. Most of the participants belong to age group 31-50 years and most of them are literate (diagram 1 and 2). About 97 (94.17%) participants were associated with some or other kind of agricultural work over a decade. Almost, all of them, except 5 directly handled pesticide in farms depending on their seasonal use over crops. Repeated spraying of pesticide (twice or thrice/year) in rice fields was done by 68 participants. They were never received any kind of community training regarding handling and safety measures while using the pesticides. During assessment about basic knowledge of pesticides, various responses were noted. Most of them 63 (61.17%) does not have any idea regarding various types of pesticides, their specific use, manufacturer etc. While most of them i.e. 82 (79.61%) were aware about the harmful effect of pesticide spraying on the environment, however only 49 (47.57%) participants were aware about its side effects on human body. 82.52% subjects never bothered to read the safety instructions mentioned on the label (table 1).

Maximum use of pesticide by the workers (73.79%) was noted during winter season due to increased activities of pests on the crops in this season (diagram 3). Usually farmers purchase these pesticides from local community vendors just few days before its actual use and mostly store it at home (57.28%), followed by godown (22.33%) and paddy field (20.39%). Actual spraying mixture of pesticide is prepared in paddy field (82.52%) rather than at home or storage places (diagram 6). When questioned about the actual use of PPE during spraying and sprinkling of pesticide, we found that only 18 (28.57%) workers were regularly using mask and goggles, whereas 3 (4.76%) were using handkerchief as mask (table 2). Habit of tobacco chewing during spraying was also prominent amongst them (53.25%) (diagram 7). Maximum participants (95) knew about standard practice of spraying and sprinkling pesticides in the direction of wind.

Practice of discarding remaining pesticide mixture after its use was followed by all farmers, except two. Majority 70 (67.96%) of workers told that they are washing and cleaning the containers at the site of spraying in the field itself and keeping them there for further use. However, surprisingly some of them were using the community pool (24.27%) or household tube well (7.77%) for the said purpose. Only few (9 workers) were using the same container thereafter for household use (table 3). On

questioning about the cleaning of the clothes worn at the time of spraying /sprinkling of pesticide, it was found that most of them wash it separately (96.12%), whereas, few respondents (3.88%) mix them with other clothes before washing (diagram 4).

Majority of farmers 79 (76.70%) use their own dispenser for spraying and out of these 55 (69.62%) does its periodic servicing. While, remaining farmers use it on rental basis, hence does not know about servicing of dispenser (diagram 5).

While there were no reported incidents of fatal accidental poisoning amongst the agricultural workers in the village involved in handling of pesticide in the fields till completion of this study. However, 89 respondents had experienced some kind of common self-limiting symptoms like itching (50 cases), lachrymation (45 cases) and running nose (42 cases) lasting for 1 to 2 days after pesticide handling in the field for which they never seek any medical help (table 3).

## DISCUSSION

Village which we had selected in our study is an agrarian belt and main source of family income is agricultural output with principal crop is rice. Most of the respondents in our study were adult male having good experience in terms of years as agriculture workers. Male members of the families are breadwinners and mostly work in their own paddy field, whereas their female counterparts are occasional farm workers as they look after routine household activities.

Most of the participants (95.15%) were agreeing upon the issue of injudicious use of pesticides over the crops throughout the year to increase crop output. However, after assessing their general knowledge about pesticides; we found that most of these agricultural workers were unaware of its different types, chemical composition, crop specificity, dosing, manufacturing company etc. In sharp contrast to their awareness about the hazardous effects of pesticide on environment, majority of participants were totally unaware of the its toxic effect on human body and their portals of entry. However, findings of study on similar topic conducted in Puducherry depicted completely different finding.<sup>[18]</sup> Some of the previous studies concluded that the participants having formal education are more aware about the harmful effects of pesticides.<sup>[5,16,17,19]</sup> However, such type of correlation was not established in our study; in spite of the fact that most

of the respondents have minimum formal education. This is solely can be attributed to behavioral attitude of the respondents who were reluctant about obtaining the information. They don't even have that curiosity to read the instructions written on the labels pasted over the pesticide containers that too in language understood by them. Similar observations were noticed in one of the previous study.<sup>[20]</sup> They sometimes use pesticide products which are officially banned by various controlling authorities. This finding clearly reflects that awareness plays an important role above formal education.

Ideally, pesticides should be kept in an isolated area having no access to children or elderly. However, we noticed that, pesticides are being ignorantly kept and stored in their houses along with other household items. Despite of this habit; majority (85%) of the participants showed some kind precautionary behavior as they were actually preparing mixture of pesticide in the field itself before its actual use. This is again in contrast to the findings quoted by another author.<sup>[17]</sup> Contrasting habits of the participant regarding storage and mixing of pesticide could be attributed to the operational factors rather than adoption of safety measure.

Most of the respondents knew about the use of personal protective equipment (PPE). But they had doubts regarding its applicability and availability. Some of them were using PPE albeit inadequately and not following the recommendation of appropriate authority. They mostly wear musk and goggles (28.57%) and that too using the same pair repeatedly without washing in between. This finding was surprisingly seen in a particular group of workers as they learnt it from their senior community farmers without having firsthand knowledge of toxic effects of pesticide handling. When they were told about the benefit of adequate use of PPE, most of them showed no interest in lieu of causing uneasiness while working in paddy field. Similar response was elicited by an author in their study from Sri Lanka. They did not find any correlation between awareness and use off PPE.<sup>[7]</sup> Lack of use of PPE was also described by some other authors in their research works in different geographical locations.<sup>[4,18,19,20]</sup> The only natural scientific protective measure followed by the respondents in our study was spraying pesticide in the direction of wind.

There was no standard protocol followed by the workers to discard left over pesticide mixture after spraying. We observed hazardous behavior of workers to wash

pesticide mixing containers and dispensers in community ponds. However, people residing in that area were not using pond water for drinking purposes. Similar studies mentioning lack of standard protocol for proper disposal of pesticide mixing containers and left-over mixture after spraying strongly reflects ignorance on the part of participants about its harmful effects.<sup>[5,17,18,20]</sup> All the respondents frequently use community pool or water from household tube-well for shower after spraying in the paddy field. However, they do not change their cloth immediately after spraying and stay in the field wearing same clothes until all the work is completed.

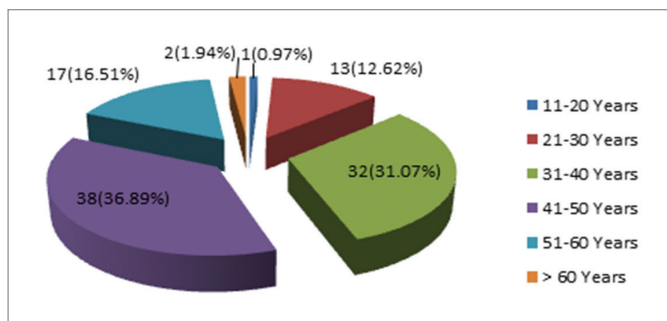
About 86.41% respondents had experienced some kind of symptoms every day after handling pesticides. However, they ignore them because of minor in intensity and self limiting in nature. They believe that these ill effects are unavoidable and are part of their farm related work. Most of the participants use over the counter drugs for these symptoms and never visited any physician. Appearance of most of these symptoms can be explained by the lack of PPE, spending more time in the paddy field wearing same clothing, not washing hands properly and habit of smoking or chewing during the time of handling. A significant negative correlation between using PPE and appearance of symptoms was found by two authors in their studies.<sup>[7,17]</sup> In another study done in Philippines, authors found abnormal cranial nerve function and motor strength amongst participants who are full time worker.<sup>[15]</sup>

## CONCLUSIONS

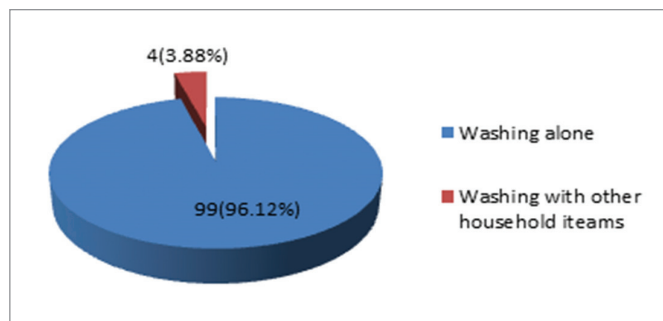
The study showed that there is lack of knowledge and awareness amongst the farmers regarding safety measures for pesticide use. They are using the pesticides since long without adopting any kind of precaution framed by authority to save themselves and the environment. Although, there is no reported fatality till now; it cannot be expected that it will not happen in the near future. Hence, this is the real time to make them aware about the different aspects of the pesticides that are used by them regularly. Considering *literacy rate in the* target population, it will be easier to convince them to adopt safety measures like PPE for handling pesticides. Small group periodic hands on training of farmers and awareness programmes using audiovisual aids must be organized regularly to tackle this serious issue at each village level. Provisioning of continuous supply of single use PPE to farmers must be ensured at the administration

## Figures :

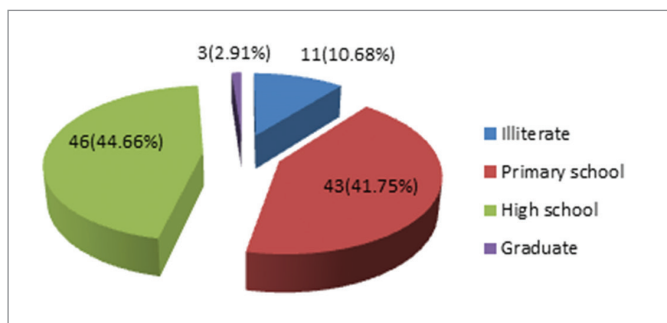
1. Pie diagram showing age wise distribution of participants:



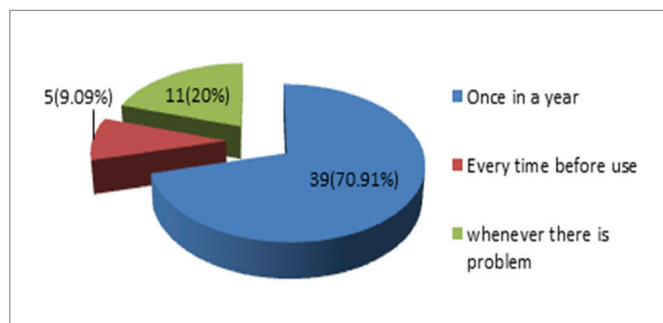
4. Pie diagram showing post sprinkling cleaning of clothing:



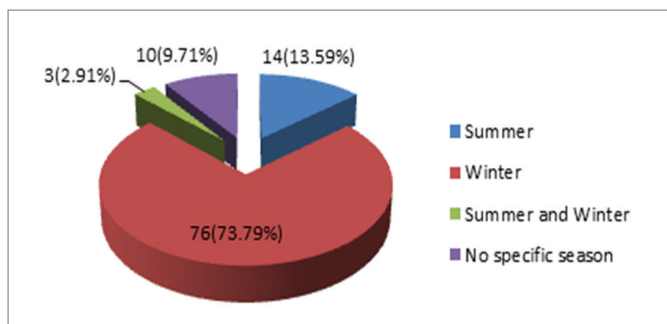
2. Pie diagram showing educational qualification of participants:



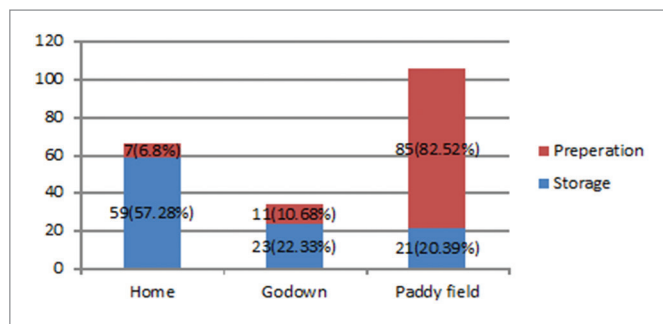
5. Pie diagram showing periodic servicing of manual dispenser:



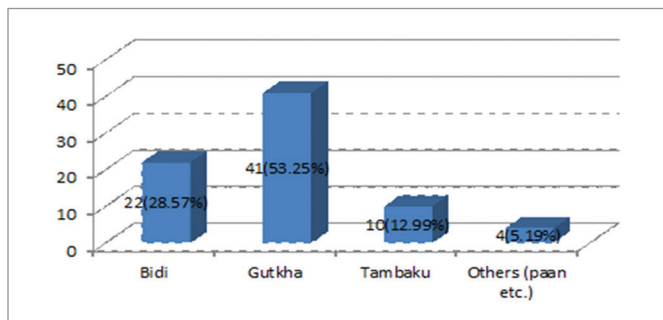
3. Pie diagram showing ideal season for sprinkling pesticides:



6. Bar diagram showing places of storage and preparation of pesticides:



7. Bar diagram showing substance abuse during sprinkling:





**Tables 1:** Table showing response of questions for assessing knowledge about pesticides:

Questions	Response: Yes	Response: No
Knowledge of type(s) of pesticides	40 (38.83%)	63 (61.17%)
Knowledge of manufacturing company	0 (00%)	103 (100%)
Knowledge of harmful effect on human body	49 (47.57%)	54 (52.43%)
Knowledge of harmful effect on environment	82 (79.61%)	21 (20.39%)
Knowledge of precautions given in the packet label	18 (17.48%)	85 (82.52%)
Knowledge of ban of some pesticides	27 (26.21%)	76 (73.79%)

**Tables 2:** Table showing personal protective equipments/ measures taken while sprinkling/ handling:

Measures taken	Number of participants
Protective clothing, shoes, musk, goggles	4 (6.35%)
Only protective clothing	10 (15.87%)
Only shoes	4 (6.35%)
Musk	16 (25.40%)
Goggles	2 (3.17%)
Musk & goggles	18 (28.57%)
Handkerchief	3 (4.76%)
Regular clothing	6 (9.52%)
Total	63

**Tables 4:** Table showing symptoms seen following sprinkling / handling:

Symptoms	Number of cases
Running nose	2 (2.25%)
Itching of different parts of body	7 (7.87%)
lachrymation	10 (11.24%)
Running nose + Itching	17 (19.10%)
Running nose + lachrymation	9 (10.11%)
Itching + Lachrymation	12 (13.48%)
Running nose + Itching + lachrymation	14 (15.73%)
Excessive salivation	2 (2.25%)
Difficulty in breathing	7 (7.87%)
Difficulty in vision	1 (1.12%)
Excessive sweating	3 (3.37%)
Headache	3 (3.37%)
Generalized weakness	1 (1.12%)
Increased frequency of micturition	1 (1.12%)
Total	89

**Tables 3:** Table showing place of washing containers after its use:

Places	Number
Washing in paddy field and kept there	70 (67.96%)
Washing in nearby community pond after initial rinsing in paddy field	25 (24.27%)
Washing in household tube well	8 (7.77%)
Total	103

level. Setting proper health care services providing facilities to treat all pesticidal poisoning at primary and tertiary levels are of paramount importance. Vendors of pesticide must be warned to keep them updated about the new pesticides and actions should be taken for selling banned products to farmers.

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