



Occupational Health: Farmers Knowledge on Pesticide usage and it's Harmful Effects on Human Health in Rural Areas of South India

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Abstract

An estimated 1.3 billion workers are engaged in agricultural production worldwide. This represents half of the total world labor force. Almost 60% of them are in developing countries. Pesticides can enter the human body by three common ways: Through the skin (contact), the mouth (ingestion) and the lungs (inhalation). The state of the chemical, i.e. solid, liquid or gas, affects the chances of pesticide penetration into the body. During the usage of pesticides farmers reported problems such as eye irritation, headache, dizziness, breathing difficulty, skin rashes and all of these symptoms at least once during their exposure to pesticides. A field based cross sectional study was conducted in the rural areas of Karnataka state, Gadag district, to assess the farmer's knowledge, attitudes and practices about pesticide usage and its harmful effects on human health. A pre-tested semi-structured questionnaire was used to obtain the data from January to February 2020. Data was collected at the rural settings by visiting their house and agriculture fields. Totally 265 farmers were interviewed, out of that more than half of them have good knowledge about pesticide usage but only few of them have knowledge about the harmful effects of pesticide on their health. In our study findings majority of the farmers are not aware about the health hazards due to usage of pesticides, they showed good attitude and poor practices about pesticide usage.

Keywords: Attitude and Practices, Farmers Knowledge, Health Awareness, Occupational Health, Occupational Hazard

1. Introduction

A great majority of agricultural workers are found in Asia, which is the most densely populated region of the world, with more than 40% of the world's agricultural population concentrated in China and more than 20% in India¹. In India inadequate safety precautions by workers using or manufacturing pesticides, health checks for employees or workers, labeling of chemical products and chemical contamination of food, unsafe storage of chemicals in the home, environmental pollution from industry often due to uncontrolled disposal of waste are the major causes for occupational hazards². Mixing and spraying are the tasks associated with the greatest intensity of pesticide exposure, given that during this phase farmers are exposed to the concentrated product and, therefore, often face high exposure events^{3,4}. Studies on pesticide dermal contamination highlight that the spray deposition the sprayers bodies is crucial

as these results indicated that all the farmers were at risk from the pesticides they used⁵. The working environment frequently contains a wide variety of chemical, physical, biological and psychosocial health hazards. The early detection and assessment of occupational hazards fall under the discipline of occupational hygiene⁶. In this study we wanted to assess the rural area farmer's knowledge about the pesticide usage and its harmful effects on human health.

2. Materials and Methods

2.1 Study Design

A field based cross sectional study was conducted in rural areas of Gadag district on farmers. Purposive sampling technique was used to recruit the study participants. Socio-demographic details, knowledge, attitudes and practices about the pesticide

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usage and its harmful effects on farmers health related data was obtained using pre-tested semi-structured questionnaire.

2.2 Study Setting

A field based cross sectional study was conducted in the rural areas of Gadag district on farmers. Data was obtained from January to February 2020 using a pre-tested semi-structured interview questionnaire.

2.3 Participants

Those who were involved in the agriculture activity and have experience of previously used the pesticides and those who have at least once sprayed the pesticide and among them those who given oral consent to participate in the study were included.

2.4 Variables

Independent variables: Gender, age, education and income status.

Dependent variables: knowledge was assessed using semi-structured questionnaire.

2.5 Data Sources

Primary data was obtained introducing the questionnaire to farmers. Visited the farmer's agriculture fields and questionnaire was administered related to pesticide usage and its harmful effects on their health.

2.6 Study Size

KSRDPR University was located in the Gadag district headquarters. Purposive sampling technique method was used to recruit the study participants. Totally 265 farmers data was collected from the 5 villages.

2.7 Statistical Methods

Data was entered into excel sheet, analyzed using SPSS v20 and expressed in frequency and percentages.

3. Results

In the current study majority of the participants belongs to 41-50 age group, half of them are completed primary education and all most all are married (Table 1).

In the north Karnataka majority of the farmers grown commercial crops and in Nagavi majority of farmers grown vegetables (Table 2).

In our study almost all the farmers have knowledge about definition of pesticide, its name, how many times it should be sprayed, storage and its safe usage. Majority of the farmers

Table 1. Socio-demographic details of study participants

Characteristics		Frequency (%)
Gender	Male	232 (87.5)
	Female	33 (12.5)
Age Group	20-30	17 (06.4)
	31-40	82 (30.9)
	41-50	89 (33.6)
	51-60	56 (21.1)
	61 and above	21 (07.9)
Education level	Illiterate	57 (21.5)
	Primary	113 (42.6)
	Secondary	74 (27.9)
	Undergraduate	13 (04.9)
	Graduate	08 (03.0)
Marital status	Single	10 (03.8)
	Married	255 (96.2)

Table 2. Frequency distribution of types of crops harvesting in 5 villages

Villages	Types of crops harvest				
	Vegetables	Food grains	Commercial crops	Fruits	All
Binkadakatti	24	11	2	0	0
Hulkoti	4	17	20	7	11
Kalapur	3	4	35	14	0
Kurthkoti	21	7	30	1	3
Nagavi	34	4	13	0	0
Total	86	43	100	22	14

were aware about necessity of reading the label on pesticide prior to its usage and nearly half of them know the names of banned pesticides (Table 3).

In the present study majority (36.6%) of the study participants responded that pesticide residue will exist in air, soil, surface water and fruits, seeds, leaves of crop. For the question disposal of pesticide containing majority (26.8%) of the responded, they will burn the containers (Table 4).

In this study all farmers replied that they were aware about the adverse health effects of pesticides and if they get exposed then they will visit the hospital. If they saw the pesticide poisoned person they will take them into the hospital, nearly half of the farmers responded that they will wash pesticide contacted skin with soap and water. None of them aware about the poison information centre and its toll free number (1800-4250297) (Table 5).

Table 3. Knowledge about pesticide and its usage

Variables	Responses given by Farmers (n - 265)	
	Yes	No
Do you know what is Pesticide	257 (97.0)	08 (03.0)
Do you know the name of the pesticide which you used	236 (89.1)	29 (10.9)
Are you aware about how many times you can sprayed the pesticide	256 (96.6)	09 (03.4)
Do you know that pesticides need to be stored separately and handled safely	251 (94.7)	14 (05.3)
Is it Necessary to read and understand the label or leaflet of pesticide container prior to its use	207 (78.1)	58 (21.9)
Do you know the names of the banned pesticides	133 (50.2)	132 (49.8)

Table 4. Knowledge about other aspects of pesticide usage

Variables	Farmers responses (n - 265)	
	Frequency	Percentage
In which of the following pesticide residues may exist		
Air	33	12.5
Soil	87	32.8
Surface water and ground water	04	01.5
Fruits, Seeds and Leaves of crop	28	10.6
All of the above	97	36.6
None of the above	04	01.5
Do not know	12	04.5
Which of the following ways of disposal of pesticide containers or bottles was safe		
Throw the container in garbage	85	32.1
Throw the container in barren land or any water source	04	01.5
Burn the container	71	26.8
Clean the container and use them for the daily routine	65	24.5
All of the above	29	10.9
None of the above	05	01.9
Do not know	06	02.3

Table 5. Farmer's responses about the harmful effects of pesticide usage

Variables	Correct response given by farmers (n - 265)	
	Yes	No
1. Do you aware that exposure to the pesticides have adverse health effects	256 (96.6)	09 (03.4)
2. Do you know that if you are exposed to pesticides, you should visit the hospital	241 (90.9)	24 (09.1)
3. What would you do when you see a person poisoned with pesticide	Frequency	Percentage
Find out which way the person was poisoned	05	01.9
Render the first-aid	26	09.8
Take the person to the hospital	194	73.2
All of the above	36	13.6
None of the above	04	01.5
4. What would you do if your skin come in contact with pesticide		
Wipe it off the exposed area with clothes	08	03.0
Wash the exposed area with soap and water	147	55.5
Make a call to the poison information centre	00	00
Go to the nearest hospital	108	40.0
Do not do anything	02	00.8
5. What would you do in case of accidental spillage of pesticides into your eyes		
Wash the eyes with water	123	46.4
Make a call to the poison information centre	00	00
Take the person to the nearest hospital	140	52.8
Do not do anything	02	00.8

In our findings majority of the farmers opined that pesticide can enter all routes (Nose, mouth, skin and eyes) and skin irritation and irregular heartbeat are the symptoms and signs (Table 6).

4. Discussion

4.1 Socio-demographic Characteristics

Majority of the farmers are males, belongs in the age group 41-50 years completed their primary education and married.

Table 6. Farmer's responses about toxic symptoms and signs

Variables		Frequency	Percentage
In which route pesticides can entry into human body	Nose	50	18.9
	Skin	16	6.0
	Mouth	36	13.6
	Eyes	09	3.4
	All routes	121	45.7
	Don't know	33	12.4
Which of the following are toxic symptoms of pesticide	Headache	67	25.3
	Watery/sore eyes	23	08.7
	Nausea	19	07.2
	Excessive Sweating	01	00.4
	Cough and cold	10	03.8
	Skin irritation	49	18.5
	Abdominal pain	05	01.9
	Body pain	01	00.4
	All of the above	47	17.8
	None of the above	05	01.9
	Don't know	38	14.3
When you are using pesticides have you experienced the following signs	Dizziness	26	09.8
	Blurred vision	15	05.7
	Excessive salivation	20	07.5
	Hand tremor	13	04.9
	Convulsion staggering	17	06.4
	Narrow pupils	11	04.2
	Vomiting	25	09.4
	Insomnia	21	07.9
	Breathlessness	26	09.8
	Skin rashes	30	11.3
	Irregular heartbeat	34	12.8
	Diarrhea	27	10.2

The similar socio-demographic characteristics found in study conducted at Pudukcherry⁷.

4.2 Types of Crops Grown

In this area majority of the farmers grown commercial crops followed by vegetables. Similar findings found in study conducted at Karnataka⁸ Bangladesh⁹ and Palestine¹⁰.

4.3 Knowledge Pesticide Usage

In our study majority of the farmers knows about where to store the pesticide containers or bottles, a study conducted

at Chikkabalapur district South Karnataka found the similar findings¹¹, Ethiopia¹² and Pakistan¹³.

1/3rd of the farmers responded that the necessity of the reading the label on pesticide container, the similar opinion found in study conducted at Bangladesh⁹ and Brazil¹⁴.

In the current study almost all (96.6%) farmers are knows that how many times they have sprayed the pesticide. A study conducted at Nigeria¹⁵ and Indonesia¹⁶ found the similar opinion.

4.4 Knowledge on Pesticide and Containers Disposal

We came out in the interesting findings that pesticide residue will exists in the air, soil, surface and ground water and in crops. Similar findings found in Kuwait¹⁷, Spain¹⁸ and Sweden¹⁹.

In our study majority (32.1%) of the farmers replied that they will throw the pesticide containers in garbage followed by burned the container. A study conducted at Tanzania²⁰ found the similar results.

4.5 Knowledge on Harmful Effects of Pesticides on Health

In our study majority of the farmers responded that they were aware about the adverse health effects of pesticide usage. The interesting findings found in rural village of Chikabalapur district South Karnataka¹¹, United State of America⁴ and in Northern Iran²¹.

Farmers opined that when they saw the pesticide poisoned person they will render the first-aid and take him to the hospital, the similar advice found in World health Organization report².

Nearly half of the famers replied that they will wash their eyes with water when they met an accidental spillage of pesticide into eyes. The review study conducted by department of agriculture development along with Democritus University of Thrace at Greece found the similar findings²².

4.6 Knowledge on Symptoms and Signs Toxic Effect of Pesticide

In the current study nearly half (45.7%) of the farmers replied that pesticide will enter into the body through nose, skin, mouth and eyes. The similar study conducted in Sweden showed that pesticide will enter into body through skin¹⁹. Similar results found in studies conducted at Palestine¹⁰ and in Uganda²³.

Among the 265 farmers majority of them replied as skin irritation and irregular heartbeat are symptoms and signs of the pesticide harmful effects on health. The similar findings found in Kuwait¹⁷.

In our findings 25.3% of the farmers opined that headache was a common symptom of pesticide usage. Similar results found in Uganda²³ and in Indonesia study²⁴.

5. Conclusion

In our study majority of the farmers aware about the pesticide usage but only few of them are aware about harmful effects of the pesticide usage on health. Henceforth continuous education provision on proper mixing or spraying would increase their knowledge and helps to avoid the harmful consequence on health.

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