

Knowledge and Practice of Pesticides among the Farmer of Bhaktapur Municipality, Nepal

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Abstract

Background and Objectives: Pesticides are the substance which is used in agriculture to prevent, destroy and control the unwanted pests, weeds and other plant disease to enhance the production, processing, storage and transport food and agriculture commodities. The use of pesticides dramatically increases agricultural production and productivity. However, there are some negative externalities from such use of pesticides, as the use of pesticides raises the negative impact also increases. So the objective of this study is to assess knowledge and practice of pesticide use among farmers of Bhaktapur municipality.

Methods: A self-designed questionnaire about knowledge and practice of pesticide use was distributed to the farmers of Bhaktapur municipality. The questionnaires were collected, processed, analyzed and tabulated to find out the existing knowledge and practices of farmers about pesticides use.

Results: This study comprising of 54.1% (n=106) male and 45.9 % (n=90) female in the suburb of Bhaktapur shows majority (80.1%) of the pesticides users aware of pros and cons of pesticides. Only 40.8% store in dedicated pesticide store and 69.4% of the respondents got information for using pesticides from the sales man. However, only 58.2% the respondents take into account the preventive measure of Acute Pesticides Poisoning (APP).

Conclusions: Despite having adequate knowledge of pesticides use, farmers seem to be less aware regarding the hazard of pesticides. Certain efforts must be placed not only to provide additional knowledge on risks of pesticide use but also on the execution of Personal Protective Measures (PPM) which is also necessary to decrease the pesticide exposure of farm workers. Various awareness programs and easy provisions/ supply of PPE would significantly reduce the risk of pesticides. **Keywords:** Pesticides, Acute Pesticides Poisoning, Bhaktapur municipality.

Introduction

With expected nine billion people over the next 50 yrs, the food demand is expected to be double and the global pesticide production to be treble than in the present days. The massive production thus increasing the exposure of human beings and animals to the pesticides to a larger extent[1].

Pesticides are the substances which are used in agriculture for the control and prevention of unwanted pests, weeds and also various diseases of the plants. Besides they are also used to process, store and transport food and agricultural commodities [2].

A study has shown that developing countries have more agriculture related problems such as crop losses, different diseases of the plants and competition from weeds [3]. The various forms of pesticides are herbicides, nematocides, rhodenticides, insecticides, fungicides and weedicides. Out of these, insecticide is a major constitute and this can be used in agricultural, animal husbandry practices and even in public health[4].

Negligence or inappropriate safety measures may lead to exposure to the pesticide which has adverse effects to our body such as skin diseases, neurotoxicity, chemical burns, lung diseases and methemoglobinemia of the infants. Also various pesticides are not only attributed to reproductive, developmental and immunological anomalies but also hematopoietic cancers [5,6].

Bhaktapur is one of the districts in Kathmandu valley where large number of population are involved in farming since many years ago to produce large quantity of the food and vegetable products. The farmers are using the pesticide for increasing the production. Although this is small scale study it will provide baseline information about the knowledge and practices regarding pesticide use among the farmers.

Material And Methods

Descriptive cross sectional study was carried out among the farmers of Bhaktapur municipality. Permission was taken from the IRC of Nobel College and from each participant before data collection. A total of 196 farmers who use pesticides in their field were chosen as respondents by convenient sampling. A semi-structured questionnaire was developed. Data were then analyzed by using descriptive statistics such as frequency, percentage and chi-square test.

Results

Demographic characteristics of the farmer

There were only 11.2% of the respondents who were below the age of 30 and 69.9% of the respondents were above 40. Similarly male respondent were 45.9% and female respondent were 54.1%. 32.7% of respondents were illiterate and only 8.2% of the respondents studied up to higher secondary. We found 36.3% respondents were non-smokers and 36.7 were smokers. Most of the respondents were engaged in agriculture for more than 10 years i.e. 68.4% whereas only 17.3 % were engaged for less than 5 years. Full time workers were 55.6% and half time workers were 44.4%.

Pesticides used

About 50% (5 out of 10) of the pesticides used belonged to the World Health Organization (WHO) toxicity class II (moderately hazardous), 30% of the pesticides used belonged to toxicity class NH and with 20% under toxicity class Ib (highly hazardous).

Farmers knowledge regarding pesticides use

Study revealed that, about the reason of using pesticides by the farmers. 40.3% respondents use pesticides to increase production in agriculture, 48.5% respondents were using pesticides to destroy pest, 10,7% were using pesticides to increase crop quality and 1% were using to increase crop quality. Among

the total respondents 70.9% replied that they had knowledge about the environmental impact of the pesticides. Study revealed that 70.9% of the total respondents knew about organic pesticides and among them 63.8% used organic pesticides in their field. Furthermore 92.9% of the respondents had the knowledge of personal protective equipment (PPE) and 49.5% of the respondents believes that pesticides enter the body through skin, whereas 85.2% believes that pesticides enter the body through breathing (Table 2). The association between use of organic pesticides with knowledge of organic pesticides and educational status.

Farmer practice regarding pesticide use

Farmers' practice towards storing of pesticides, following instruction while using pesticides, use of PPE and hygiene measure after using pesticides are shown in Table 3. 66.3% of the total respondents store pesticide container elsewhere in the farm, 40.8% store in dedicated pesticide store, 23.5% store pesticides in general store within the house, 4.1% store in the kitchen and 7.1% store in toilet.

The instruction for using pesticides is followed by 95.4% of the respondents and among them 69.4% follow the instruction by the salesman, 16.8% of the respondents read the instruction on the pesticide container, 27% follow the instruction from neighbors/ friend, 19.9% of them follow from family members and the remaining 11.2% follow as they wish.

55.1% of the respondents use masks as the personal protective equipment while 38.3% use gloves, 15.3% use boots, 4.6% use aprons/plastic cover and 38.3% use gloves, 15.3% use boots, 33.2% of the respondents used all masks, gloves, boots and apron while spraying pesticides. Similarly 63% of the respondents mix the pesticides by bare hand while the remaining 67.9% mix pesticides by wearing gloves. In the study, 58.2% of the respondents change clothes, wash hands and body as a personal hygiene measure after spraying while 28.5% only wash their hands as a personal hygiene measure.

Self-reported symptoms in connection with pesticides

Regarding symptoms perceived by the respondents, headache was the most perceived symptom of the respondents it was perceived by 43.4% of the respondents. Dizziness is perceived by 16.3%, tiredness is perceived by 10.2%, nausea/vomiting is perceived by 10.7% whereas the least perceived symptoms is blurred vision, skin disease, respiratory problem, eye problem which is perceived by 1%, 2%, 4.6% and 1.5% of the respondents respectively (Table 4).

Discussion

The results of this survey shows that agriculture was the main source of income as most of the respondents (68%) were engaged in agriculture for more than 10 years and the full time workers (67.3%)

were more than half time worker. In the study done in Ethiopia, very few farmers were full time worker and the maximum of them are working as a farmer for less than 5 years [7].

Almost one third of the respondent considerable in this study were illiterate (32.7%) or had limited formal education (40%) which may be the main factor responsible for not being able to read and understand the label of pesticides regarding safe and correct use of pesticides. Similar types of result were seen in the study conducted in Kavre and Kuwait [8, 10].

The use of Personal protective equipment seems to be inadequate. It was found that more than half the farmers used at least one kind of personal protection when handling pesticides. Face mask were used by 55.1% of the respondents as they were found concerned regarding covering their mouth and nose. In Kavre, Karmacharya found 50% of the respondents use masks and cloths on mouth, 6.25% of them use the gloves, no one use both the mouth cover and gloves in combination [8]. The study conducted in Ghana, Tanzania and Kuwait also found the similar findings regarding PPE use [3, 9, 11]. The findings are almost similar with many other studies that people seems to be concerned regarding handling pesticides it does not seems to be adequate. Due to reasons such as discomfort and/or high cost the adequate use of PPE is often neglected. In the study majority of the respondents i.e. 68.4% mix the pesticides by using gloves whereas in Dhading almost half of the farmers mix the pesticides with their bare hands and only about one-sixth (16.6%) by wearing gloves.

Regarding the storage of pesticides, this study showed some worrying practices. The pesticides are found to be stored unguarded by most of the farmers in Bhaktapur. While comparing this study with the Tanzanian one it is found out that more of the respondents store pesticide in the farm this may be because the respondents of Tanzanian study were well educated and very much aware about consequences of pesticide poisoning [11]. According Koirala, in Dhading majority of users (86.6%) store it in a separate place away from food items and medicine (Koirala et al., 2010). In developing countries the farmers are unable to read and write so the interactive and participatory training model is required. The pictograms can be used to simplify pesticide labels and communicate risk information [3].

The most common symptoms reported by the farmers were headache (43.3%), dizziness (16.3%) and nausea and vomiting (10.7%). Similar findings about symptoms perceived have been reported in studies conducted in Ethiopia, India, Ghana, Tanzania and Kuwait [3, 7, 9, 11, 12]. People were found confused in differentiating APP symptoms and symptoms from other diseases conditions which may contribute to over-reporting of APP symptoms.

Conclusion

In this study it is found that most of the respondents have sufficient knowledge regarding the use of pesticides. However they seem to be neglecting the safety measures and found to be adopting other risky behavior while handling pesticides. This study also shows that several illnesses associated can be reduced with appropriate measure like proper use of personal protective equipment and safe storage of pesticides.

Abbreviations

PPE; APP; Acute Pesticides Poisoning.

Declarations

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Authors' contributions: NH (a) and NH (b); Study concept and design, Manuscript writing, Drafting of the manuscript, Data Collection, AKS; Data Analysis, JN and KM; Supervision and data analysis. All authors read and approved the final manuscript.

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Consent for publication:

Not Applicable.

Competing interests:

The authors declare that they have no competing interests.

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Tables

Table 1: socio-demographic characteristic (n=196).

Demographic information	Number	Percent
Age		
Less than 30	22	11.2
30-40	37	18.9
More than 40	137	69.9
Sex		
Male	106	54.1
Female	90	45.9
Education		
Primary	53	27
Secondary	36	18.4
Higher Secondary	16	8.2
Able to read and write	27	13.8
Illiterate	64	32.7
Duration of work		
0-5 years	34	17.3
6-10 years	28	14.3
More than 10 years	134	68.4

Table 2. Farmers' knowledge and understanding about pesticide (n = 196).

Characteristic	Frequency(n)	Percentage
Reason of using pesticides		
Increase in agriculture production	79	40.3
Destroying pest		
Increase in crop quality	95	48.5
Lower the labor cost	21	10.7
	1	5
Know about environment impacts of pesticides		
Yes	157	80.1
No	39	19.9
Know about organic pesticides		
Yes	139	70.9
No	57	29.1
PPE knowledge		
Yes	182	92.9
No	14	7.1
Pesticides enter body		
Through skin	97	49.5
Through breathing	167	85.2

Table 3 Practice regarding pesticide use (n=196)

Characteristics	Frequency	Percentage
Store pesticide		
General store within the house	46	23.5
Dedicated store		
Elsewhere in the farm	80	40.8
Kitchen	130	66.3
Toilet	8	4.1
	14	7.1
Follow instructions		
Yes	187	95.4
No	9	4.6
Advised by whom		
Salesman	136	69.4
Read instruction on pest container before	33	16.8
Neighbors/friend		
Family member	53	27
As wish	39	19.9
	22	11.2
PPE use while spraying		
Mask	108	55.1
Gloves	75	38.3
Boots	30	15.3
Apron/plastic covering	9	4.6
All of the above	65	33.2
Mix Pesticides		
By Bare hand	63	32.1
By wearing gloves	133	67.9
Personal hygiene measures after spraying		
Changing clothes only		
Washing hands	5	2.6
Washing body	52	28.5
All of the above	25	12.8
	114	58.2

Table 4 Symptoms perceived by the farmers in connection with pesticide spraying

Symptoms perceived	Frequency	Percentage
Headache	84	42.9
Dizziness	32	16.3
Tiredness	20	10.2
Blurred vision	2	1
Nausea/Vomiting	21	10.7
Skin disease	4	2
Respiratory disease	9	4.6
Eye problem	3	1.5