KNOWLEDGE AND PRACTICE OF PESTICIDE USE TO PROTECT FARMERS' HEALTH IN AGRICULTURE PRODUCTION IN CAN THO CITY IN 2021 - 2022

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ABSTRACT

Background: *For many years, Insecticide poisoning has always been a leading issue in healthcare for the community, especially in developing countries. If it is used improperly, insecticides can adversely affect human health. The study identifies that the ratio of having knowledge and proper practices about using insecticide helps us to prevent people and the environment from harmful effects as well as risk factors in the future.* ***Objective:*** *Determines the ratio of knowledge and practice to protect the health of farmers when using insecticides and figure out some associated factors involved in Can Tho city in 2021-2022.* ***Materials and methods:*** *A cross-sectional descriptive study on 400 farmers over 18 years old be randomly chosen on the system in Can Tho city in 2021 – 2022 by interviewing a questionnaire.* ***Results:*** *The percentage of farmers having general knowledge is 12.75% and knowing how to practice is 51.25%. Especially, knowing of the meaning of colored lines is still low (4.0%), the knowledge and practice of processing insecticides residues after spraying are very low (4.0% and 5.3%), and the knowledge of the way to deal with insecticide poisoning is low (47.3%) and using protective clothing (91.8%). There is involvement between Academic level, Years*

of exposure, Cultivated area, being trained knowledge and practice for using insecticide ($p<0.05$). ***Conclusions:*** *People's knowledge about using an insecticide is still limited. Therefore, we recommend promoting the propagation of these issues via social media, improving knowledge of using safely of insecticides for farmers, and strictly handling violations.*

Keywords: *Knowledge, practice, pesticides, insecticide, Can Tho.*

I. INTRODUCTION

Pesticides are widely used in agriculture to control pests and diseases to help limit pests and increase crop yields [2], [4], [5], [7]. Improper use of pesticides will harm human health and the environment. According to statistics from the World Health Organization (WHO), every year, there are 3 million poisoning cases related to pesticides and about 200,000 deaths [8], [9]. In Vietnam, from 2000-2001, the number of plant protection drugs and imported chemicals increased 2.5 times and 3.5 times, respectively [9], [10]. Some studies in recent 10 years have shown that knowledge and practice of using an insecticide are still low. According to the study in Ha Nam in 2015, the percentage of people having proper knowledge and practicing was 40.9% and 38.1%, respectively [3]. The study in Dak Lak in 2016 presented a similar trend in figures, with 64.7% for people having proper knowledge and 40.8% for people practicing [1]. A study in Dien Bien in 2019 showed that the number of people who had knowledge of using insecticide was about 57.2% [6]. The most important cause of improperly using insecticide is that farmers do not fully understand and poor practices lead to adverse effects on the environment and human health now and in the future. Therefore, we conducted a study to describe the current status of farmers' knowledge and practice of pesticide use in Can Tho City in 2021 - 2022.

II. MATERIALS AND METHODS

2.1 Participants and Data Collection

Being a farmer directly engaged in agricultural production in Can Tho City.

- Selection criteria: direct use of pesticides; ≥ 18 years old; farming for ≥ 12 months and agreed to participate in the study.

- Exclusion criteria**:** Inability to respond to an interview.

2.2. Research Methods

- Study design: Cross-sectional description.

- Sample size:

The sample size is calculated based on the formula for the estimated sample size for population proportion:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

In which: n is the size of the sample that needs to do; (α= 5%); According to the study of Trinh Khanh Linh, the percentage of people with knowledge and practice of using pesticides in Dien Bien District in 2019 was 57.2%; Choose d=0,05. The sample number (n) is calculated as 377. In fact, 400 people participated in the study.

- Research content

Objective 1:

+ Group of demographic characteristics: age, gender, ethnicity, literacy.

+ Group of knowledge of using insecticide: effects, adverse effects, way into the body, the dose of insecticide, location of spraying insecticide, way to dissolve insecticide, handle the packaging, handle the excess insecticide.

+ Group of practicing using insecticide: location of spraying insecticide, ways to dissolve insecticide, handle the packaging, handle the excess insecticide.

Objective 2:

+ Figure out some factors involved: age, gender, ethnicity, knowledge, and insecticide practice.

Standards of measurement, classification, and evaluation:

+ Each correct and complete answer gets 1 point, and the wrong answer gets 0 points. Multiple choice questions: all correct answers are awarded 1 point and missing or incorrect answers are counted as 0 points.

+ The total knowledge and practice score reached 75 to 100 percent of the total score is considered to be passed, and less than 75 percent of the total score is considered to be failed.

- Research tools and locations:

+ Tools: using a set of questions prepared by face-to-face interviews.

+ Study places: O Mon district, Phong Dien district and Co Do district, Can Tho city from 2/2021 - 2/2022.

- The method of data collection

Direct interviews with farmers. The set of questions and rating scales for knowledge and practice is prepared based on the theory of pesticides and previously studied topics.

- The method of data processing:

Enter and clean data with Epi Data 3.1 data entry software and analyze data with SPSS 18.0 software.

- Research ethics

This study was approved by the Medical Ethics Committee of Can Tho University of Medicine and Pharmacy under Decision No. 421/QD-ĐHYD.

Collected data is encrypted, confidential, and only for research purposes.

III. RESULTS

3.1. General characteristics of research subjects

Table 1. General information of research subjects (n = 400)

Characteristics	General Information	Frequency (n)	Rate (%)
Gender	Male	354	88.5
	Female	46	11.5
Ethnic	Kinh	391	97.8
	Other	9	2.3
Age	Under 30	9	2.3
	30 – 39	54	13.5
	40 – 49	132	33.0
	50 – 59	96	24.0
	Over 60	109	27.3
	Mean age	51.2 ± 12.4	
Education Level	Illiterate	28	7.0
	Primary School	146	36.5
	Secondary School	158	39.5

Characteristics	General Information	Frequency (n)	Rate (%)
	High School	54	13.5
	Above high school	14	3.5

Comments: 97.8% of the study subjects are of the Kinh ethnic group, with the proportion of men accounting for 88.5%.The average age of the subjects group was 51.2 ± 12.4 years old, of which the age group 40-49 years old accounted for the highest percentage (33.0%). In terms of educational attainment, mainly those who finished lower secondary school accounted for 39.5

3.2. Knowledge of using chemical pesticides

Table 2. Knowledge of pesticide use

Correct knowledge	n	%
Know chemicals	147	36.8
Effect of chemical pesticides (Knowing > = 3 harms)	225	56.3
Penetration path of chemical pesticides	198	49.5
Meaning of color bars	16	4.0
How to safely dissolve chemicals	312	78.0
Handling chemical residues after spraying	12	3.0
Principle of safe spraying	312	78.0
Handling chemical packaging and bottles after use	322	80.0
Safe chemical storage	199	49.8
Types of labor protection	112	28.0
Symptoms of poisoning	117	29.3
How to handle poisoning	189	47.3

Comments: 4.0% of people knew the meaning of the color line, 56.3% knew the harmful effects of pesticides, and 49.5% knew the penetration route of pesticides. Only 3.0% of subjects knew how to handle residual pesticides after use, and up to 78.0% of subjects knew safely the correct principles of spraying. 29.3% knew the poisoning symptoms, and 47.3% knew how to handle them when poisoned.

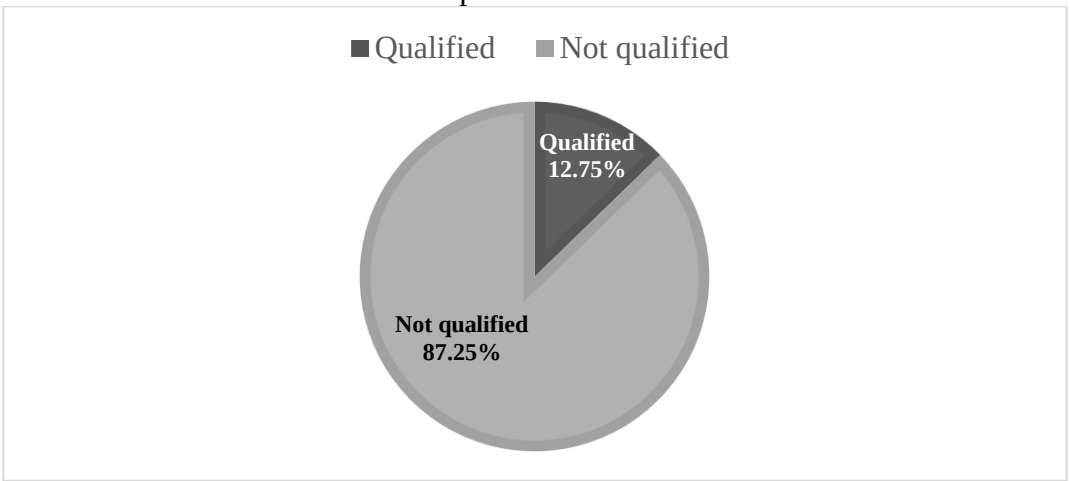

Figure 1. Graph of general knowledge about the use of chemical pesticides

Figure 1 showed that 12.75% of farmers had proper knowledge about using insecticide safely, while 87.25% had poor knowledge.

3.3. Practice the use of chemical pesticides.

Table 3. Practices on the use of chemical pesticides

Practice correct use of pesticides	**n**	**%**
Read the full range of specific information on the package	355	88.8
Observe the colored line on the packaging	87	21.8
Pesticide spraying time	247	61.8
Dissolve chemicals safely	286	71.5
Dosage of insecticides	253	63.2
Proper handling of the excess insecticide after spraying	21	5.3
Safely handling packaging after spraying	17	4.3
Cleaning the tank after safe spraying	326	81.5
Eating/smoking after spraying	145	36.3
The frequently used protective equipment	360	90.0
Safely storage insecticide	287	71.8
Safely store mixture/spray bottles	335	83.8

Comments: 36.3% of the subjects ate/smoked after spraying. Up to 94.7% of subjects did not handle the excess chemicals after spraying, and the subjects who safely handled the packaging after spraying constituted a low proportion, with only 4.3%. Famers who regularly used protective equipment accounted for 90%, and those who knew how to safely store insecticide accounted for 71.8%.

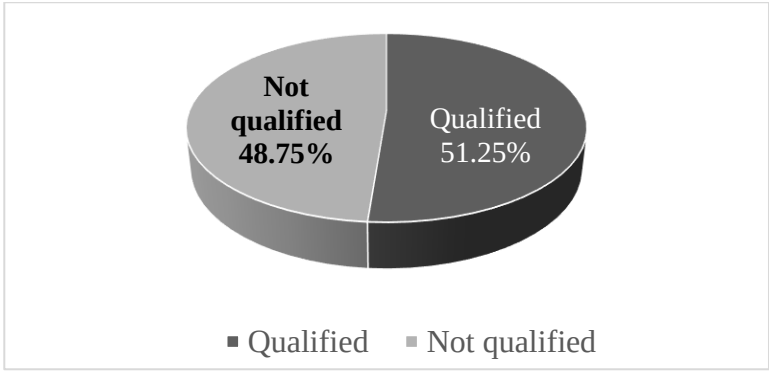

Figure 2. Practices in the safe use of chemical pesticides

The results of Figure 2 show that 51.25% of the subjects had the correct pesticide application, while the number of respondents with the incorrect practice accounted for 48.75%.

Table 4. The connection between academic level, years of exposure, cultivated with knowledge of farmers.

Variable		**Knowledge**		**OR (95% CI)**	**p**
		Not Qualified	**Qualified**		
Academic level	Below is my junior high school	106 (60.9)	68 (39.1)	**2.4 (1.6 – 3.5)**	**0.0001**
	Above the junior high school	89 (39.4)	137 (60.6)		

Variable		Knowledge		OR (95% CI)	p
		Not Qualified	Qualified		
Years of exposure	Under 10 years	23 (31.5)	50 (68.5)	-	-
	11-20 years	64 (48.1)	69 (51.9)	**0.49 (0.27 – 0.9)**	**0.02**
	Over 20 years	108 (55.7)	86 (44.3)	**0.36 (0.2 – 0.64)**	**0.001**
Cultivated area	≤ 1 ha	101 (39.8)	153 (60.2)	**0.36 (0.24 – 0.55)**	**0.0001**
	>1 ha	94 (64.4)	52 (35.6)		

Comment: People with an academic level below junior high school had knowledge not qualified higher than those above academic level. The difference has statistical meaning (OR = 2.4 and p<0.0001). People contacted with pesticides less than 10 years had no qualified lower knowledge and had statistical meaning with p<0.005. People who had cultivated area ≤1ha had no qualified knowledge lower than people who had cultivated area >1ha (OR=0.36 and p<0.005).

Table 5. The relation between approaching information and practicing using insecticide

Variable		Practice		OR (95% CI)	p
		Not qualified	Qualified		
Knowledge	Not Qualified	184 (52.7)	165 (47.3)	**4,0 (2 – 8)**	**0.0001**
	Qualified	11 (21.6)	40 (78.4)		

Comments: The result showed that 52.7% percent is the figure for people who do not have soild knowledge so that they cannot practice well, which is higher than the percentage of the knowledgeable man with 21.6%. This difference had statistically significant (OR=4,0 and p<0.0001).

IV. DISCUSSION

After interviewing 400 farmers in 3 districts of Can Tho city, the result shows that 97.8% of participants aged 40 to 49 are Kinh, and 83.0% have literacy below junior high school. The percentage of males who spray insecticide is higher than females (88.5% and 11.5%). This can be explained that males mostly earn the family's main income, and farming is heavy work, so most males will undertake it.

4.1 Knowledge using pesticide

Knowledge of using insecticide: fully knowing about its effects and adverse effects helps farmers use it for the right purpose, the right dose for each type. The result showed that 12.75% of participants had enough knowledge of using insecticide safely while 87.25% were not. Our study result is similar to the result researched in Krong Buk District, Dak Lak Province(2016). Participants who have common knowledge accounted for 64.0% [1]. But our result is higher than the one at Dien Bien (2019), with 42.8% of people who grew rice having [6]. Most people with knowledge about chemicals accounted for 36.8%, and 56.3% knew about the adverse effects (at least 3). The result was similar to the figure of the research in Dak Lak which people knew the adverse effects of chemicals accounted for 62.9% [3]. This lack of understanding resulted in abusing pesticides, which seriously affect people's health and the environment in the future. As can be seen clearly from Table 2, 49.5% of people know that pesticide pervades our body in 3 main ways, and only 4.0% of people know the meaning of the color line. 78.0% of people know how to dissolve pesticide safely

is to use a stick stir properly, and only 3.0% of participants know how to handle residual pesticide after spraying. Participants who know safely spraying is 78.0%, and 80.0% have proper knowledge about handling the packaging and handling the bottle after use. Participants can list protective clothing when spraying accounted for 28.0%. Our study result is similar to the study in Dak Lak in 2016 [3].

4.2 Pesticide use practice

Farmers who know how to use insecticide safely are pretty high, the study shows that 51.25% of participants practice using insecticide safely. Our result was higher than the research at Ha Nam in 2014 (38,1 [1] and in Dak Lak year 2016 (40.8%) [3]. So, the knowledge about using insecticide safely has been improved over time, and perhaps participants in the study are from an agricultural region; therefore, from generation to generation have passed correctly using insecticide eventhough people haven't had high knowledge yet. 88.8% of participants had full reading information on the packaging; only 21.8 % of them observed the colored lines on the packaging; 61.8% of participants knew the timestamp to spray, and 71.5% of participants practiced correctly dissolving insecticide. 83.8% know how to store pesticide sprayers correctly; 63.2% mix pesticides with the right dosage, only 5.3% of participants handle excess pesticides properly after spraying, and 4.3% handle the packaging safely after spraying. Participants who practice using protective clothing regularly when spraying account for 90.0%. Our study result is similar to the study in Dak Lak in 2016 [3].

In our study, there is a statistically significant relation between Academic level, Years of exposure, and Cultivated area with proper knowledge of using pesticides safely. Participants with knowledge will practice better than those without (OR=4.0 and $p<0.001$). Our result is similar to the study at Dak Lak in 2016 and Ha Nam in 2014 [1], [3].

V. CONCLUSIONS

The study has indicated that farmers have the right knowledge of using pesticide are still low, accounting for 12.75%, but the practice of using pesticides safely is pretty high, accounting for 51.25%. So that when farmers being asked about the knowledge, they can't answer but the farmer will practice perfectly because they know what is the right thing to do. The region should strengthen social media, practice using pesticides safely and encourage people to plant and harvest according to VietGAP standards, contributing to the protection of human health, consumers as well as the environment.

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