AWARENESS OF SAFETY MEASURES ON PESTICIDE USE AMONG FARM WORKERS IN SELECTED VILLAGES OF AUNGLAN TOWNSHIP, MAGWAY DIVISION, MYANMAR

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ABSTRACT:

Background: Myanmar is a developing agricultural nation that inevitably uses pesticides in agricultural food production. Consequently, knowledge based on how to use and react to pesticide poisoning is crucial. Pesticides cause adverse health outcomes for human and animals as well as the environment. In Myanmar, most farm workers handle pesticides without using personal protective equipment (PPE). This is because they do not understand the actual effectiveness of PPE because their education level is not high and they lack awareness of pesticide and safety precaution measures. Thus, it is important to find out knowledge and practice levels relating to the safe use of pesticides. This study investigated the knowledge and practice of the safe use of pesticide among farm workers.

Methods: A cross-sectional study was applied. One hundred farm workers in the Aunglan Township and Magway Region were selected by using simple random sampling. This study was conducted during May 2016. Data collection was done by face to face interviews with semi-structured questionnaires. The study used descriptive statistics regarding frequency and percentage to analyze the data.

Results: This study revealed that respondents in both villages were educated to primary level. Half of the respondents in each village did not know how to use personal protective equipment (PPE) properly, while a few of them knew the importance of wearing an apron and protective clothes. Pesticides were used in a combination of at least 2 to 3, and sometimes up to 5 kinds which were mixed and sprayed on the crops.

Conclusion: Since half the farm workers lack knowledge of the importance of PPE, this impacts health outcomes. Hence, educating people on how to use PPE is highly recommended. A further study to assess the use of PPE should also be addressed. In order to mitigate this issue, one suggestion is that pesticide sellers should be registered and sell only registered pesticides. More surveys should be carried out to cover a larger population; so that cases detected could be given medical assistance.

Keywords: Pesticides; Farm workers; Education level; Personal protective equipment; Myanmar

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INTRODUCTION

Myanmar is an agricultural country with 27,861,565 acres of cultivating area and about 52 million of people residing there [1].In Myanmar, the use of agro-pesticides has increased in recent years because of the expansion of cultivated areas and the introduction of double and multi-cropping system [2]. Pesticides play a vital role in food production. They are mixed blessings to human life [1].The

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indiscrimination use of pesticides among agricultural workers suggested the possible existence of acute and chronic intoxication. Very few have been reported about the health hazards on human, as well as the health impact on the wildlife and the possible environmental pollution from the use of pesticide in Myanmar [3]. Pesticide poisoning is one of the agricultural hazards in our country. Farm workers can have or buy various kinds of pesticides in market today. Utilization of pesticides without safety precaution results in adverse effects on health. Pesticides are used in combination of at least 2 to 3; and sometimes up to 5 kinds are mixed and sprayed on the crops [4]. These pesticides are used deliberately without any restriction and precaution; also the empty containers are not disposed off systematically due to scarcity of the land areas [4].

Pesticides poisoning is one of the agricultural hazards in our country. Good technical training for safety measures and proper application of personal protective equipment are needed. As the protective measures are specific depending on the stage of cycle and toxicological characteristics of pesticides, specific instructions should be given for individual case; but some general guidelines are also needed. Therefore to prevent pesticide toxicity in work place safety precautions are needed. Safety precaution regarding knowledge and practice on safety measures are provided among agricultural workers. It takes an important role in preventing adverse effect of pesticides on human health and environmental pollution [5]. It is necessary to have insight knowledge and practice among agricultural workers in using pesticides. The result of this study highlighted the pesticides usage and subsequently developed intervention strategies if there would be the gaps.

According to annual report of Magway Regional Health Department in 2013, cases/deaths due to farm hazards are 197/18 and cases/deaths due to poisoning are 175/21. In Magway Region, Aunglan Township had 319 farm hazards and 23 poisoning cases. There was no death due to hazard and poisoning. Poisoning cases are the most common in Aunglan Township [6].

In Myanmar, the major economic sector is agricultural sector. Nowadays, Myanmar is trying to change from agriculture based economy to agriculture based industrialized economy. The agriculture workforce constitutes about 56.47% of the entire workforce. The agriculture sector contributes 40% of the Gross Domestic Product (GDP) and 47% of the foreign earnings of Myanmar. Agricultural workers have to face with agricultural hazard including pesticide poisoning [7].

Agricultural hazard can be reduced by applying personal protective equipment and by training about safe use of pesticide and PPE for farm workers [8]. Training is necessary for farm workers because most of the farmers' education level is not high enough to be aware of the label on pesticide package and using personal protective equipment [5]. But training alone is not enough to cover the whole population. Therefore, the objectives of this study were to explore knowledge and practice of safe use of pesticide among farm workers. According to the objective, this study attempts to determine level of knowledge and practice of safety measures on pesticides use among farm workers in our country.

METHODOLOGY

Magway Region is the largest of Myanmar's seven divisions, with an area of 44,820 square kilometres (17,306 sq mi); and it is a tropical area. The major crops are sesamum and groundnut. Other crops grown are rice, millet, maize, sunflower, beans and potatoes. Famous products of Magway Region include Thanaka (Limoniaacidissima) and Phangar (Chebulicmyorobalan) fruit.Magway is not a tourist industry region [9].Since Myanmar is an agro-industrial country, the majority of country's economic sector is agriculture. Majority of country's work force consists of agricultural workers.

A cross-sectional analytic study was conducted in selected villages, Aunglan Township, in Magway region during May, 2016. The study explored knowledge and practice of safety use of pesticide among agricultural workers at Sin Ma Taung Village and Thar Si Village which two villages under the Aung Lan Township in Magway Division, Myanmar between 5 - 15 May 2016.Aunglan Township was purposively selected. There are seven rural health centre (RHC) in this township. Two rural health centers were randomly selected. Then, two villages from two RHC were selected by simple random sampling. Farm workers in each village were selected by lottery method; and each farm worker was also taken as study unit. Each farm worker was face-to-face interviewed by using semi-structured questionnaires. Both two villages have same households and estimated about 350 households each. Male and female is 1:2; and for one household has 4-5 household members.

Table 1 General information in selected villages of Aunglan Township, Magway Division, Myanmar

Variables	Sin Ma Taung Village		Thar Si Village	
	Frequency	Percentage	Frequency	Percentage
Age (years)				
21-30	8	16.0	6	12.0
31-40	10	20.0	13	26.0
41 to 50	16	32.0	19	38.0
Above 50	16	32.0	12	24.0
Total	50	100	50	100
Sex				
Male	50	100	50	100
Female	-	-	-	-
Total	50	100	50	100
Education				
Read and write	4	8.0	4	8.0
Primary school level (Grade 1to 5)	38	76.0	36	72.0
Middle school level (Grade 6 to 9)	2	4.0	5	10.0
High school level (Grade 10 to 11)	4	8.0	0	0.0
University level	2	4.0	5	10.0
Total	50	100	50	100
Duration of work and pesticides exposure				
1 to 4 years	6	12.0	0	0.0
5 to 9 years	9	18.0	2	4.0
Above 10 years	35	70.0	48	96.0
Total	50	100	50	100

Table 2 Pesticides usage in two villages

Name of chemical pesticide used among the studied population	Sin Ma Taung Village		Thar Si Village	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Cypermethrin	22	44.0	28	56.0
Malathion	4	8.0	3	6.0
Endosulfun	6	12.0	3	6.0
Diazinon	3	6.0	4	8.0
Mancozeb	3	6.0	6	12.0
Phenthoate	3	6.0	3	6.0
Chlorpyriphos	3	6.0	3	6.0
Cartep HCL	2	4.0	-	-
Monocrotophos	2	4.0	-	-
Imidacloprid	2	4.0	-	-

According to the simple size, a total of agricultural workers is 100, 50 for each village; and it approved by the Ethics Committee of Medical Research Center from Myanmar (ERC No: 001414, Ethnics/DMR/2016/035) in May 2, 2016. All respondents were asked for their consent to make sure that they were willing to participate in this study. Inclusion criteria were 18 year old and above who are currently working in agriculture and have history of using pesticide**.** Exclusion criteria were less than 18 years old and no history of using pesticide. Face-to-face interview was conducted in the field by one interviewer. After interviewing, the questionnaires were checked for completeness and correctness daily. Then the responses for questionnaires were coded; and the data were entered into the SPSS version 16 (Statistical Package for Social Science). Responses on knowledge and practice questions were given a score of 1 each correct answers.

RESULTS

Table 1, the study population consisted of (100) individuals who were groundnut farmers from 2 villages of Aunglan Township, Magway Region, Myanmar. Among them, all of 100 were males in both villages. Their age ranged from 21 to 82 years. Most of them had primary education level (Grade 1 to 5). The years of exposure to pesticides were from 0 to 15 years. Cypermethr in groups of pesticides

Table 3 Knowledge on questions about pesticide among farm workers

Items	Sin Ma Taung Village			Thar Si Village		
	Yes	No	Total	Yes	No	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Knowledge on effect of pesticides on human health	44(88)	6(12)	50(100)	48(96)	2(4)	50(100)
Pesticide can cause environmental pollution	42(84)	8(16)	50(100)	35(70)	15(30)	50(100)
Knowledge on pesticides' routes of entry	32(64)	18(36)	50(100)	38(76)	12(24)	50(100)
Knowledge on acute toxicity of pesticide	39(78)	11(22)	50(100)	38(76)	12(24)	50(100)
Knowledge on chronic toxicity of pesticide	23(46)	27(54)	50(100)	18(36)	32(64)	50(100)
Knowledge about the chemical residual effect of pesticide in crops by applying pesticides	33(66)	17(34)	50(1000)	12(24)	38(76)	50(100)
Knowledge about ways of the pesticides' exposure:(Carrying, Storage, Spraying, Mixing)	35(70%)	15(30%)	50(100%)	41(82%)	9(18%)	50(100%)

Table 4 Respondents' knowledge about clinical features of pesticide acute toxicity

Clinical features of acute toxicity	Sin Ma Taung Village			Thar Si Village		
	Yes	No	Total	Yes	No	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Dizziness& vomiting	39(78)	11(22)	50(100)	22(44)	28(56)	50(100)
Pain in abdomen	-	50(100)	50(100)	1(2)	49(98)	50(100)
Difficult to breath	1(2)	49(98)	50(100)	7(14)	43(86)	50(100)
Feeling heavily of the limbs	2(4)	48(96)	50(100)	-	50(100)	50(100)
Oliguria	5(10)	45(90)	50(100)	3(6)	47(94)	50(100)
Convulsion	7(14)	43(86)	50(100)	12(24)	38(76)	50(100)
Shock	1(2)	49(98)	50(100)	-	50(100)	50(100)

Table 5 Knowledge on chronic toxicity effect on body system due to long term use of pesticide

Effect on systems	Yes	No	Total	Yes	No	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Nervous system	10(20)	40(80)	50(100)	4(8)	46(92)	50(100)
Respiratory system	9(18)	41(82)	50(100)	5(10)	45(90)	50(100)
Hepatic system	7(14)	43(86)	50(100)	4(8)	46(92)	50(100)
Reproductive system	1(2)	49(98)	50(100)	3(6)	47(94)	50(100)
Urinary system	-	50(100)	50(100)	3(6)	47(94)	50(100)
Skin (contact)	20(40)	30(60)	50(100)	11(22)	39(78)	50(100)

were used among famers in this study Table 2.

There were 9 questions for prevalence of general knowledge levels upon pesticides usage in these two villages and shown as in Table 3, 4 and 5.

There were 10 questions for prevalence of preventive knowledge levels upon pesticides in these two villages and shown as in Table 6.

Knowledge grading uses 9 questions of general knowledge level. A correct answer will give 1 score and 0 score for wrong answer. The scores were classified into 3 levels as follows: Bloom's cut-off point, 60%-80% as low, moderate and good level of knowledge [10], Table 7.

Practice scores range were classified into 3 levels upon 30%, 60% and 90% as poor, fair and good practice [4], Table 8.

Table 6 Practice of farm workers on utilization of PPE and safe practice

Items	Sin Ma Taung Village			Thar Si Village		
	Yes	No	Total	Yes	No	Total
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Habit of reading the label on package or bottle of pesticide	24(48)	26(52)	50(100)	25(50)	25(50)	50(100)
Danger of pesticides containers put together with food and water	27(54)	23(46)	50(100)	41(82)	9(18)	50(100)
Practice about the storage places	39(78)	11(22)	50(100)	33(66)	17(34)	50(100)
Avoid eating, smoking and drinking behavior during application of pesticides	50(100)	-	50(100)	50(100)	-	50(100)
Practice on conditions when pesticides should not be sprayed in - Windy condition - Under extreme heat of sun - Raining	50(100)	-	50(100)	50(100)	-	50(100)
Practice on the sites which should be started in up wind condition when spraying the pesticides	36(72)	14(28)	50(1000)	46(92)	4(8)	50(100)
Do not smoke emerged from incineration of pesticides containers can be harmful	29(58)	21(42)	50(100%)	33(66)	17(34)	50(100%)
Practice on using empty pesticides containers as containers for drinking purpose if they are washed thoroughly	4(8)	46(92)	50(100%)	12(24)	38(76)	50(100%)
Dispose of the empty pesticide cans in 20 inches depth	4(8)	46(92)	50(100%)	10(20)	40(80)	50(100%)
Using of the personal protective equipment while spraying, mixing	26(52)	24(48)	50(100%)	21(42)	29(58)	50(100%)

Table 7 General knowledge level upon pesticides usage between two villages

Knowledge level	Sin Ma Taung Village		Thar Si Village	
	Frequency	Percentage	Frequency	Percentage
Low knowledge level	22	44	17	34
Moderate knowledge level	24	48	24	48
Good knowledge level	4	8	9	18
Total	50	100	50	100

Table 8 Preventive knowledge levels upon pesticides between two villages

Knowledge level	Sin Ma Taung Village		Thar SiVillage	
	Frequency	Percentage	Frequency	Percentage
Poor practice level	15	30	17	34
Fair practice level	25	50	27	54
Good practice level	10	20	6	12
Total	50	100	50	100

DISCUSSION

All the respondents are agricultural workers who grow sesamum, groundnut, rice, bean and vegetables. Majority of them grow sesamum and groundnut. Their ages are in between 41 to 50 years; and their education level is at primary education level. Their work experiences are above 10 years. Respondents in these two villages for this study were male; because in Myanmar farms workers are usually male. Female works as housewives in their homes.

Pyrethroid is the most used. In fact, pyrethroid

causes lowest toxicity to human and environment [7]. Farmers do not choose pesticides based on their knowledge, but nature of pests on their farms and availability of pesticide in the market. Regarding knowledge on safety measures of pesticide utilization, most of the respondents know about these measures, for instance, avoidance of eating, smoking and drinking while spraying pesticide; and pesticide should not be sprayed during the windy condition, under extreme heat of the sun and during raining. Up wind site is the most common answer, which it should be started in spraying pesticide. It means that there is an adequate knowledge about correct or appropriate site. Regarding to the knowledge about personal protective equipment, most of the respondents don't know about the PPE measures.

Farm workers do not want to use PPE; although they have knowledge on it because of tropical weather and inconvenient in working for a long duration. Furthermore, some PPE are expensive. Most of the respondents have poor safety precaution in disposing pesticide containers; and they dispose rinsed water in the field / on the farm after cleaning pesticide containers and spraying apparatus. It may be due to the lack of awareness on environmental pollution; and these actions can harm the environments, animals and people.

Majority of agricultural workers have low education status. It is essential to provide education and training concerning general knowledge of pesticide and safety measures in utilization of pesticides to all kinds of agricultural workers in our country. However majority of source of information from television is from advertising of pesticides by companies. Therefore, these TV programme should be matched with guidelines of safety precautions.

CONCLUSION

It is necessary for health personnel to educate agricultural workers concerning with pesticide utilization and to promote their knowledge as well. This is because the way of spreading knowledge about safety measures via media is not much effective especially about the use of protective clothes or aprons. It will be more effective if health workers provide knowledge by explaining pros and cons. Enhancing of education regarding to PPE is suggested for reducing risks of pesticide toxicity among agricultural workers.

RECOMMENDATION

More health education talks and discussions regarding to negative effects on health due to pesticides should be given. More surveys should be carried out to cover a larger population; so that cases detected could be given medical assistance. Proper use of pesticides, for instance, proper type of pesticide, proper concentration, and proper methods of application should be taught to the villagers along with imparting knowledge regarding improper use of pesticide. Improper use of pesticides may promote pests resistant in long term use and excess pesticides residues in vegetables which may cause poisoning in consumers leading to shunning of their products thus hurting their economy. Alternative environmentally friendly method of pest control should be sought. Pesticide sellers should be registered and sell only the registered pesticide. Those who handle pesticides should have thorough knowledge in physical properties, signs of poisoning and first aid treatment in case of poisoning. Training should be given about pesticides and its poisoning to all those handle them.

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