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Knowledge, Attitude and Practice about the Safe Use of Pesticides among Farmers at a Village in MiniaCity, Egypt

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Abstract:***Background:*** *The use of pesticides has increased many folds over the past few decades. About 5.2 billion pounds of pesticides are used worldwide per year, so it is useful to spread the idea of safe use of pesticides, annually between 250,000 to 370,000 human deaths, most of these deaths occurred in developing countries. So this study aims to assess knowledge, attitude and self-reported practice about the safe use of pesticides among farmers at a village in Miniacity.* ***Design:*** *A descriptive research designwas used in this study. A simple random sample of 322 farmer was selected. Data were collected through one tool that includes; 1st. part; questions related to demographic characteristics of the study sample, 2nd. part; knowledge questionnaire related to the using of pesticides in general, and the knowledge regarding the first aid of pesticide poisoning, 3rd. part; an attitudesquestionnaire regarding the usage of pesticides and the 4th .part; was a self-reported practices use of pesticides among farmers.****Results:*** *the mean age of elderly adults who participated in the study sample was47.7± 8.3and 53.4% of farmers were illiterates. The current study showed that total knowledge of farmers about pesticides were 72% have low level of knowledge with a mean ±SD1.35±0.62. In relation to farmers 'attitudes revealed that 79.8% of farmers have negative attitudes with a mean ±SD 1.13± 0.34. Regarding the self-reported practice; 80% have poor practice.* ***Conclusion:*** *in these study found that the majority of studied farmers have low level of knowledge, negative attitude and poor practices toward safe usage of pesticides.* ***Recommendation****: Development and implement training and health education program for Egyptian farmers are essential for safe practices during pesticides' usage also further researches are needed****.***

Keywords: *Safe use of pesticides, Training Program, farmers.*

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I. Introduction

Pesticidesareusedtoenhanceagriculturalproductionandreducepests, the most common use of pesticides is as plant protection products, which in general protect plants from damaging influences such as weeds, diseases or insects (**1).** Intense farming and pest control activities which are often based on heavy pesticide use promote hazardous waste build up in many phases of pesticide handling. Due to lack of knowledgeand guidance in the proper management of pesticide-related waste, hazardous chemicals are often left lying around in rural and urban areas, whereas the reuse of contaminated empty containers for domestic purposes, which has been frequently identified in many developing areas, is another major health risk. (2)

II. Significant Of The Study:-.

According to World Health Organization, each year, about 3,000,000 cases of pesticide poisoning and 220,000 deaths are reported in developing countries. About 2.2 million people, mainly belonging to developing countries are at increased risk of exposure to pesticides. Besides, some people are more susceptible to the toxic effects of pesticide than others, such as infants, young children, agricultural farm workers and pesticide applicators (Pesticides and Human Health. **(3)**

Egypt consumed about10600metrictonofpesticides(Activeingredient)during2016which represent 0.2%oftheglobalconsumption(5millionmetrictonsofavalueof52billiondollars, nearly 80% of work force in Egypt are involved in agriculture and exposed to agriculture aerosols. Unlike other occupation they live in the same environment and thus exposure for them and their children continue over the week. Agriculture workers and those living in rural environment are at increased risk of developing lung diseases**. (4)**

Aim of the Study:-

The aim of this study was to assess the knowledge, attitudes, and self-reported practices regarding the safe use of pesticide among farmers in one village atMiniacity, Minia, Egypt.

III. Subjects And Methods

Research Design:-

A descriptive research design was used in this study.

Research Setting:-

The study was conducted in selected village (Damaris village) of Miniacity at Minia governorate, Egypt.

Participants and Sample size Calculation*:*

Sample: the sample size was estimated to fulfill the aim of the study, with a 95% level of confidence (error=5 %) and a study power of 80% (error=20%). Using the Epi-info computer software program the required sample size was 322 subjects.

Simple random sample technique was used to select one village (Damaris village) in Miniacity, Minia governorate, Egypt. All farmers who are involved in pesticides usage in this village were included in the study.

Tools of Data Collection

Data collection was done through one tool with four parts (socio demographic characteristics, knowledge, attitude and self- reported practice).

Study Tools:

A Structured questionnaire was designed by the researcher regarding the safe use of pesticides after reviewing of literature related to the study topic; this tool will be adapted from other instrument used in previously reported study **(Norkaew, S., 2009**)with some modification by the researcher.

The tool content were tested for validity by three experts in community health nursing and community medicine andmodification were done accordingly to ascertain relevance and completeness.

This tool includes four parts:

1st part: **Demographics characteristics**

The first part was designed to assess demographic and occupational characteristics of the farm workers such as (age, level of education, experience, working hours

2nd part:**Knowledge regarding using of pesticide, it consist of:-**

- General knowledge regarding using of pesticide (10 questions)

(Knowledge of using pesticide, personal protective equipment, health effect of pesticides What is disadvantage of pesticide use, How to use the pesticide properly, When you want to buy pesticide, how do you consider,……..etc.).

- **Knowledge regarding first aid of pesticide poisoning (8 questions)**

(Routes of entering of pesticides to the body**,** S&s of pesticides poisoning, management and first aid of each route of poisoning such as drinking, inhalation and dermal contact).A correct answer will give 1 score and 0 score for wrong answer.The scores vary from 0-10 points and will classify into 3 levels as follow

Scores Descriptions: - (0-05 (Less than 59%) Low level, 6-8 (60-80%) Moderate levels and 9-10 (80-100%) High levels).

3rdpart: **Attitudes regarding using of pesticide (15 questions)**

Farmers respond to 5 statements are a Likert's scale which include both positive and negative. The rating scale is measure as follow :**(** Strongly agree=4, Agree=3, Neural=2, disagree=1 and strongly disagree=0) this will be reversed in negative statements. The scores were classified into 3 levels (Positive Attitude48-60 scores (80%-100%), Neutral Attitude36-47 scores (60%-80%), and Negative Attitude 0-35 scores (Less than 59%).

***4th part*: Self-reportedPractice of pesticide usage (23 questions)**

This part asks about how often they use each personal protective equipment. There were **4** statements which include both positive and negative. The rating scale is measure as follow: Usually=**4,** Sometime=3, rarely=2, Never=1.The scores ranged from 0 to 92 and were classified into 3 levels (Good Practice87-92 (80%-100%), Fair Practice65-86 (60%-80%) and Poor Practice0-64 (Less than 59%)

Content Validity: - The content validity of the data collection tools was determined through an extensive review of national and international literature related to safe use of pesticides. The tools were submitted tothree experts in community health nursing and community medicine to test their validity. The tools were examined for content coverage, sequence of items, clarity, relevance, applicability, wording, length, format, and overall appearance. Based on experts` comments and recommendations; minor modifications had been made such as rephrasing and rearrangements of some sentences.

Reliability: The internal consistency of the questionnaires was calculated using Cronbach's alpha coefficients. Test-retest was used. The Cronbach's alpha of the questionnaires were 0.87, 0.97and 0.96 respectively indicate good reliability.

Procedure

Verbal informed consents were obtained from all the farmers before the study enrollments after that a detailed explanation on study objectives. The questionnaire was administered to everyfarmers individually in their farm area and data was collected by using theprevious mentioned study tool after full explanation of each item. Each farmer filled in the questionnaire than back it to the researcher. And researcher filled it for the illiterate participants this lasted for 20 to30 minutes for each onetill the needed sample was completed.

Pilot study

To assess the clarity, reliability and applicability of the study tools which was used in the study for data collection; a pilot study was conducted on 10% of the sample. The results of the pilot study was helped in the necessary modifications of the tools in which omission of unneeded or repeated questions, adding missed questions will be done.

Statistical Analysis

Statistical package for the social science SPSS version 21 was used for statistical analysis of data, as it contains the test of significance given in standard statistical books. Collected data was summarized and tabulated.

Ethical consideration

Informed verbal consent will be obtained from participants to be included in the study. It was included full explanation of the sheet, rights for privacy, confidentiality and rights to withdraw at any time.

IV. Results

Table (1) Distribution of the studied sample pesticides farmers according to their socio-demographic characteristics: (N. =322):-

Socio-demographic characteristics	No.	%
1. age		
• 10-20 years	24	7.4
• 21-40	83	25.8
• 41-60	157	48.8
• >61	58	18.0
Mean ± SD 47.7± 8.3		
2. Level of education		
• Illiterate	172	53.4
• Read and write	64	19.9
• Below university	48	14.9
• University	38	11.8
3. income/ month		
• >2000 L.E	208	64.6
• 2000-5000 L.E	79	24.5
• < 5000 L.E	35	10.9

4. years expos to pesticides		
• 1-5 years	56	17.4
• 6-10 years	125	38.8
• >10years	141	43.8
Mean ± SD 20.7± 3.1		
5. Previous training		
• Yes	75	23.3
• No	247	76.7
6. source of pesticide information		
• Media	37	11.5
• Label	0	0
• neighbors	30	9.3
• agricultural supervisors	85	26.4
• pesticides salesman	170	52.8

Table (1) showed that socio demographic characteristics of pesticides' users, nearly half (48.8%) of pesticides' farmers were in the age group from41-60 years with mean age Mean ± SD 47.7± 8.3, 53.4% of farmers were illiterate and 64.6% of the respondents had an income less than 2000 bound. Years of exposure to pesticides (<10years) were(43.8%), and (76.7%) have no previous training about safe use ofpesticides,and nearly half of participants (52.8%) take their information about the pesticide from pesticides salesman.

Table (2) General knowledgeof farmers about pesticides and the first aids for toxicity by pesticides among farmers (N=322)

knowledge	No.	%
1. meaning of illustrations on the containers		
• Yes	110	34.2
• No	212	65.8
2. effects of unsafe use of pesticides		
• Yes	75	23.3
• No	247	76.7
3. treating with signs of toxicity		
• do first aid then go to hospital	49	15.2
• go to pharmacy	202	62.7
• private clinic	37	11.5
• district hospital	34	10.6
4. first aid in case of drinking of the pesticide		
• Yes	87	27.0
• No	235	73.0
5. first aid in case of inhalation of the pesticide		
• Yes	88	27.3
• No	234	72.7
6. first aid in case of entering of pesticides to eyes		
• Yes	87	27.0
• No	235	73.0
7. first aid in case of the pesticide contact with the skin		
• Yes	84	26.1
• No	238	73.9

Table (2) illustrates that only (34.2%) of farmers know the meaning of illustrations on the containers, also a small percentage was known the effects of unsafe use of pesticides, While (62.7%) go to pharmacy to ask for help in case of toxicity in pre-test. And only a small percentageof farmers was known the first aid in case of drinking, inhalation, entering of pesticides to the eyes, andtoughthe pesticideof the skin.

Table (3) Frequency distributionof farmer'sattitude toward using of personal protective equipment (N. = 322):-

Attitude	No.	%
1. use of personal protective equipment hinder of mobility		
• strongly agree	185	57.5
• agree	69	21.4
• Neutral	29	9.0
• Disagree	39	12.1
• strongly disagree	0	0.0
2. using of PPE is expensive and unnecessary		
• strongly agree	185	57.5
• agree	69	21.4
• Neutral	29	9.0
• Disagree	39	12.1
• strongly disagree	0	0.0
3. stand windward direction when spraying , don't concern about clothes		
• strongly agree	0	0.0
• agree	51	15.8
• Neutral	160	49.7
• Disagree	111	34.5
• strongly disagree	0	0.0
4. wearing cloths thoroughly is unnecessary during spray		
• strongly agree	0	0.0
• agree	164	50.9
• Neutral	72	22.4
• Disagree	86	26.7
• strongly disagree	0	0.0
5. shower immediately after the spray as a preventive measure		
• strongly agree	0	0.0
• agree	68	21.1
• Neutral	86	26.7
• Disagree	168	52.2
• strongly disagree	0	0.0

Table (3) indicates that (57.5%) of farmers were strongly agree with use of personal protective equipment hinder of mobility. Also (57.5%) of farmers were strongly agree with using of personal protective equipment was expensive and unnecessary. Nearly sixty percent of farmers were agree withwearing of cloths thoroughly is unnecessary during spraying pesticide. And more than half (52.2%) of farmers were disagree with you must shower immediately after the spray as a preventive measure.

Table (4) Frequency distribution of farmer's attitude toward preparing and application of pesticides (N. = 322):-

Attitude toward preparing and application of pesticides	No.	%
1. **follow pesticides label recommendation not necessary**		
• strongly agree	87	27.0
• agree	168	52.2
• Neutral	47	14.6
• Disagree	20	6.2
• strongly disagree	0	0.0
2. Using wood-based to mix the pesticides is safety than using hand		
• strongly agree		
• agree	0	0.0
• Neutral	39	12.1
• Disagree	143	44.4
• strongly disagree	140	43.5
	0	0.0
3. using of extra amount of pesticides is the only route to get rid of pests		
• strongly agree	87	27.0

• agree	149	46.3
• Neutral	47	14.6
• Disagree	39	12.1
• strongly disagree	0	0.0
4. can enter the farm area immediate after spraying		
• strongly agree	0	0.0
• agree	164	50.9
• Neutral	72	22.4
• Disagree	86	26.7
• strongly disagree	0	0.0
5. safe method to get rid of containers by burning		
• strongly agree	0	0.0
• agree	68	21.1
• Neutral	145	45.0
• Disagree	109	33.9
• strongly disagree	0	0.0

Table (4) illustrates that (52.2%) of farmers agree with that follow pesticides label not necessary**.** Additionally, (43.5%)of farmers were disagree withuse of wood-based to mix the pesticides is safety than hand. while (46.3%) of farmers were agree with using of extra amount of pesticides is the only route to get rid of pests. More than half of farmers were agree with of pesticides can enter the farm area immediate after spraying in pre-test.(33.9%) of farmers in were disagree with safe method to get rid of containersby burning.

Table (5) Frequency distribution self-reported practice of farmers toward using of personal protective equipment among farmers:-

Practice during and after spraying of the pesticides	**No.**	**%**
1. wear clothing thoroughly		
• usually	0	0.0
• sometimes	63	19.6
• rare	86	26.7
• never	175	54.7
2. Wear boot		
• usually	0	0.0
• sometimes	0	0.0
• rare	59	18.3
• never	263	81.7
3. Wear mask		
• usually	0	0.0
• sometimes	0	0.0
• rare	59	18.3
• never	263	81.7
1. Smoking or drinking		
• Usually	172	53.4
• Sometimes	87	27.0
• Rare	63	19.6
• Never	0	0.0
4. Dispose pesticide containers in the river		
• usually	107	60.2
• sometimes	90	28.0
• rare	38	11.8
• never	0	0.0
5. burned or buried of empty pesticide containers		
• usually	0	0.0
• sometimes	0	0.0
• rare	94	29.2
• never	228	70.8
6. shower after spraying pesticides		
• usually	0	0.0
• sometimes	0	0.0
• rare	94	29.2
• never	228	70.8

Table (5) shows that. (54.7%) of pesticides' farmers reported that they were never wear clothing thoroughly during spraying of the pesticides. In addition, the majority of participants (81.7%) never wear boot during spraying of the pesticides, also(70.8%) of farmers in pre-test reported that they never wash hand and face with soup before having mealor shower immediately after spray.

Table (6): The relation between total knowledge and socio-demographic characteristics (N=322):-

Variable	knowledge		attitude		practice	
	Mean± SD	P-value	Mean± SD	P- value	Mean± SD	P- value
Age group						
• 10-20	4.71± 3.4	0.000*	24.9±11.7	0.001*	48.75±11.1	0.0001*
• 21-40	3.13±3.1		20.6± 11.5		43.72±11.6	
• 41-60	3.67±2.93		20.76±12.0		43.74±11.0	
• > 61	1.72±2.1		15.2±5.7		36.79± 6.2	
Level of education						
• Illiterate	1.78±2.03	0.000*	14.27±2.97	0.0001*	36.7± 4.6	0.0001*
• Read and write	2.84±2.37		12.73±2.98		37± 4.06	
• Diploma	5.94±2.24		31.02±4.57		57.79± 3.6	
• High education	7.26±2.19		44.5± 0.51		61.68±2.78	
User income/month						
• <2000LE	3.25±2.94	0.71*	19.17±10.6	0.14*	41.77±10.6	0.06*
• 2000-5000 LE	3.42±2.92		22.1± 11.7		44.85±11.4	
• >5000LE	2.91±3.18		20.46±13.3		44.8±11.34	
Years of exposure to pesticides						
• -5 years	3.38±3.14	0.06*	21.7±11.1	0.08*	45.09±11.2	0.06*
• 6-10 years	3.68±2.84		21.04±12.1		44.1± 11.3	
• >10 years	2.84±2.95		18.45±10.3		40.87±10.1	
Previous training						
• Received	6.44±2.22	0.0001**	34.5±10.2	0.0001**	56.98±8.4	0.001**
• Not received	1.9± 2.06		13.87±3.06		36.86±4.4	

N.B*F-test ** T-test

Table (7): Denotes that there were highly statistical significant differences between socio demographic characteristics of the studied sample related to age, level of education and previous training and both total knowledge, total attitude and total practice.

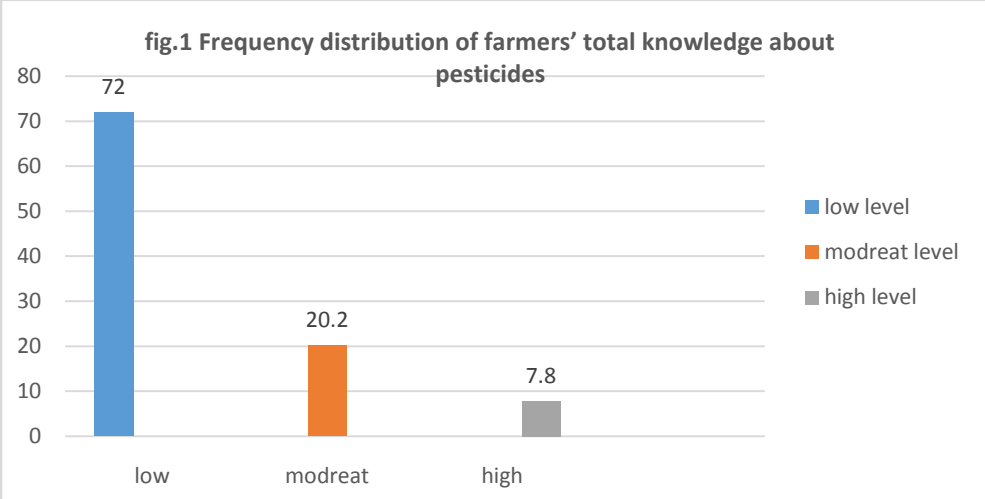

Fig. (1) Shows frequency distribution of total knowledge of farmers about pesticides where 72% have low level of knowledge while only 20.2% and 7.8% of farmers have moderate and high level of knowledge respectively.

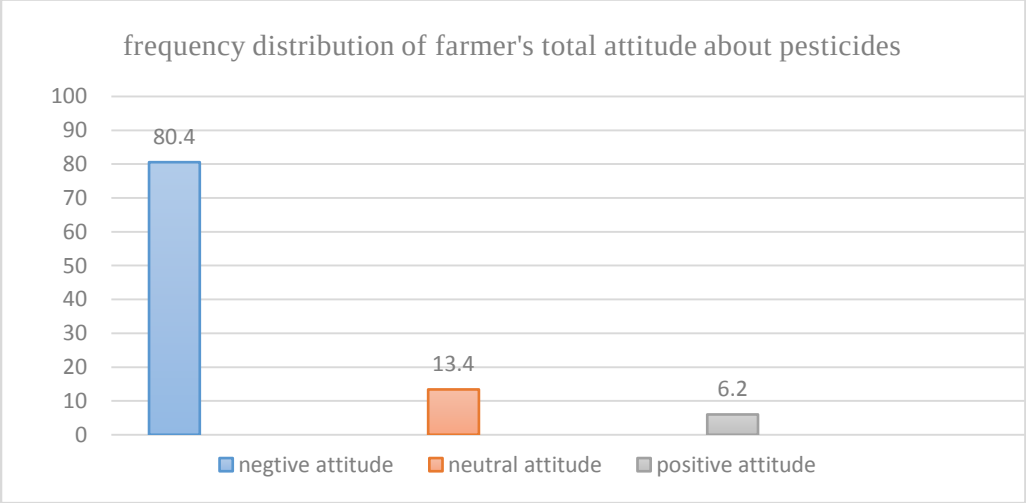

Fig. 2explains that 80.4% of farmers have negative attitudes and 13.4% have neutral attitude and only 6.2% of farmers had positive attitudewith a mean ±SD 1.13± 0.34.

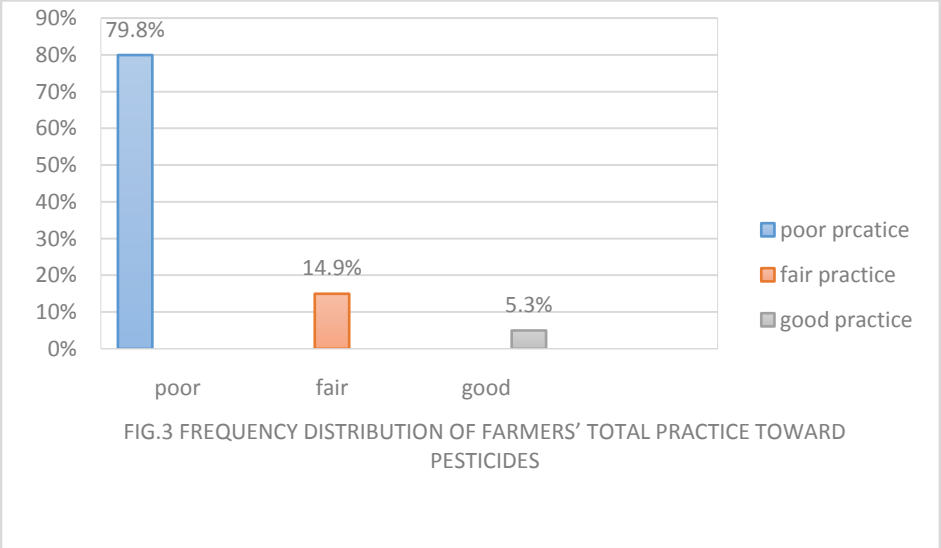

Fig. 3 indicates thatself-reported practices of farmers regarding usage of pesticides (79.8%) have poor practice while only (14.9%) and (5.3%) have fair and good practice respectivelywith a mean score ± SD 1.01±0.12.

V. Discussion

The present study was carried out in one selected village from Minia city in Upper Egypt, which hasseveral environmental problems, including concern about theeffects of pesticide related activities in the agricultural sector. The presentstudy describes the knowledge, attitude and self-reported practice of pesticide usage among farmers.

Demographic characteristics of farmers in the current study showed that, nearly half of farmers were in the age group from41-60 years with mean age was 47.7± 8.3.while more than ten years of exposure to pesticides were tow fifth of farmers. Itcomes with the results of Zalat et al (2015) in their study in Egypt, which indicate that the mean age of the study participants was 38.3±16.1, and 78.7% of them range from 20-60 years; also the exposure to pesticides was 25.2±15.2 years. This may be interpret the resistance to change in old age group with long duration in work field.

In relation to the farmers' income found that 64.6% had an income less than 2000 LE monthly. Approximately two third of them owned less than 1acreas the similarly to Norkaew, S. (2009) in his study in Thailand who found that 57.6% of the respondents had low income and the majority of the farmers were farm owner with less than one acre.

Level of education and previous training in current study, half percent of the farmers was illiterate andthree quarters have no previous training about safe usage of pesticides. These results were in a harmony withZalat et al (2015) whomreported thatmost of the farmers were illiterates or had moderate education, and only 18.3% of the study respondents received training for pesticides usage before. From the researcher point of view, according to this current study the farmers were at high risk for health hazard on the long ran and dangers of poisoning from unsafe use of pesticides due to lack of training.

As regards the source of information in relation to pesticides usage, half of the farmers depended on pesticides salesman in their information about the pesticides, while only tenth of the study farmers got information from mass media, neighbors and one quarter of farmers got information from the agricultural supervisors. It in the same line with Amal et al (2016), in their study found that half of the farming mothers had no source of information about pesticides, while the information from mass media, agricultural guide and neighbor were constituted 23.3%, 16.7% and 10% respectively. AlsoOkonya, andKroschel(2015) in their study in Uganda mentioned that most farmers received information about pesticide from their neighbors and only minority from agricultural extension officers. From researcher point of view this may be due to the decline in the role of the governmental agricultural guides as well as the increase of satellite channels and the decline in the role of state local channel in spreading agricultural awareness, that lead to poor in knowledge and practice regarding the safe usage of pesticides.

In these study found that only one third of farmers know the meaning of pictograms on the pesticide containers and nearly a quarter of the farmers know harm effects of using of pesticides on long ran. It in harmony withMengistie et al (2017) in their in Ethiopian found that almost all farmers lacked extensive knowledge on the environmental and health effects from using pesticides. And the survey also shows that the majority of the farmerscould not indicate the correct meaning of these pictograms.

from researcher point of view this may be due to ignorance of pesticides users about the importance ofpictograms on the pesticide packaging becausein current study the majority of studying sample were have low level of education and without previous training on the safe use of pesticides.

Regarding the knowledge about the first aids for toxicity by pesticides in found that nearly two third of the farmers go to pharmacy to ask for treatment of the signs of toxicity, While only around one quarter had high level of knowledgeaboutfirst aid for drinking, inhalation, entering of pesticides to the eyes, andtoughthe pesticideof the skin, it was in the same line withAryal et al (2016) in their study in Nepal,. Among 317 participants most of the participants took rest, one fourth of participants used self-medication, only 9.4% visited to health centers /hospital and very few participants did not do anything when they were ill.

In current study nearly half of farmers have neutral attitude toward use of wood-based to mix the pesticides is safety than using hand, the same percentage agree with using of extra amount of pesticides is the only route to get rid of pests, and have neutral attitude toward standing windward direction when spraying pesticide, don't concern about clothes.. This in the same line with Norkaewl, et al (2009) found only 26% of respondents stated that the using wood stick to mix pesticides mixing was safer than using their hands and 45.5% of respondents believed that spraying should be done in the windward direction. In addition, 36.4%of respondents believed that they if used more than the recommended amount of pesticide while spraying that it would increase their crop yield. Less than 30% of the respondents were considered with after spraying without wearing protective equipment must take a shower as a preventive alternative.

In these study found that more than half of farmers agree with that follow of pesticides label not necessary. It was in the same line with Gaber and Abdel-Latif (2012) in their study in Egypt, found that most of the farmers did not read labels or instructions on the pesticide containers. It was in contrast with Farahat et al (2016) reported that In terms of attitudes, it indicated that more than half of the respondents believed that pesticides are poisonous and nearly two third believed that it is necessary to read or understand the label on OP pesticide containers. This difference in result may be due to in Farahat et al (2016) study educational levels of the participantsshowed that half of the respondents had received higher education.

In current study results showed that there were highly statistical significant differences between total knowledge and some of socio demographic characteristics of the studied sample such level of education and the previous training. AsGaber and Abdel-Latif(2012)in their study about" Effect of education and health locus of control on safe use of pesticides a cross sectional random study" showed thatfarmers who received school education had higher levels of knowledge.

Receiving previoustraining with total knowledge in current study pointed out highly statistical significant differences the results were similar to Adeola(2012) in his study of Perceptions of Environmental Effects of Pesticides Use in Vegetable Production by Farmers in Ogbomoso, Nigeria,Also this was in the same line with Christos. Damalas and Spyridon D. Koutroubas (2017) in their study about Farmers' Training on Pesticide usage. They reported that showed significantly higher levels of knowledge, beliefs about pesticide hazard control, and safety behaviors in pesticide use than non-trained farmers.

In relation to the age of studied sample and their level of total safety self-reported practice,Current study showed that there were highly statistical significant differences between total practice and age group, the current study results showed that the highest rate of satisfactory use of pesticide was among youngest age of farmers. Compared with Magda et al (2016) in their study about "The Effect of Health Hazards Intervention on the Farmer's knowledge, Practice and Self-Reported Symptoms of Pesticides Exposure"showed that the highest rate of satisfactory use of pesticide was among youngest age of workers and least years of experience.The researcher suggest that may be related to the youngest farmers had high level of education and more motivated to adopt safety practices.

There was statistically significant relationship between educational level and satisfactory level of total safety practices among studied farmers. the results of the current study were in agreement withFarahat andMichael, (2009) who evaluated the effect of an educational intervention for farming families to protect their children from pesticide exposure, they found that the parents with high school or university degrees showed significantly greater improvements in knowledge and practice than parents who were illiterate or only able to read and write".

It also in the same line with Mustapha et al (2017) in their study about Pesticide Knowledge and Safety Practices among Farm Workers in Kuwait they found that respondents with higher education levels were significantly less likely to store pesticides in their home (20.89, $p < 0.01$). On the other hand it was found that the result of current study contradicted with the study of Sam et al., (2008) in India. Found that "the average baseline KAP score not influenced by educational level of farmers". The differences of the results intheir study might be related to nearly half of studied workers have satisfactory level of education and had satisfactory knowledge about safe use of pesticide. The educated farmers were more initiated and motivated to adopt safety practices.

VI. Conclusion

The majority of studied farmers have low level of knowledge, negative attitude and poor self-reported practices toward safe usage of pesticides.

VII. Recommendations

1. Educational and training program about safe usage of pesticides should be available and offered on regular basis forfarmers.
2. Providing personal protective devices for farmers with reasonable prices to encourage them to take safety precautions.
3. Official mass media channel should be involved in giving different programs related to safe usage of pesticides
4. Further researches should be conducted to explore the health problems in the field of safe usage of pesticides.

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