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FARMERS HEALTH AND SAFETY AT SHARKIA GOVERNORATE AND THE INFLUENCING ENVIRONMENTAL FACTORS

By
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Abstract

Agriculture is one of the most hazardous of all economic sectors and many agricultural workers suffer occupational accidents and ill health each year.*This* study explored the most significant factors that impact on the health of farmers and the interrelationship between these factors. Cross-sectional descriptive study was conducted on 521 of farmers at Dawar-Gihenna village, Faqous District, Sharkia Governorate. Tools were used for data collection are an interview questionnaire consists of six parts to collect data socio-demographic characteristics of farmers, Economical status and home environment, Medical history, Knowledge regarding health and safety, Attitude regarding health and safety and Practice regarding health and safety. The fieldwork was executed in three months. It started in March 2013 to till the end of June 2013. The results revealed that (58.2%) of participants had unsatisfactory knowledge, while (61.4%) had Positive attitude towards agricultural hazards and (51.1%) of participants had adequate practices towards agricultural hazards.

Key words: Farmers, Socio-demographic characteristics, Agricultural healthor Rural nurse.

Introduction

Generally speaking, the main impetus for 'modern' intensive animal production occurred after the Second World War, when Western governments developed policies to increase the availability of cheap, safe food for their populations. Livestock benefit under intensive husbandry by protection from environmental extremes and predators, and better nutritional and health management. Nevertheless, there are costs to the animal, such as impaired social behavior, limited choice of living environment or pen mates, poor environmental stimulation and behavioral restrictions. The rapid progress in genetic selection of production traits has also, in some cases, adversely affected welfare by creating anatomical and metabolic problems. Besides, the intensively housed animal is heavily reliant on the stockperson and, therefore, inadequate care and husbandry practices by the stockperson may be the largest welfare risk, and that inadequate regulation and staff who lack the appropriate training to care for the welfare of intensively housed-livestock can be major challenges to overcome (Cronin *et al*, 2014).

Agriculture ranks among the most hazardous industries. Farmers are at high risk for fatal and nonfatal injuries, work-related lung diseases, noise-induced hearing loss, skin diseases, and certain cancers associated with chemical use and prolonged sun exposure. Farming is one of the few industries in which the families (who often share the work and live on the premises) are also at risk for injuries, illness, and death (CDC, 2013a). Agriculture is a human activity, which includes a number of different tasks and occupies a huge number of people worldwide. Estimates of World Bank for 2003 suggest that 51% of global-population lives in rural areas. ILO estimates that 1.3 billion of workers are engaged in agriculture, and they represent almost a half of the total number of economically active subjects (2,838,897,404). In developed countries, agriculture workers are only a small fraction of the whole work force (up to 9% according to ILO data), while in developing countries, especially in Asia, agriculture workers rep-

resent up to the 60% of the total work force. Most agriculture workers reside in Asia, in the Pacific (74%) and in Africa (16%). ILO estimates suggest that half of fatal occupational injuries in the world are attributable to agriculture. This means that around 170,000 agriculture workers die every year as a consequence of occupational injuries. Using the same estimate, half of the fatal accidents could be linked to agricultural activities, more than 130 million (Bulat *et al*, 2006). de Merich and Forte (2011) in Italy mentioned that the risk assessment is the fundamental process of an enterprise's prevention system and is the principal mandatory provision contained in the Health and Safety Law (Legislative Decree 81/2008) amended by Legislative Decree 106/2009. In order to properly comply with this obligation also in small-sized enterprises, the appropriate regulatory bodies should provide the enterprises with standardized tools and methods for identifying, assessing and managing risks. They concluded that according to the logic based on the providing support to enterprises by means of a collaborative network among institutions, local supervisory services and social partners, standardized hazard assessment procedures should be, irrespective of any legal obligations, the preferred tools of an "updatable information system" capable of providing support for the need to improve the process of assessing and managing hazards in enterprises Colosio (2013) in Italy stated that since produce food using the environment, agricultural activities are fundamental for human and environmental health. They expose workers to all the known health and safety risks: pesticides and other chemicals, noise, vibrations, solar radiation, climate changes, organizational factors, biological, biomechanical and allergic risks. Also, the risk of accidents is very relevant. Apart for these well-known risks, new risks and diseases are emerging, such as biological risk from vectors, modulated by climate changes, or risks related to new production modalities, such as the cases of peripheral neuropathy observed in pig butchers. The risks can affect particularly vulnerable groups as seasonal, temporary workers and migrants.

ISO (the International Organization for Standardization) is a worldwide federation of national standard bodies (ISO member bodies). The work of preparing international standards is normally carried out through ISO technical committees. ISO 15189 was prepared by Technical Committee ISO/TC 212, clinical laboratory testing, and in vitro diagnostic test systems. This third edition replaces the second edition (ISO 15189: 2007), which was technically revised. Medical laboratory services are essential for patient care and, therefore, have to be available to meet the needs of all patients and the clinical personnel responsible for the care of those patients (Shimoda and Kubono, 2014). Agricultural work possesses several characteristics that are risky for health: exposure to the weather, close contact with animals and plants, extensive use of chemical and biological products, difficult working postures and long hours, and use of hazardous agricultural tools and machinery (Chapman *et al*, 2013) Machine safety is critical to worker safety, because machines have many ways to injure workers: Many machines have moving parts, sharp edges, and hot surfaces with the potential to cause severe workplace injuries such as crushed fingers or hands, amputations, burns, or blindness. Safeguards are essential for protecting workers from these preventable injuries. Any machine part, function, or process that might cause injury must be safeguarded. When the operation of a machine may result in a contact injury to the operator or others in the vicinity, the hazards must be eliminated or controlled (CDC, 2013b)**.**

Lundvall and Olson (2001) stated that the agricultural health nurses address the health and safety issues of farmers, agricultural workers, and farm families. This nurse role incorporates both public health and occupational health nurse specialty practice. They

described the agricultural health nurse job functions and competencies used in providing services to agricultural populations. The greatest importance competencies were interpersonal the communication skills, the knowledge of injury prevention principles and measures, ability to recognize potential hazards within the work and home environment, and demonstrate a strong sense of self. Postma (2006) stated that changes in livestock farming over the last 50 years have led to the increase of large-scale livestock farms called concentrated animal feeding operations (CAFOs). These farms pose a threat to the environment by polluting the air and nearby ground and surface waters. Nevertheless, the nursing literature contained very little information on health effects from CAFOs. Occupational, community, and public health nurses should be aware of the dangers from CAFOs and should participate in caring practices, research, and advocacy to diminish the risks. Besides, Maciuba *et al*. (2014) in USA reported that elevated suicide mortality rates have been reported for farmers and for the elderly. Very little literature exists that looks at the health of older minority farmers. Nurses can frame culturally appropriate strategies for aging farmers to maximize positive outcomes.

Subject and Methods

The present study dealt with the following four main designs: technical, operational, administrative, and statistical designs.

I- Technical design consists of research design, study setting, subjects, and the tools of data collection. A) Research design: A descriptive design was utilized to achieve the study aim. B) Setting and sampling technique: The study was conducted at Dawar-Gihenna Village, Faqous District, which consists of 15 centers and Faqous center consists of 46 villages

The sample size was estimated to determine the prevalence of the satisfactory knowledge, positive attitude, or adequate practice of 30% or more **(**Abou El-Soud *et al*, 2009), with a 2% standard error and a 95% level of confidence. Using the single proportion equation for dichotomous variables (Epi-Info 6.04), and after adjustment for a non-response rate of about 5%, the required sample size was 521 subjects. The sample included all women and men in the chosen village, according to the following inclusion criteria (except those who refuse to participate in the study): a-Male and female, b- Farmer, c- Resident in chose village

c) Tools of data collection:

I. An interview questionnaire was developed to collect data needed for the study, which consisted of:

Part 1: demographic characteristics of the studied participants as age, education, occupation, social status, residence, number of children etc. (questions 1-8).

Part 2: Economical status and home environment such as income, home environment (questions 9-17)

Part 3: Medical history, such as chronic diseases, diseases- related work and injuries-related work (questions 18-24)

Part 4: To assess knowledge regarding health and safety consists of 15 statement to which the respondent must indicate true or false. Scoring: For the knowledge items, a correct response was scored 1 and the incorrect zero. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. Knowledge was considered satisfactory if the percent score was 50% or more and unsatisfactory if less than 50%.

Part 5: To assess attitude regarding health and safety consists of 15 items. Scoring: For attitude, the responses “agree”, “uncertain”, and “disagree” were respectively scored 2, 1, and zero, the scoring was reversed for negative statements. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score. These scores were converted into a percent score. The attitude was considered favorable or positive if the score was 67% or

more, and unfavorable or negative if less than 67%.

Part 6: To assess practice regarding health and safety consists of 10 items about health habits and 25 items to assess practice. Scoring: For practice the items reported to be done all time were scored “2,” sometimes "1" and the items not done were scored “0”. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. The practice was considered adequate if the percent score was 60% or more and inadequate if less than 60%.

2- Examination of fresh samples of urine, stool and blood analysis for common endemic parasitosis. Laboratory investigations included complete blood count (CBC), stool analysis macroscopically for pin-worms, cestod-segments, blood, mucus and consistency and microscopically by direct wet mount method (Cheesbrough, 2004) stained with haematoxylin an eosin. For the detection of *Cryptosporidium* oocysts, smears from fecal samples were stained by modified Ziehl-Nielsen (acid-fast) method (El-Naggar *et al*, 2006). Stool analysis by Kato-Katz method (Katz *et al,* 1972) was done whenever indicated.

Validity: Face and content validity were achieved by a panel of five professors in nursing who revised the tools for clarity, relevance, applicability, comprehensiveness, understanding and ease for implementation. Modifications were applied according to their opinions.

Reliability: The reliability of the tool was tested through measuring its internal consistency, and demonstrated a good level of reliability.

II. Operational design: The operational design included preparatory phase, pilot study, content validity and field work. A- Preparatory phase: It included reviews of national and international related literature using journals, magazines, periodicals, textbooks and internet and theoretical knowledge of various aspects of this issue in order to develop the data collection tool. B- Pilot study: A pilot study was carried out with 10% of the sample. They were selected randomly, and were excluded from the sample of research work to assure stability of the answers. The purposes of the pilot study were to test the clarity and applicability to the study tool and to determine the time needed to complete the questionnaire sheet for each participant. Data obtained from the pilot study were analyzed and according to their results some items were corrected, modified, and ordered. C- Field of work: When tools were finalized after pilot testing, the actual field started after obtaining official permissions, the researcher started to prepare a schedule for collecting the data.

Farmer were interviewed by the authors who introduce themselves and explained briefly the aim of the study, and reassured them that information obtained would be strictly confidential and would not be used for any purposes other than research. All questionnaires were answered by respondents, and the time needed ranged from 15 to 25 minutes. The fieldwork was executed in three months, from March 2013 to the end of June 2013.

III. Administrative Design: Ethical considerations: The subjects who agreed to participate in the study were assured about confidentiality and anonymity of the data. They were informed about their right to refuse or withdraw from the study at any time without giving a reason.

Statistical design: Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Cronbach’s alpha coefficient was calculated to assess the reliability of the developed attitude scale through its internal consistency. Qualitative categorical variables were compared using chi-square test. Whenever the

expected values in one or more of the cells in a 2x2 table were less than 5, Fisher exact test was used instead. Spearman rank correlation was used for the assessment of inter-relationships among quantitative variables and ranked ones. Statistical significance was considered at p-value <0.05.

Study limitation: The study was faced with some obstacles such as lack of co-operation of many farmers for carrying out laboratory investigation.

Results

The results were presented in the following tables (1 to 26):

Table 1: Socio-demographic characteristics of participants (n=521)

Socio-demographic characteristics	Frequency	Percent
Age: <30	68	13.1
Age: 30-	248	47.6
Age: 50+	205	39.3
Range	19.0-70.0	
M±SD	44.4±12.3	
Median	45.0	
Male	449	86.2
Female	72	13.8
Education: Illiterate	152	29.2
Education: Read/write	88	16.9
Education: Primary	65	12.5
Education: Preparatory	50	9.6
Education: Secondary	122	23.4
Education: University	44	8.4
Marital status: Single	36	6.9
Marital status: Married	458	87.9
Marital status: Divorced/widow	27	5.2
Have children: No	11	2.3
Have children: Yes	474	97.7
No. of children: Range	0-15	
M±SD	3.9±2.0	
Median	4	

Table 2: Work and home characteristics of participants (n=521)

Work and home characteristics	Frequency	Percent
Work in: Own land	375	72.0
Work in: Others' land	146	28.0
Work in exclusively agriculture: No	170	32.6
Work in exclusively agriculture: Yes	351	67.4
Other job: Employee	53	31.7
Other job: Manual worker	114	68.3
Income: Insufficient	166	31.9
Income: Sufficient	318	61.0
Income: Saving	37	7.1
Land ownership: No	142	27.3
Land ownership: Yes	379	72.7
Home: Own	474	91.0
Home: Rent	47	9.0
Crowding index: <2	360	69.1
Crowding index: 2+	161	30.9

Table 3: Properties and home utilities of participants (n=521)

Properties and home utilities	Frequency	Percent
Properties:		
Cattle	332	63.7
Sheep	264	50.7
Birds	468	89.8
Tractor	32	6.1
Car	13	2.5
Irrigation machine	322	61.8
Total properties: <4	391	75.0
Total properties: 4+	130	25.0
Total properties: Range	0-6	
M±SD	2.7±1.0	
Median	3	
Utilities:		
Potable water	519	99.6
Electricity	521	100.0
Stockyard	367	70.4
Bird yard	450	86.4
Separate WC	504	96.7
Separate kitchen	500	96.0
Total utilities: <6	206	39.5
Total utilities: 6	315	60.5
Total utilities: Range	3-6	
M±SD	5.5±0.7	
Median	6	
Type of sanitary disposal:		
Municipal system	12	2.3
Trench	209	40.1
None	300	57.6
Assets:		
Radio	277	53.2
TV	514	98.7
Dish	349	67.0
Fridge	513	98.5
Washer	478	91.7
Automatic washer	72	13.8
Stove	507	97.3
Computer	72	13.8
Internet	28	5.4
Total assets: <7	462	88.7
Total assets: 7+	59	11.3
Total assets: Range	1-9	
M±SD	5.4±1.2	
Median	5	

Table 4: Smoking habits of participants (n=521)

Smoking habits	Frequency	Percent
Smoking: Never	337	64.7
Smoking: Current	144	27.6
Smoking: Ex-smoker	40	7.7
Smoking type: Cigarettes	106	58.2
Smoking type: Hookah	66	36.3
Smoking type: Both	10	5.5
Number of cigarettes/day: Range	2-30	
M±SD	11.6±7.0	
Median	10.0	
Number of hookah/day: Range	2-20	
M±SD	4.7±3.1	
Median	4.0	
Number of smoking years: Range	1.0-53.0	
M±SD	15.1±9.9	
Median	15.0	
Drug addiction: Never	498	95.6
Drug addiction: Current	11	2.1
Drug addiction: Ex-smoker	12	2.3

Table 5: Eating and sleeping habits of participants (n=521)

Eating and sleeping habits	Frequency	Percent
Number of main meals/day: <3	55	10.6
Number of main meals/day: 3	466	89.4
Number of main meals/day: Range	1-3	
M±SD	2.6±0.9	
Median	3	
Number of water/fluids cups/day: <10	320	61.4
Number of water/fluids cups/day: 10+	201	38.6
Number of water/fluids cups/day: Range	4-20	
M±SD	8.6±2.9	
Median	8	
Number of sleeping hours/day: <8	122	23.4
Number of sleeping hours/day: 8+	399	76.6
Number of sleeping hours/day: Range	4-12	
M±SD	8.3±1.3	
Median	8	
Perceived body weight: Underweight	57	10.9
Perceived body weight: Normal	410	78.7
Perceived body weight: Overweight/obese	54	10.4

Table 6: Medical history of participants in the study sample (n=521)

Medical history	Frequency	Percent
Have chronic diseases	163	31.3
Diabetes	45	8.6
Hypertension	60	11.5
Cardiac	16	3.1
Renal	6	1.2
Hepatic	25	4.8
GIT	14	2.7
Bronchial asthma	2	0.4
Parkinsonism	1	0.2
Neoplasm	3	0.6
Rheumatoid	6	1.2
Osteoarthritis	10	1.9
Vertigo	3	0.6
Syncope	6	1.2
Total diseases Range	0-4	
M±SD	0.4±0.6	
Median	0	
On regular medications	149	28.6

Table 7: Work-related diseases and injuries among participants (n=521)

Work-related diseases and injuries	Frequency	Percent
Have work-related diseases:	198	38.0
Occupational diseases: [@]		
Zoonosis from animals	15	2.9
Zoonosis from birds	13	2.5
Infections from canal water	115	22.1
Infections from canal contamination	87	16.7
Total number of occupational diseases: Range	0-3	
M±SD	0.4±0.6	
Median	0	
Have work-related injuries:	322	61.8
Occupational injuries:[@]		
Wounds	281	53.9
Fractures	66	12.7
Burns	27	5.2
Pesticides poisoning	66	12.7
Asphyxia	30	5.8
Sun stroke	159	30.5
Total occupational injuries: Range	0-5	
M±SD	1.2±1.1	
Median	1	

Table 8: Knowledge about agricultural hazards among participants (n=521)

Have correct knowledge about:	Frequency	Percent
▪ Birds as a source of infection	346	66.4
▪ Transmission of schistosomiasis	99	19.0
▪ Transmission of ankylostomiasis	336	64.5
▪ Transmission of viral hepatitis	316	60.7
▪ Transmission of tuberculosis from animals	398	76.4
▪ Transmission of brucellosis from milk	397	76.2
▪ Risks of pesticides	285	54.7
▪ Pesticides oral toxicity	273	52.4
▪ GIT symptoms/signs of pesticides toxicity	135	25.9
▪ Systemic symptoms/signs of pesticides toxicity	303	58.2
▪ Management of pesticides toxicity	179	34.4
▪ Tetanus vaccination	123	23.6
▪ Management of sun stroke	341	65.5
▪ Risk of smoking at work	392	75.2
▪ Asphyxiating gases in barns	382	73.3
Total knowledge: Satisfactory (50%+)	218	41.8
Total knowledge: Unsatisfactory (<50%)	303	58.2

Table 9: Attitudes towards agricultural hazards among participants (n=521)

Agree (positive attitudes) upon:	Frequency	Percent
▪ Periodic medical checkup	161	30.9
▪ Protection from sun exposure	372	71.4
▪ Reading guidelines before use of pesticides	364	69.9
▪ Hand washing after using pesticides	426	81.8
▪ Washing hands with gloving	283	54.3
▪ Washing hands before eating at work	387	74.3
▪ Avoiding smoking at work	269	51.6
▪ Wearing boots at work	250	48.0
▪ Tetanus vaccination after injury	396	76.0
▪ Knowledge of first-aid	375	72.0
▪ Changing clothes after use of pesticides	343	65.8
▪ Vaccination of children	437	83.9
▪ Periodic checkup for animals and birds	292	56.0
▪ Not using empty pesticides containers at home	314	60.3
▪ Follow instructions for entry after pesticides	271	52.0
Total attitude: Positive (67%+)	320	61.4
Total attitude: Negative (<67%)	201	38.6

Table 10: Practices related to agricultural hazards among participants in the study sample (n=521)

Adequate practices:	Frequency	Percent
▪ Proper storage of chemicals	350	67.2
▪ Proper storage of animal dung	149	28.6
▪ Avoiding use of home utensils in pesticides formulation	372	71.4
▪ Avoiding use of canal water in bathing	349	67.0
▪ Avoiding use of canal water in washing	276	53.0
▪ Avoiding drinking canal water	437	83.9
▪ Reading instructions before using pesticides	269	51.6
▪ Using personal protective equipment when using pesticides	193	37.0
▪ Keep children away from hazardous equipment	309	59.3
▪ Keep children away from pesticides	396	76.0
▪ Post warning labels	201	38.6
▪ Avoid re-use of empty pesticides containers	305	58.5
▪ Good ventilation of barns and silos	207	39.7
▪ Use head cover to avoid sun stroke	175	33.6
▪ Storing sharp equipment safely	218	41.8
▪ Drinking enough fluids	48	9.2
▪ Keeping animals away from home	224	43.0
▪ Keeping birds away from home	191	36.7
▪ Keep children's vaccination schedule	430	82.5
▪ Encourage antenatal care for wife	320	61.4
▪ Eat balanced diet	237	45.5
▪ Follow health education programs in media	184	35.3
▪ Follow good dietary regimen	196	37.6
▪ Ea breakfast regularly	279	53.6
▪ Eat snacks	92	17.7
Total practice: Adequate (60%+)	266	51.1
Total practice: Inadequate (<60%)	255	48.9

Table 11: Participants' knowledge about agricultural hazards and their personal characteristics

personal characteristics	Knowledge				X^2 test	p-value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Age: <30	27	39.7	41	60.3		
Age: 30-	109	44.0	139	56.0	0.87	0.65
Age: 50+	82	40.0	123	60.0		
Male	193	43.0	256	57.0	1.74	0.19
Female	25	34.7	47	65.3		
Education: Illiterate/ Read/write	91	37.9	149	62.1		
Education: Basic	36	31.3	79	68.7		
Education: Secondary	64	52.5	58	47.5	19.31	<0.001*
Education: University	27	61.4	17	38.6		
Current marital status: Not married	25	39.7	38	60.3	0.14	0.71
Current marital status: Married	193	42.1	265	57.9		
Have children No	7	63.6	4	36.4	Fisher	0.22
Have children Yes	198	41.8	276	58.2		
Work in: Own land	166	44.3	209	55.7	3.23	0.07
Work in: Others' land	52	35.6	94	64.4		
Work in exclusively agriculture: No	88	51.8	82	48.2	10.21	0.001*
Work in exclusively agriculture: Yes	130	37.0	221	63.0		
Other job: Employee	38	71.7	15	28.3	11.25	0.001*
Other job: Manual worker	50	43.9	64	56.1		

(*) Statistically significant at p<0.05

Table (11) showed a statistically significance between secondary educations, positive work in exclusively agriculture, manual workers and knowledge about agricultural hazards.

Table 12: Economic and health characteristics and knowledge

Economic and health characteristics	Knowledge				X^2 test	p-value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Income: Insufficient	59	35.5	107	64.5		
Income: Sufficient	141	44.3	177	55.7	4.23	0.12
Income: Saving	18	48.6	19	51.4		
Land ownership: No	52	36.6	90	63.4	2.19	0.14
Land ownership: Yes	166	43.8	213	56.2		
Total properties: <4	167	42.7	224	57.3	0.49	0.49
Total properties: 4+	51	39.2	79	60.8		
Home: Own	199	42.0	275	58.0	0.04	0.84
Home: Rent	19	40.4	28	59.6		
Crowding index: <2	152	42.2	208	57.8	0.07	0.79
Crowding index: 2+	66	41.0	95	59.0		
Total utilities: <6	100	48.5	106	51.5		0.01*
Total utilities: 6	118	37.5	197	62.5	6.29	
Municipal sanitary disposal: Yes	2	16.7	10	83.3	3.20	0.07
Municipal sanitary disposal: No	216	42.4	293	57.6		
Total assets: <7	184	39.8	278	60.2	6.81	0.009*
Total assets: 7+	34	57.6	25	42.4		
Chronic diseases: No	164	45.8	194	54.2	7.40	0.007*
Chronic diseases: Yes	54	33.1	109	66.9		
Occupational diseases: No	152	47.1	171	52.9	9.50	0.002*
Occupational diseases: Yes	66	33.3	132	66.7		
Occupational injuries: No	101	50.8	98	49.2	10.51	0.001*
Occupational injuries: Yes	117	36.3	205	63.7		
On regular medications: No	164	44.1	208	55.9	2.69	0.10
On regular medications: Yes	54	36.2	95	63.8		

(*) Statistically significant at p<0.05

Table 13: Relation between participants' attitude towards agricultural hazards and their personal characteristics

Personal characteristics	Attitude				X^2 test	p-value
	Positive		Negative			
	No.	%	No.	%		
Age: <30	49	72.1	19	27.9		
Age: 30-	149	60.1	99	39.9	3.75	0.15
Age: 50+	122	59.5	83	40.5		
Male	275	61.2	174	38.8	0.04	0.84
Female	45	62.5	27	37.5		
Education: Illiterate/ Read/write	138	57.5	102	42.5		
Education: Basic	58	50.4	57	49.6	21.99	<0.001*
Education: Secondary	87	71.3	35	28.7		
Education: University	37	84.1	7	15.9		
Current marital status: Not married	41	65.1	22	34.9	0.40	0.52
Current marital status: Married	279	60.9	179	39.1		
Have children: No	7	63.6	4	36.4	Fisher	1.00
Have children: Yes	288	60.8	186	39.2		
Work in: Own land	255	68.0	120	32.0	24.45	<0.001*
Work in: Others' land	65	44.5	81	55.5		
Work in exclusively agriculture: No	131	77.1	39	22.9	26.04	<0.001*
Work in exclusively agriculture: Yes	189	53.8	162	46.2		
Other job: Employee	42	79.2	11	20.8	0.18	0.67
Other Job: Manual worker	87	76.3	27	23.7		

(*) Statistically significant at p<0.05

Table 14: Participants' attitude towards agricultural hazards and their economic and health characteristics

Economic and health characteristics	Attitude				X^2 test	p-value
	Positive		Negative			
	No.	%	No.	%		
Income: Insufficient	94	56.6	72	43.4		
Income: Sufficient	200	62.9	118	37.1	3.12	0.21
Income: Saving	26	70.3	11	29.7		
Land ownership: No	63	44.4	79	55.6	23.96	<0.001*
Land ownership: Yes	257	67.8	122	32.2		
Total properties: <4	236	60.4	155	39.6	0.75	0.39
Total properties: 4+	84	64.6	46	35.4		
Home: Own	304	64.1	170	35.9	16.34	<0.001*
Home: Rent	16	34.0	31	66.0		
Crowding index: <2	216	60.0	144	40.0	0.99	0.32
Crowding index: 2+	104	64.6	57	35.4		
Total utilities: <6	130	63.1	76	36.9	0.41	0.52
Total utilities: 6	190	60.3	125	39.7		
Municipal sanitary disposal: Yes	6	50.0	6	50.0	Fisher	0.55
Municipal sanitary disposal: No	314	61.7	195	38.3		
Total assets: <7	270	58.4	192	41.6	15.28	<0.001*
Total assets: 7+	50	84.7	9	15.3		
Chronic diseases: No	237	66.2	121	33.8	11.04	0.001*
Chronic diseases: Yes	83	50.9	80	49.1		
Occupational diseases: No	240	74.3	83	25.7	59.53	<0.001*
Occupational diseases: Yes	80	40.4	118	59.6		
Occupational injuries: No	144	72.4	55	27.6	16.27	<0.001*
Occupational injuries: Yes	176	54.7	146	45.3		
On regular medications: No	247	66.4	125	33.6	13.60	<0.001*
On regular medications: Yes	73	49.0	76	51.0		

(*) Statistically significant at p<0.05

Table 15: Relation between participants' practice regarding agricultural hazards and their personal characteristics

Personal characteristics	Practice				X^2 test	p-value
	Adequate		Inadequate			
	No.	%	No.	%		
Age: <30	37	54.4	31	45.6		
Age: 30-	127	51.2	121	48.8	0.45	0.80
Age: 50+	102	49.8	103	50.2		
Male	234	52.1	215	47.9	1.46	0.23
Female	32	44.4	40	55.6		
Education: Illiterate/ Read/write	111	46.3	129	53.8		
Education: Basic	57	49.6	58	50.4	16.63	0.001*
Education: Secondary	63	51.6	59	48.4		
Education: University	35	79.5	9	20.5		
Current marital status: Not married	37	58.7	26	41.3	1.69	0.19
Current marital status: Married	229	50.0	229	50.0		
Have children: No	9	81.8	2	18.2	4.53	0.03*
Have children: Yes	234	49.4	240	50.6		
Work in: Own land	214	57.1	161	42.9	19.35	<0.001*
Work in: Others' land	52	35.6	94	64.4		
Work in exclusively agriculture: No	103	60.6	67	39.4	9.18	0.002*
Work in exclusively agriculture: Yes	163	46.4	188	53.6		
Other job: Employee	39	73.6	14	26.4	5.58	0.02*
Other job: Manual worker	62	54.4	52	45.6		

(*) Statistically significant at p<0.05

Table 16: Participants' practice regarding agricultural hazards and their economic and health characteristics

Economic and health characteristics	Practice				X^2 test	p-value
	Adequate		Inadequate			
	No.	%	No.	%		
Income: Insufficient	59	35.5	107	64.5		
Income: Sufficient	182	57.2	136	42.8	24.88	<0.001*
Income: Saving	25	67.6	12	32.4		
Land ownership: No	51	35.9	91	64.1	17.91	<0.001*
Land ownership: Yes	215	56.7	164	43.3		
Total properties: <4	197	50.4	194	49.6	0.28	0.59
Total properties: 4+	69	53.1	61	46.9		
Home: Own	253	53.4	221	46.6	11.32	0.001*
Home: Rent	13	27.7	34	72.3		
Crowding index: <2	182	50.6	178	49.4	0.12	0.73
Crowding index: 2+	84	52.2	77	47.8		
Total utilities: <6	105	51.0	101	49.0	0.00	0.98
Total utilities: 6	161	51.1	154	48.9		
Municipal sanitary disposal: Yes	4	33.3	8	66.7	1.54	0.21
Municipal sanitary disposal: No	262	51.5	247	48.5		
Total assets: <7	221	47.8	241	52.2	16.93	<0.001*
Total assets: 7+	45	76.3	14	23.7		
Chronic diseases: No	188	52.5	170	47.5	0.97	0.32
Chronic diseases: Yes	78	47.9	85	52.1		
Occupational diseases: No	194	60.1	129	39.9	27.59	<0.001*
Occupational diseases: Yes	72	36.4	126	63.6		
Occupational injuries: No	123	61.8	76	38.2	14.90	<0.001*
Occupational injuries: Yes	143	44.4	179	55.6		
On regular medications: No	196	52.7	176	47.3	1.39	0.24
On regular medications: Yes	70	47.0	79	53.0		

(*) Statistically significant at p<0.05

Table 17: Relation between participants' work-related injury and their personal characteristics

Personal characteristics	Work-related injury				X^2 test	p-value
	No		Yes			
	No.	%	No.	%		
Age: <30	33	48.5	35	51.5	6.68	0.04*
Age: 30-	100	40.3	148	59.7		
Age: 50+	66	32.2	139	67.8		
Male	163	36.3	286	63.7	4.93	0.03*
Female	36	50.0	36	50.0		
Education: Illiterate/ Read/write	71	29.6	169	70.4		
Education: Basic	49	42.6	66	57.4	14.70	0.002*
Education: Secondary	58	47.5	64	52.5		
Education: University	21	47.7	23	52.3		
Current marital status: Not married	31	49.2	32	50.8	3.68	0.06
Current marital status: Married	168	36.7	290	63.3		
Have children: No	5	45.5	6	54.5	Fisher	0.55
Have children: Yes	175	36.9	299	63.1		
Work in: Own land	151	40.3	224	59.7	2.43	0.12
Work in: Others' land	48	32.9	98	67.1		
Work in exclusively agriculture: No	74	43.5	96	56.5	3.04	0.08
Work in exclusively agriculture: Yes	125	35.6	226	64.4		
Other job: Employee	29	54.7	24	45.3	3.82	0.051
Other job: Manual worker	44	38.6	70	61.4		

(*) Statistically significant at p<0.05

Table 18: Relation between participants' work-related injury and their economic and health characteristics

Economic and health characteristics	Work-related injury				X^2 test	p-value
	No		Yes			
	No.	%	No.	%		
Income: Insufficient	52	31.3	114	68.7	10.57	0.005*
Income: Sufficient	125	39.3	193	60.7		
Income: Saving	22	59.5	15	40.5		
Land ownership: No	45	31.7	97	68.3	3.50	0.06
Land ownership: Yes	154	40.6	225	59.4		
Total properties: <4	145	37.1	246	62.9	0.82	0.37
Total properties: 4+	54	41.5	76	58.5		
Home: Own	185	39.0	289	61.0	1.55	0.21
Home: Rent	14	29.8	33	70.2		
Crowding index: <2	146	40.6	214	59.4	2.75	0.10
Crowding index: 2+	53	32.9	108	67.1		
Total utilities: <6	89	43.2	117	56.8	3.62	0.06
Total utilities: 6	110	34.9	205	65.1		
Municipal sanitary disposal: Yes	4	33.3	8	66.7	Fisher	1.00
Municipal sanitary disposal: No	195	38.3	314	61.7		
Total assets: <7	172	37.2	290	62.8	1.61	0.20
Total assets: 7+	27	45.8	32	54.2		
Chronic diseases: No	169	47.2	189	52.8	39.36	<0.001*
Chronic diseases: Yes	30	18.4	133	81.6		
Occupational diseases: No	182	56.3	141	43.7	118.62	<0.001*
Occupational diseases: Yes	17	8.6	181	91.4		
Occupational injuries: No	177	47.6	195	52.4	48.53	<0.001*
Occupational injuries: Yes	22	14.8	127	85.2		

(*) Statistically significant at p<0.05

Table 19: Relation between participants' work-related accidents and their personal characteristics

Personal characteristics	Work-related disease				X^2 test	p-value
	No		Yes			
	No.	%	No.	%		
Age: <30	54	79.4	14	20.6		
Age: 30-	150	60.5	98	39.5	10.35	0.006*
Age: 50+	119	58.0	86	42.0		
Male	279	62.1	170	37.9		
Female	44	61.1	28	38.9	0.03	0.87
Education: Illiterate/ Read/write	139	57.9	101	42.1		
Education: Basic	56	48.7	59	51.3	26.98	<0.001*
Education: Secondary	92	75.4	30	24.6		
Education: University	36	81.8	8	18.2		
Current marital status: Not married	42	66.7	21	33.3	0.66	0.42
Current marital status: Married	281	61.4	177	38.6		
Have children: No	7	63.6	4	36.4	Fisher	1.00
Have children: Yes	292	61.6	182	38.4		
Work in: Own land	251	66.9	124	33.1	13.84	<0.001*
Work in: Others' land	72	49.3	74	50.7		
Work in exclusively agriculture: No	121	71.2	49	28.8	9.03	0.003*
Work in exclusively agriculture: Yes	202	57.5	149	42.5		
Other job: Employee	39	73.6	14	26.4	0.21	0.65
Other Job: Manual worker	80	70.2	34	29.8		

(*) Statistically significant at p<0.05

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Table 20: Participants' occupational diseases and their economic and health characteristics

Economic and health characteristics	Occupational disease				X^2 test	p-value
	No		Yes			
	No.	%	No.	%		
Income: Insufficient	86	51.8	80	48.2	10.75	0.005*
Income: Sufficient	212	66.7	106	33.3		
Income: Saving	25	67.6	12	32.4		
Land ownership: No	68	47.9	74	52.1	16.49	<0.001*
Land ownership: Yes	255	67.3	124	32.7		
Total properties: <4	239	61.1	152	38.9	0.50	0.48
Total properties: 4+	84	64.6	46	35.4		
Home: Own	306	64.6	168	35.4	14.62	<0.001*
Home: Rent	17	36.2	30	63.8		
Crowding index: <2	226	62.8	134	37.2	0.30	0.58
Crowding index: 2+	97	60.2	64	39.8		
Total utilities: <6	125	60.7	81	39.3	0.25	0.62
Total utilities: 6	198	62.9	117	37.1		
Have municipal sanitary disposal: Yes	8	66.7	4	33.3	Fisher	1.00
Have municipal sanitary disposal: No	315	61.9	194	38.1		
Total assets: <7	273	59.1	189	40.9	14.62	<0.001*
Total assets: 7+	50	84.7	9	15.3		
Chronic diseases: No	274	76.5	84	23.5	102.68	<0.001*
Chronic diseases: Yes	49	30.1	114	69.9		
On regular medications: No	281	75.5	91	24.5	101.24	<0.001*
On regular medications: Yes	42	28.2	107	71.8		

(*) Statistically significant at p<0.05

Table 21: Participants' knowledge about agricultural hazards and their attitude and practice

Attitude and practice	Knowledge				X^2 test	p-value
	Satisfactory		Unsatisfactory			
	No.	%	No.	%		
Total practice: Adequate (60%+)	138	51.9	128	48.1	22.50	<0.001*
Total practice: Inadequate (<60%)	80	31.4	175	68.6		
Total attitude: Positive (67%+)	162	50.6	158	49.4	26.29	<0.001*
Total attitude: Negative (<67%)	56	27.9	145	72.1		

(*) Statistically significant at p<0.05

Table 22: Laboratory findings of participants (n=50).

Laboratory investigation	Frequency	Percent
Anemia: No	30	60.0
Anemia: Yes	20	40.0
Hb level: Range	7.0-14.0	
M±SD	11.1±1.6	
Median	11.00	
Urine analysis: Negative	11	22.0
Urine analysis: Positive	39	78.0
Urine analysis: Urates	16	32.0
Urine analysis: Oxalates	14	28.0
Urine analysis: Uric acid	10	20.0
Stool analysis: Free	14	28.0
Stool analysis: Positive	36	72.0
Stool analysis: *Entameba histolytica/hartmani*	12	24.0
Stool analysis: *Enterobius vermicularis*	6	12.0
Stool analysis: *Ascaris lumbricoides*	10	20.0
Stool analysis: *Schistosoma mansoni*	3	6.0
Stool analysis: *Hymenolepis nana*	5	10.0

Table 23: Relation between participants' attitude towards agricultural hazards and their practice

Attitude	Practice				X^2 test	p-value
	Adequate		Inadequate			
	No.	%	No.	%		
Total attitude: Positive (67%+)	223	69.7	97	30.3		
Total attitude: Negative (<67%)	43	21.4	158	78.6	115.23	<0.001*

(*) Statistically significant at p<0.05

Table 24: Relation between participants' urine and stool analyses and anemia

Urine and stool analysis	Anemia				X^2 test	p-value
	No		Yes			
	No.	%	No.	%		
Urine analysis : Negative	10	90.9	1	9.1	Fisher	0.03*
Urine analysis : Positive	20	51.3	19	48.7		
Stool analysis: Negative	14	100.0	0	0.0	12.96	<0.001*
Stool analysis: Positive	16	44.4	20	55.6		

(*) Statistically significant at p<0.05

Table 25: Correlation matrix of participants' knowledge, attitude and practice scores

Items	Spearman's rank correlation coefficient		
	Knowledge	Attitude	Practice
Attitude	.361**		
Practice	.303**	.582**	

(**) Statistically significant at p<0.01

Table 26: Correlation between participants' knowledge, attitude and practice scores and their characteristics

Items	Spearman's rank correlation coefficient		
	Knowledge	Attitude	Practice
Age	0.01	-0.07	0.00
Education	.200**	.163**	.176**
Income	.137**	.138**	.258**
No. of properties	-0.05	0.03	.104*
No. of utilities	-0.06	0.00	-0.02
No. of assets	.126**	.290**	.324**
No. of chronic diseases	-.139**	-.133**	-0.06
No. of occupational diseases	-.139**	-.329**	-.226**
No. of occupational accidents	-.148**	-.256**	-.217**

(*) Statistically significant at p<0.05 (**) Statistically significant at p<0.01

Discussion

In the present study, the participants were 47.6% ages (30-) of whom 86.2% were males. 46.1% were illiterate or read & write and 87.9% were married with 97.7% had children, 72% worked in their own land and 67.4% worked in exclusively agriculture, 68.3% were manual workers and 61% had sufficient income and 69.1% lived in < 2 rooms. They (89.8%) had domestic birds, electricity, 70.4% had stockyard, 57.6% without sanitary disposal, 98.7% and 98.5% had a TV and fridge respectively and 2.5% had a car.

Adenle (2011) reported that the controversies surrounding transgenic crops, often called Genetically Modified Organisms (GMOs), call for a need to raise the level of public awareness of Genetic Modification (GM) technology in Africa. This should be accomplished by educating the public about the potential benefits and risks that may be associated with this new technology. In the

last 15 years, GM crop producing countries have benefited from adoption of this new technology in the form of improved crop productivity, food security, and quality of life. The increased income to resource-poor farmers is a key benefit at the individual level especially as most countries using this technology are in the developing world, including three African countries (South Africa, Burkina Faso and Egypt). Despite clear benefits to countries and farmers who grow GMOs, many people are concerned about suspected potential risks associated with GMOs and that the GM technology can be adopted for agricultural development in Africa

In the present study, the participants (27.6) were smoker, 36.3% Hookah-smoker, and 5.5% adapted both and 2.1% were drug addiction. Radwan *et al*. (2014) stated that smoking addiction is influenced by cultural and environmental factors and personality trait, and assessed the associations between neuroticism and depression and smoking behavior and motives among Egyptian adult men in rural Qalyubia Governorate. They concluded that neuroticism and depression were associated with smoking behavior and motives among Egyptians, and thus attention should be given to individual needs in designing and implementing smoking cessation interventions.

In the current study, farmer had chronic diseases, the commonest was hypertension. This may be due to lifestyle, such as improper diet, smoking and defect in health services follow up. They (89.4%) eat 3 meals/day, 61.4% had <10 water/fluids cups/day and 76.6% sleep more than 8 hours/day, and 78.7% with normal body weight. As to the work related diseases, 31.1% had chronic diseases, hypertension & diabetes (11.5% & 8.6%) respectively.

El-Gilany and Hammad (2005) in rural areas in Dakahlia Governorate conducted a household survey of diarrhea among 4458 children under age 5 years. Overcrowding, improper refuse disposal and non-flush toilets were also significantly correlated with diarrhoea incidence. Beltrame *et al*. (2007) in Italy stated that chronic heart failure (CHF) is characterized by the inability of the heart to supply the body with sufficient amount of blood for metabolic and circulatory needs. The main risk factors for CHF development are: hypertension, type 2 diabetes, obesity, smoking, chronic kidney diseases. Many occupational exposures, such as extremes of heat or cold temperatures, prolonged exposure to noise, vibrations, pesticides, can contribute to etiology of this disease. They concluded that the farmer job could be associated with the severity of CHF. Pérès *et al.* (2012) in France reported that the health of the agricultural population has been previously explored, particularly in relation to the farming exposures and among professionally active individuals. However, few studies specifically focused on health and aging among elders retired from agriculture. Yet, this population faces the long-term effects of occupational exposures and multiple difficulties related to living and aging in rural area (limited access to shops, services, and practitioners). However, these difficulties may be counter-balanced by advantages related to healthier lifestyle, richer social support and better living environment. Sandstead (2013) stated that zinc kinetics confirmed the zinc deficiency. The endocrine studies showed hypopituitarism. Treatment with zinc and an omnivorous diet was more efficacious for growth than no treatment, diet alone, or iron and diet, which was confirmed in stunted Iranian farmers. He added that the key role of diet in the illness became evident when Prasad found 16 severely stunted farmers from 2 oases who were not infected with schistosomiasis or hookworm. Tomei *et al*. (2013) suggested that farmers nowadays are more likely to contract cardiovascular diseases than in the past. Also, Busingye *et al*. (2014) in Australia provided evidence that the association between hypertension and socioeconomic status in rural populations of low- and middle-income in

Asia varied according to geographical region. This has important implications for targeting intervention strategies aimed at high-risk populations in different geographical regions. Barnes *et al*. (2014) explored the implications of sleep for morality and suggested that the lack of sleep leaves people less morally aware, with important implications for the recognition of the morality in others

Concerning the level of knowledge more than half of study samples had unsatisfactory knowledge regarding agricultural hazards. This may be due to less than half of them were illiterate or read & write. Ahmed *et al.* (2001) in Saudi Arabia reported that only 38.7% of workers exposed to noise knew the adverse health and hazards. Kripa *et al.* (2005) in India reported that 98.7% of the brine salt workers knew the health problem associated with their jobs. Bagchi *et al.* (2008) in India dealing with farmers found no significant difference among age groups, occupation, marital status and experience regarding knowledge improvement after educational program. Also, Kumari and Reddy (2013) in India found that most of the agricultural workers were Illiterate and had insufficient level of knowledge regarding pesticide use and hazards.

In the present study, there was a statistically significance between age (30-), basic education, working in others land, positive working in exclusively agriculture and work-related disease. Also, there was a statistically significance between all economic and health characteristics and occupational disease except total properties, crowding index, total utilities and municipal sanitary disposal. Moreover, the samples with inadequate practice who had unsatisfactory knowledge, and participants with negative attitude showed inadequate practice.

Besides, there were a positive correlation between attitude and knowledge, and between practice & knowledge and attitude, as well as age, properties and utilities had significant weak negative correlation with the knowledge, attitude and practice scores and positive correlation with all personal characteristics.

Hadfield-Law (2001) in UK reported a significant increase in the incidence of body piercing in the Western world over the last decade and that accident and emergency nurses are in an excellent position to offer skill and advice on the treatment of head lice, from health education to diagnosis and cure to contact tracing. He concluded that nurses do need to be aware of how lice move between people, so they can take an active role in health education and make sure that patients affected by head lice are managed properly.

No doubt, all pesticides to be effective against the pests must be biologically active, or toxic. Because pesticides are toxic, they are also potentially hazardous to humans, animals, other organisms, and the environment. Thus, the people who use pesticides or regularly come in contact with them must understand the relative toxicity, potential health effects, and preventative measures to reduce exposure to the products they use. Toxicity generally results from accidental or intentional ingestion of or exposure to, agricultural pesticides. Other potential causes of organophosphate or carbamate toxicity include ingestion of the contaminated fruit, flour, or cooking oil, and wearing contaminated clothing (Watson *et al*, 2003). The miss-use of pesticides was connected at least with the high incidence of colorectal cancer in Egyptian children and youth (Soliman *et al,* 2003). The hazard depends on the toxicity of the insecticides and the amount of exposure to the insecticides (Jira et al, 2012). Nearly all insecticides have the potential to significantly alter ecosystems; the majorities are toxic to humans; edible animals and others are concentrated in the food chain (Ahsan *et al*, 2006). Exposure to insecticides is one of the most important occupational risks among staff worker in Military camp (Brimfield, 2012)

In Egypt, Dogheim *et al*. (1998) reported that buffalo milk was much preferred by

consumers over cow's milk, while small catfish and bolti fish are common in the diet of farmers. Samples of buffalo milk, catfish, and bolti fish collected from Beni-Suef Governorate (Upper Egypt) were analyzed for organochlorines and polychlorinated biphenyls. They found that pesticide contaminants found most often were HCH isomers including lindane, DDT complex, aldrin and dieldrin, heptachlor and heptachlor epoxide, hexachlorobenzene, and oxychlordane.

El Sebaie *et al.* (2000) reported that fertile soil was the most important resource for food production, and Egyptian agricultural area was limited to six million faddans. This limited area has derived many farmers to use several types of chemical fertilizers, to enhance the fertility of the land and hence the productivity. The excessive application of chemical fertilizer led to the build-up of these residuals because they are superfluous. This would cause waste of money and also soil pollution. Ultimately, this would adversely affect the ecological system in the soil and surrounding environment, especially water bodies

Abdel-Wahab *et al.* (2007) stated that hepatocellular carcinoma (HCC) is now regarded as one of the major malignant diseases worldwide, with significant variations in the epidemiology. They concluded that the number of newly diagnosed patients with HCC increases annually. The prevalence of HCC is high in Nile Delta area, and is more common in males, rural residents and farmers especially in HCV patients. In rural areas there are other risk factors that may be responsible for this high incidence, such as pollution, aflatoxins and use of insecticides, which need more study**.**

Mansour (2008) reported that indoor use of pesticides for pest control is widespread in Egypt. Accurate information concerning the types and amounts of Egyptian household pesticide use, or numbers of poisoning or contamination incidents, is unavailable. The results of a survey of Egyptian farmers' attitudes toward pesticides and their behavior in using them garnered new insights as to how pesticides should be better controlled and regulated in Egypt. Farahat *et al*. (2008) developed culturally appropriate educational intervention toward agricultural families to improve their knowledge and practice in order to protect their children from exposure to pesticides.

Raafat *et al.* (2012) in Sharkia Governorate reported that chronic exposure of the non-diabetic farmers who handle agricultural organophosphorus malathion pesticides induced insulin resistance, and might be associated with increased risk of developing diabetes mellitus. They concluded that this effect tended to strengthen as waist circumference increases.

El-Bahnasawy *et al*. (2014) in Egypt reported that insecticides are used to control diseases spread by arthropods, but they vary greatly in toxicity. They added that toxicity can be either acute or chronic. Acute toxicity is the ability of a substance to cause harmful effects which develop rapidly following absorption, i.e. few hours or a day. Chronic toxicity is the ability of a substance to cause adverse health effects resulting from long-term exposure to a substance, with great range in the insecticidal toxicity to humans.

AlAteeq and AlAeawi (2014) in Saudi Arabia assessed four main determinants of the healthy lifestyle (smoking, diet, physical activity, and body mass index) among primary health care professionals. They found that the primary health care professionals were not up to the expected level of healthy lifestyle parameters.

Sato (1997) stated that occupational health nursing in USA developed a solid foundation for a century, and was one of the pioneering countries which had the most advanced occupational health nursing practices in the world. He added that there were three periods in the history of the role development of occupational health nursing in the U.S. I. 1890s-1920s: the Emergence of Occupational Health Nursing; Ada Mayo Stewart, the first occupational health nurse in the

U.S., was employed by Vermont Marble Company in 1895, and worked as a clinician to provide the emergency care for work related injuries as well as working a primary nurse to visit the homes of the employees and their families for health education. II. 1930s-1950s: The Development of Standards of Nursing Practices; Occupational health nurses were committed to the early detection and prevention of the work/non-work related diseases and illnesses as well as direct care. The American Association of Industrial Nurses (AAIN), the nationwide professional organization for the industrial nurses, was established in 1942. The AAIN developed standards of industrial nursing practices which formed the basis of the current standards of occupational health nursing practices; III. 1960s-: Occupational Health Nurses working as Nurse Specialists; Since the 1960s, many health hazards related to workplace exposure and working conditions had resulted in illness and injuries, and had become a social problem. The federal government legally obligated employers to promote workers' safety and health. Employers sought the services of occupational health nurses who had special knowledge and skills to improve health and safety in the workplaces. In 1972, the AAIN started the program of the Certified Occupational Health Nurses. In the 1970s, several universities established the programs of occupational health nursing at the master level. With the impacts of these legal and social changes, the occupational health nurses have been evolving and developing advanced nursing practices. The current five basic roles of occupational health nurses are: clinician, administrator, educator, consultant and researcher. In conclusion, it was stated that the occupational health nurses in the U.S. started their practices as clinicians, and developed their advanced nursing practices which require professional knowledge and skills. Fleming (2004) in USA reported that 1- Agriculture remains one of the most dangerous industries in America. To serve this worker population, agricultural health is emerging as a new nursing specialty in which nurses can use their vision to establish new areas of practice. 2- Nurses who are a member of the farming audience can be effective agents of change because they know the audience in a personal way. 3- To establish a new agricultural nursing specialty, one must overcome obstacles including uncertain funding, a rapidly changing work environment, worker preference for independent decision making, and no existing

Ross *et al*. (2006) reported that the occupational health nurse in a large manufacturing facility arrives at work early one Monday morning to find three ill employees in the clinic waiting room and a message from several plant supervisors that multiple employees have called in sick. The supervisors are concerned. The employees have reported similar symptoms, including nausea, vomiting, diarrhea, and fever Furthermore, two supervisors who rarely miss work have also called in sick and other employees are complaining of stomach cramps and diarrhea. The occupational health nurse promptly begins completing a nursing assessment and health history. She discovers that all sick employees attended the company picnic, catered by the facility's food service vendor, the day before. After notifying the local public health department, occupational health nurse begins to investigate further. The occupational health nurse visits the cafeteria to speak with the manager and inquire about the food served at the picnic. The menu included ham and cheese sandwiches with mayonnaise, hamburgers, potato salad, and cake. The beverages were milk, non-bottled water, and lemonade. All leftover food was discarded, so nothing is available for testing. Dimaria-Ghalili *et al*. (2013) found that the nutrition education curricula for students in U.S. medical schools and schools of other health professions, such as the nursing and oral health, did not provide enough opportunity to gain knowledge of interactions among micro- and macronutrients, their role

in maintaining optimal body functions, factors that interfere with these interactions, or, importantly, how to integrate this knowledge into the medical practice? There was a need to better prepare healthcare professionals for identifying nutrition risk and managing the hospitalized patients, especially those with chronic conditions, by an interprofessional, team-based approach. Also, Main and Jones (2014) stated that increasing the number of individuals adequately immunized to prevent illness is a goal of community health nursing, but achieving this goal among occupational groups such as farmers remains a challenge. They dealt with 280 farmers or individuals associated with farming were surveyed over a 7-month period and found that positive outcomes included increasing the tetanus immunization rate among participating farmers and facilitating partnerships with community agencies and organizations.

In New Zealand, Wood *et al.* (2014) mentioned that responding to demands for the transformed farming practices requires new forms of knowledge. Given their scale and complexity, agricultural problems can no longer be solved by linear transfers in which technology developed by specialists passes to farmers by way of extension intermediaries. Research on alternative approaches has focused on the innovation systems formed by interactions between heterogeneous actors. They concluded that thematic analysis reveals three general principles: farmers value knowledge delivered by persons rather than roles, privilege farming experience, and develop knowledge with empiricist rather than rationalist techniques.

Phillips (2014) stated that modern livestock farming industry practice continues to cause concern about hazardous exposures among workers and nearby residents. Occupational and environmental health nurses can join other advocates and encourage policies that protect workers, communities, and the environment from confined animal feeding operations health hazards.

Taken together these findings suggest that farmers deliberate about science in intensive and durable networks that have significant implications for theorizing agricultural innovation.

In the present study, participants suffered from anemia. Massoud *et al*. (1987) in Sharkia Governorate correlated between health hazards and agricultural workers. Olsen *et al*. (2006) in Sweden stated that Hepatitis E virus (HEV) were responsible for large waterborne outbreaks in developing countries particularly in farm rearing pigs. Medhi *et al.* (2006) in India reported that health status among tea gardens population could be ameliorated through better hygienic practices, environmental sanitation, creating the health awareness, nutritional intervention and overall improvement of socioeconomic conditions of the population. El-Sherbini and Mohammad (2006) in Giza Governorate reported that positive significant correlation was observed between farmers and their farm animals infected with *Cryptosporidium parvum.* El Shazly *et al.* (2007) in rural area in Dakahlia Governorate found that the hydatidosis *granulosus* was significantly higher in shepherd followed by farmers. Alaofè *et al*. (2008) in Canada reported that intestinal parasites represented a major public health problem that increase iron deficiency anemia in developing countries. But, they concluded that there was no significant association observed between IPIs and iron deficiency or iron deficiency anemia. Dutto and Petrosillo (2013) in Italy reported a case of 42-year-old pig farmer who was infected by soil-transmitted *Ascaris suum.*

In the present study, the detected parasites were *E. histolytica/hartmani* (24%), *A. lumbricoides* (20%), *E. vermicularis* (12%), *H. nana* (10%) and *S. msansoni* (6%). El-Sherbini *et al*. (2008) in Greater Cairo among handicapped children and their serving staff found in a descending order *E. vermicularis, G. lamblia, E. histolytica, H. nana, A. lumbricoides, Cryptospodium parvum, Tricocephalus trichura* and *Strongyloides ster-*

coralis. El Fakahany *et al*. (2013) conducted a survey at Benha City (100 soil samples) and Shiblanga village (100 soil samples) representing the urban and rural areas. Geoparasites were investigated indoors, around houses, in the fields and the streets from both areas. They found that 86/200soil samples were contaminated with different parasites, the prevalence rate of 43%. The soil samples from Shiblanga village gave higher level of parasitic contamination (56%) and Benha city showed the lower level of contamination by different parasites (30%). Soil samples obtained from Manshiet El-Nour district, Benha revealed the highest level of parasitic contamination. The parasites were eggs of *H. nana, H. diminuta, A. lumbricoides, Toxocara* spp., *Ancylostoma duodenale* larvae, *E. histolytica* cysts*, Cryptosporidium parvum* oocysts and *T. gondii* oocysts. The parasitic prevalence among Egyptian households stool samples in Qualyobia G. was 30.5%, containing *H. nana* eggs, *A. lumbricoides, E. vermicularis* eggs, *A. duodenale*, *E. histolytica* cysts, *C. parvum* oocysts, *B. hominis* cysts and *Isospora belli* oocysts. There was no statistically significant difference in sex regarding infection**.** School age group was the commonest infected one (59%). Parasites detected were 10/50 houses. *A. duodenale* ova were detected in soil of 4 houses with the same parasite in households' stools, *A. lumbricoides* eggs were detected in 4 houses with the same parasite in house-holds stools and *E. histolytica* cysts were detected in 2 houses with the same parasite in households stools.

On the other hand, enterobiasis was the commonest auto-infection parasite worldwide in temperate and tropical climates, especially in schoolchildren aged 5 to 10 years and relatively uncommon in those under two years old (CDC, 2008).

However, perianal cutaneous amebiasis and rectovaginal fistulae were other rare complications of amebic intestinal disease among Egyptian rural youth (Badawy *et al*, 2012). Eraky *et al*. (2014) in Benha City evaluated the parasites degree on vegetables and found that *G. lamblia* cysts were the most prevalent (8.8%) followed by *Entamoeba* spp. cysts (6.8%), *E. vermicularis* eggs (4.9%), various helminth larvae (3.6%), *H. nana* eggs (2.8%), *H. diminuta* eggs (2.1%), and *A. lumbricoides* eggs (0.6%). The highest contaminated vegetable was lettuce (45.5%) then watercress (41.3%), parsley (34.3%), green onion (16.5%), and leek (10.7%). These findings provide evidence for the high risk of acquiring parasitic infection from the consumption of raw vegetables Youssef and Uga (2014) stated that the intestinal infections of parasitic zoonoses were widespread and are the leading cause of diarrhea, particularly among children and residents of rural areas, and that some parasitic zoonoses are confined to specific geographic areas in Egypt. They concluded that the prevention and control programs against the sources and reservoirs of zoonoses should be planned by public health and veterinary officers based on reliable data from systematic surveillance.

The present study showed a positive rate of 40% anemia as compared to 60% and 72% with intestinal parasites (mainly *E. histolytica/dispar* and *A. lumbricoides*). El-Sahn *et al*. (2003) in Alexandria found that parasitic infections were insignificantly associated with anemia which was found in only 12.5% of girls infected with *G. lamblia*, in 10% of those with *A. lumbricoides*, and in 7.4% of *E. histolytica/dispar* cases. Labib *et al.* (2013) in Upper Egypt reported that the students had chronic nutritional deficiencies, mainly anemia. Poor hygiene habits, poor household sanitation, and lack of parents' education in rural areas were predictors for intestinal infections. They recommended that health education campaigns be conducted to increase students' and mothers' awareness and encourage proper sanitation and hygiene habits at home and in their environment.

Conclusion

The main risk factors for farmer health and safety were level of education, work in exclusively agriculture, manual worker, total utilities, total assets, chronic diseases, occupational diseases and occupational injuries, public health and occupational health nurse specialty practice work in others' land, regular medication, land ownership and sufficient income.

Agricultural health nurses are a must to address the health and safety issues of farmers, agricultural workers, and farm families and to conduct follow up assessment of injury, illness, or disease occurring as a result of an agricultural exposure.

Recommendations

Very few qualitative studies, with theoretical underpinning, have focused on rural nurse or agriculture health nurse who can go to farm communities to provide health care system interventions, family interventions, and public health education campaigns, especially to the non-educated ones.

The undergraduate nurses should be educated in the areas of health promotion relevant to farming communities to be able to meet their rural clients' needs in relation to occupational diseases; as insecticides and pesticides, their application and storage, zoonotic diseases from dogs, cats, farm animals, soil and water transmitted diseases as well as injuries and sun stroke.

There are three themes: prevention, early intervention, and treatment and support. All services and organizations need to ensure targeting and support for farmers to enable a cultural shift towards accessing health care and support services. Prevention of contamination remains the most effective way of reducing food borne parasitic infection. A comprehensive health education should be given to vendors and farmers of fruits and vegetables and to the general population on the health risks associated with consumption of contaminated fruits and vegetables. The consumers should always observe the basic principle of food and personal hygiene by washing the fruits and vegetables before eating and washing hands before meal. The agricultural health nurses address the health and safety issues of the farmers, agricultural workers, and farm families. This nurse role incorporates both public health and occupational health nurse specialist practice.

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