Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

Effect of The Self Learning Module on Knowledge and Practices of Health Team Regarding Water-borne Diseases

Hayam Mohammed Abd Elrazak[1], Entisar Abo Elghite Elhossiny Elkazeh[2], Neamat Mazloum Mohamed[3]

[1] Nursing Specialist, at Kafr El Sheikh General Hospital,
[2] Assistant Professor of Community Health Nursing,
[3] Lecturer of Community Health Nursing, Faculty of Nursing, Tanta University, Egypt

Abstract: **Water-borne diseases are one of the major public health problems and they are the leading cause of morbidity and mortality in all age groups. Good knowledge and practice of the health care workers serve as the first line in diagnosis, treatment, prevention and notification of the water-borne diseases. The aim of the study: to evaluate effect of the self-learning module on knowledge and practices of health team workers regarding water-borne diseases. Subjects and Method: Study design: In this study Quasi-experimental design was used. Settings: This study was conducted in three Maternal and Child Health Care Centers and one Rural Health Unit. Study subjects: All health team who worked in the previous sitting were included in the study involved: community health nurses, health officers (physician), environmental health technicians (sanitarians) and medical laboratory technicians. Tools of data collection: Three tools were used for data collection Tool I: Socio-demographic characteristic of health team workers. Tool II: Knowledge regarding water- borne diseases: This tool composed of two parts: Part (1): Knowledge regarding water borne diseases for all categories of health team workers. Part (2): Knowledge for each specific categories of health team regarding water borne diseases. Tool III: A self-reported practice of health team regarding the water borne diseases. Results: The total sample size was (170) health workers. The majority of them were nurses (74.7%), while the health officer, environmental health technicians, and the laboratory health technicians represent (5.9 %, 10.6% & 8.8% respectively). The health officers achieved the highest score of correct, and complete answers in pre and post-implementation of learning module followed by laboratory technicians, environmental health technicians, and the nurses. Regarding the practice there were statistically significant differences in the total practices regarding the water-borne diseases pre and post-implementation of self-learning modules for community health nurses, environmental health technicians as p ($P < 0.05$), while there are no significant differences for health officers and laboratory technicians Conclusions: This study concluded that the self-learning module has a positive effect on improving knowledge and practices of health team workers regarding water-borne diseases. Recommendations: The finding of the present study recommended that, there was a need for continues training programs for health team workers about water-borne diseases. Pre in-services training and periodic refreshment in-service education and training especially for newly through seminars & workshops should be regularly organized by MCH centers in collaboration with health Administrators for health team workers.**

Keywords: Water-borne diseases, Knowledge, Practices, Self-learning modules.

1. INTRODUCTION

Water is one of the precious natural resources and is an essential element of our life. Clean water and optimum sanitation facilities can prevent the occurrence of various infectious diseases and help in curbing the associated morbidity and mortality. Waterborne diseases are one of the major public health threats especially in developing countries, where unsafe water, sanitation problems, and poor hygienic practices exit. The public health approach to the prevention and control of waterborne diseases consist of three basic components which include the provision of a safe and adequate water supply, improved sanitation and hygiene education. Waterborne diseases are diseases that are acquired by drinking contaminated water either by pathogens or toxic substances. It includes diseases like cholera, typhoid, diarrhea, dysentery, hepatitis A, polio, arsenicosis etc. [(1-4)] .

Water plays an important role in the transfer of many pathogenic microorganisms so, the clean water is a pre-requisite for reducing the spread of water-borne diseases. It is well recognized that the prevalence of water-borne diseases can be greatly reduced by the provision of clean drinking water and safe disposal of feces. The availability of improved and quality water supply and sanitation infrastructures are widely recognized as an essential component of human rights, social and economic development [5, 6].

WHO, 2010 reported that over 2.6 billion people had a lack of access to clean water, which is responsible for about 2.2 million deaths annually, of which 1.4 million are in children. Therefore improving water quality can reduce the global disease burden by approximately 4%. In addition to in 2012, it was estimated that diarrheal disease alone amounts to 3.6 % of the total disability-adjusted life year (DALY) global burden of disease and it is responsible for the deaths of 1.5 million people every year. Also, in 2014, every year more than 3.4 million people die as a result of water-related diseases, which make it the leading cause of morbidity and mortality around the world. Most of the victims are young children and the majority of whom dying from those illnesses caused by organisms that thrive in water sources contaminated by raw sewage. According to UNICEF assessment, it was found that 4000 children die each day as a result of contaminated water[7, 8].

Worldwide statistical in 2015 reported that diarrhea is a leading killer of children, which is accounting for 9 % of all deaths among children under age five. While WHO 2017 reported that, out of 6,939 the number of deaths represented about 7% was associated with seven water-borne pathogens which include Giardia, Campylobacter, Cryptosporidium, E.coli, Hepatitis A, Salmonella and Shigella [9,10].

In Egypt, water-borne diseases represent a public health problem as the majority of the rural population obtains their water supply from unprotected streams and groundwater. In Egypt, according to WHO, 2008 the total burden of the diseases that can be alleviated by improving drinking water, sanitation, and hygiene is 25.1 %. A report in Al-Ahram Weekly newspaper in 2009, mentioned that hundreds of people have infected by typhoid and these infections have been blamed on sewage contaminating water supplies. The Ministry of Health reported that the cause of the spread of the disease is drinking water contaminated with sewage. According to Egyptian Ministry of Health and Population (EMHP), 2009, it was estimated that around 9.1% of the mortality of children less than five years old is due to acute diarrheal disease [11, 12].

Self-learning modules refer to self-instructional, self-explanatory, self-contained, self-directed, self-motivating and self-evaluating material to assess the achievement of the learner. Water-borne disease module is a module for health center team comprised of health officers, community health nurses, medical laboratory technicians, and environmental health technicians to correctly identify cases of water-borne disease and manage them effectively as team members [13, 14] .

Knowledge and the practices of health workers regarding the water-related diseases play a vital role in providing people with related information about the prevention and controls, then they will be developed and formulate an appropriate recommendation to policy and decision makers on how best the water supply can be improved. Self- learning gives health worker foundation for knowledge in the area of infectious diseases and epidemiological perspective into their practice, which acts to prevent or intervene [15, 16].

All health team members play an important role in the prevention and treatment of waterborne disease. They detect, assess of cases, supervision of their treatment. They diagnose and investigate the health problems and health hazards related to water pollution and inform, educate, empower people about this health issues and mobilize community partnerships to identify and solve health problems related to water. They develop policies and plans that support the individual and community health efforts and enforce laws and regulations that protect the health and ensure water safety. They link people to needed personal health services and assure the provision of health care when otherwise unavailable [15].

Community health nurse plays a critical role in protecting the public's health through the recognition, management, and prevention of water-related disease. She promotes the health-related to safe, secure water, creates community awareness of their water supply and sanitation services. She observes the early warning signs and accurately diagnosing waterborne disease [17]. She helps in protecting water quality and security, ultimately the public's health and takes action on environmental issues including water. She enables people to increase control over, and to improve their health, she builds healthy public policy and creates supportive environments for health [18].

Justification of the study: Water-borne diseases are among one of the major public health problems in developing countries. They are the leading causes of morbidity and mortality in all age groups particularly in children under five years

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

of age. Therefore an integrated prevention and curative approach with community participation are required in order to tackle this prevalent public health problem [19].

The aim of the study

The aim of this study was to:

Evaluate effect of the self-learning module on knowledge and practice of health team regarding the water borne diseases.

Research Hypothesis: The level of knowledge and practice of health team regarding the water borne diseases expected to be improved after implementing the self-learning module.

II. SUBJECTS AND METHOD

Study design:

Quasi-experimental research design was used in this study.

Setting: The study was conducted at the three Maternal and Child Health Care Center (MCH) Affiliated to Ministry of Health at Tanta city (EL Embaby, Sigar, and Potros) and one Rural Health Unit which located in Cebrbai, AlGharbiya Governorate, Egypt, and the study subject selected from the previous setting because all health team categories were found there.

Subjects: a convenient sample was utilized to select sample. Study subject involved: community health nurses, health officers (physician), environmental health technicians (sanitarians) and medical laboratory technicians. The total study sample was 180 health team workers.

The tools of data collection: - In order to collect the necessary data, interview questionnaire were used which consist of three tools. These tools adapted according to module regarding water-borne diseases for the Ethiopian Health Center Team [14].

The tool I: Socio-demographic Characteristic of the Health Team Workers:-

This tool included the socio-demographic characteristic of health team workers which included data such as age, gender, marital status, residence, occupation, level of education and years of experience.

The tool II: Knowledge regarding the Water-Borne Diseases [4]:-

This tool included two subparts:

Part (1): Knowledge regarding the water-borne diseases for all categories of health team which included the definition, types, causes, clinical features and burden of the water-borne diseases.

Part (2): Knowledge for all specific categories of health team regarding water-borne diseases which included:-

a) Health Officers (physician):- Assess knowledge about the type of water-borne diseases, the risk of diseases, preventive measurement, vaccination, the most common types that lead to death, the commonest cause of diarrhea in children under five year.

b) Community Health Nurses:- Assess knowledge about water-borne diseases, the risks, epidemic form, prevention and control, treatment, signs of dehydration.

c) Environmental Health Technicians:- Assess knowledge about scale used for water treatment, prevention of water-borne diseases, disinfectant of water treatment, prevention and control, the right time to undertake a sanitary survey, methods of water treatment at a household level, causes that contaminate water.

d) Medical Laboratory Technicians: - Assess knowledge about how to the diagnosis of each type of water-borne diseases, type of specimens needed for each disease.

The scoring system for knowledge was as follow:

The total score of the studied health team knowledge was calculated according to health team answer as follow; each item of knowledge questionnaire was taken a score of (2) for a correct and complete answer, (1) for a correct and incomplete answer, and (0) for an incorrect answer and don't know. knowledge score had been classified into three categories as follows:

- A scoring of <60% of the total score indicated poor knowledge.
- A scoring of 60% -80% of the total score indicated fair knowledge.
- While a score of <80% of the total score indicated good knowledge.

The tool III: Practices of Health Team regarding Water-Borne Diseases [4]:-

The reported practice of health team was assessed through using a module for all specific categories of the health team which included: take appropriate history, perform a physical examination, carry out appropriate management, conduct appropriate prevention and control measures, provide supportive care and carryout specific laboratory diagnostic procedure.

The scoring system for practices was as follow:

The total score of studied health team practice was calculated according to the health team answer as follow; a response was measured by 2 point scale (0-1), where done = 1, not done = 0. Practice score had been classified into three categories as follows:

- A scoring of <60% of the total score indicated poor practices.
- A scoring of 60%-80% of the total score indicated fair practices.
- While a score of <80% of the total score indicated good practices.

Method

The operation of the study was carried out as follows:

(1)- Administrative approval.

An official permission to conduct the study was obtained from the Dean of Faculty of Nursing, in Tanta University.

(2)- Developing the tools:

Study tools were developed by the researcher based on a module developed by Ethiopian Health Center [13]. The study tools were tested for its content validity by a jury of three professors in Public Health in the Faculty of Medicine and two professors of the Community Nursing at the Faculty of Nursing in Tanta University. A scale ranging from very relevant (4) to not relevant (1) content validity index of questionnaire based on expert opinion was calculated and found to be = (96.4%).

The pilot study:

A pilot study was carried out by the researcher on 10 persons from maternal and child health care center team for testing the tools for its clarity, applicability and identify obstacles that may be encountered during data collection. Accordingly, the necessary modification was done. They included one health officer, six from community nurse and two from environmental health technician. That health team was excluded from the study sample. To assess the reliability, the study tool was given to ten health team workers (pilot study), two weeks later and retested using Cronbach's was computed and it was found to be = (0.987).

(4)- Ethical and legal considerations:-

- Every health team was informed about the purpose and the benefits of the study at the beginning of an interview.
- An informed consent was obtained from all study subjects after providing an appropriate explanation about the purpose of the study.
- The right to abstain or terminate participation at any time was respected.
- Nature of the study was not cause any harm or pain for the entire sample.
- Privacy and confidentiality were put into consideration regarding the data collected.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

Actual study:

Collection of data was continued during a period about one month starting at May 2016 and ending in June 2016. The research study was done through the following phases:-

(5)- Developing the self-learning module. The following steps were followed to develop the self-learning module:-

A) Assessment phases:

- Participants of the study were interviewed at the beginning of the study to gather basic data about knowledge and practices about water-borne diseases as pre-test by using previously mentioned tools (I, II and III).
- An interviewing sheet was introduced to study participants at the beginning of the study in order to assess their knowledge and practices regarding water-borne diseases.
- The self-reported practice was used by the researcher to assess the health worker practices related to water-borne diseases.

B) Planning phases:

- Preparing booklet content according to needs and based on Ethiopian Health Center Team Module [14].
- The general goal of a self-learning module (booklet) was to increase the knowledge and practice of health workers about water-borne diseases. This self-learning module was 22 pages printed material with some colorful pictorial illustrations which consisted of information on water-borne diseases.

C) Implementation phases:

- After pretest, each study subject was provided with a copy of SLM (booklet) they were instructed to read the self-instructional module carefully at their convenience.
- The meeting with studied nurses was organized in order to avoid the peak of work. A schedule was done by the researcher based on the working days of each center.
- The studied health team was classified into eight groups; two group from each center (a group of health officer and laboratory technicians & group of nurses and environmental health technicians).
- The questionnaire sheet was distributed individually to each group of the health team on a day before conducting the SLM to fill it at their morning shift after explaining the purpose of the study to assess their knowledge regarding water-borne disease.
- Each group of health team was given one session to asking about the content of the module for any clarification or misunderstanding.
- The session covers all items related to water borne diseases: meaning, causes, transmission methods, vulnerable groups, signs, and symptoms of diseases, methods of treatment, preventive measures for waterborne diseases….etc.; The duration of the session was one and half hour.
- Pre-assessment and post-assessment were done in separate days rather than the sessions' days and so each center was contacted by the researcher four times, 2 for assessment and 2 for giving self-learning module.

d) Evaluation phases:

The aim of these phases is to evaluate the effectiveness of the self-learning module on knowledge and practices of health team workers.

An evaluation was being through two times:-

1) First time (pre-test): Before implementation of the module plan using tool (I, II and III).
2) The second time (post-test): One month after introduce the self-learning module using the tool (II and III).

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

(6)- Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, the comparison between two groups and more was done using Chi-square test ($\chi 2$). For comparison between means of two groups of parametric data of independent samples, student t-test was used. For a comparison between means of two related groups (pre and post implementation of self-learning module) of parametric data, paired t-test was used. For comparison between more than two means of parametric data, F value of ANOVA test was calculated. For comparison between more than two means of non-parametric data, Kruskal-Wallis ($\chi 2$ value) was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p<0.05$ for interpretation of results of tests of significance [20] .

III. RESULTS

Table (I): Distribution of the studied health team according to their socio-demographic characteristic

Socio-demographic characteristic	The studied health team (n=170)										χ^2 P
	Health officers (n=10)		Community nurses (n=127)		Environmental technician(n=18)		Medical laboratory technician(n=15)		Total (n=170)		
	n	%	N	%	n	%	n	%	N	%	
Sex:											
Male	10	100	5	3.9	18	100	7	46.7	40	23.5	245.114
Female	0	0	122	96.1	0	0	8	53.3	130	76.5	0.0001*
Age years:											
23-<30	0	0	2	1.6	4	22.2	8	53.3	14	8.2	104.79
30-<40	0	0	22	17.3	14	77.8	7	45.7	43	25.3	0.0001*
40-<50	6	60.0	65	51.2	0	0	0	0	71	41.8	
50-60	4	40.0	38	29.9	0	0	0	0	42	24.7	
Range	44-52		28-60		24-41		23-40		23-60		
Mean±SD	48.50±2.76		46.31±7.33		33.67±4.76		30.00±4.67		43.64±8.85		
F value	35.749										
P	0.0001*										
Marital status:											
Single	0	0	0	0	2	11.1	2	13.3	4	2.4	39.100
Married	9	90.0	117	92.1	16	88.9	13	86.7	155	91.2	0.0001*
Widow	1	10.0	10	7.9	0	0	0	0	11	6.5	
Residence:											
Rural	0	0	43	33.9	8	44.4	10	66.7	61	35.9	25.149
Urban	10	100	84	66.1	10	55.6	5	33.3	109	64.1	0.001*
Educational level:											
Diploma.	0	0	92	72.4	0	0	0	0	92	54.1	457.121
Technical institute	0	0	23	18.1	18	100	12	80.0	53	31.2	0.0001*
Bachelor	0	0	11	8.7	0	0	0	0	14	8.2	
Postgraduate	10	100	1	0.8	0	0	3	20.0	11	6.5	
Experience years:											
3-5	0	0	0	0	4	22.2	8	53.3	12	7.1	141.877
>5-15	0	0	7	5.5	12	66.7	7	46.7	26	15.3	0.0001*
>15-25	5	50.0	43	33.9	2	11.1	0	0	50	29.4	
>25-35	5	50.0	56	44.1	0	0	0	0	61	35.8	
>35-42	0	0	21	16.5	0	0	0	0	21	12.4	
Range	20-29		10-42		3-16		4-18		3-42		
Mean±SD	25.20±2.70		27.04±7.14		8.44±7.09		9.73±4.25		23.40±9.58		
F value	57.248										
P	0.0001*										

***Significant (P< 0.05).**

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

Table (I): Distribution of studied health team according to their socio-demographic characteristic. This table shows that about three-quarters of health workers were community nurses (74.7%), while the health officer, environmental health technicians, and the laboratory health technicians represent (5.9 %, 10.6% & 8.8% respectively). Regarding the gender, more than three-quarters of them were female (76.5%), while the male represented 23.5% with the mean ±SD age 43.64±8.85 years. In relation to the marital status and the residence, the majority of health workers (91.2% & 64.1 %) was married and lives in urban area respectively.

Regarding the level of education, this table shows that the more than half of health team workers were diploma (54.1%), while the minority of them (31.2%, 8.2 % & 6.5%) was graduated from technical institute to bachelor and post graduated. As regard to the years of experience about two thirds (65.3%) of them had work experience within (15 – 35) years and the minority (7.1%) of them had experience within (3- 5) years with the mean ±SD (23.40± 9.58) years.

Table (II): Distribution of the studied health officers regarding their knowledge about water-borne diseases pre and post implementation of the self-learning module.

Knowledge items	The studied health officers (n=10)				χ^2	P
	Pre		Post			
	n	%	n	%		
1-**A 16 year's old male, presents with acute onset of bloody, mucoid diarrhea associated with cramps abdominal pain, tenesmus, and fever. What is the most likely diagnosis? :**						
Incorrect	5	50.0	2	20.0	1.978	0.160
Correct	5	50.0	8	80.0		
2-Which of the following waterborne diseases cause severe diarrhea:						
Incorrect	1	10.0	2	20.0	0.392	0.531
Correct	9	90.0	8	80.0		
3-**The drug of choice in the treatment of amoebiasis is:**						
Incorrect	0	0	0	0	-	-
Correct	10	100	10	100		
4-**The commonest cause of diarrhea in children under five years is:**						
Incorrect	9	90.0	7	70.0	1.250	0.264
Correct	1	10.0	3	30.0		
5-**Giardiasis affects mainly children than adults:**						
Incorrect	0	0	0	0	-	-
Correct	10	100	10	100		
6-**Diarrheal diseases can cause malabsorption:**						
Incorrect	0	0	0	0	-	-
Correct	10	100	10	100		

***Significant (P< 0.05).**

Table (II): Distribution of the studied health officers regarding their knowledge about water borne diseases pre and post implementation of the self-learning module. This table reveals that the frequency and the percentage of knowledge regarding water-borne diseases pre and post self-learning module. Regarding the commonest cause of diarrhea among children under five years of age, the most (90%) of the health officers incorrectly answered on pretest compared to (70%) of them answered incorrectly in posttest, while most of them gave the correct answer about the other questions. There were no statistically significant differences between health officer knowledge pre and post SLM as p >0.05.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

Table (III): Distribution of the studied community nurses regarding their knowledge about water borne diseases pre and post implementation of the self-learning module

Knowledge items	The studied community nurses (n=127)				χ^2	P
	Pre		Post			
	n	%	n	%		
1-**The management of a child with diarrhea include**						
Incomplete	52	40.9	24	18.9	14.720	0.0001*
Complete	75	59.1	103	81.1		
2-**Signs of dehydration include:**						
Incomplete	45	35.4	34	26.8	16.981	0.0001*
Complete	29	22.8	60	47.2		
Don't know	53	41.7	33	26.0		
3-**The primary concern in the management of dehydration is**:						
Complete	41	32.3	90	70.9	37.849	0.0001*
Don't know	86	67.7	37	29.1		
4-Which of the following signs and symptoms does not indicate dehydration in a patient with diarrhea?						
Correct	23	18.1	41	32.3	6.768	0.009*
Don't know	104	81.9	86	67.7		
5-**Breast feeding should be interrupted for a child presenting with diarrhea**:						
Correct	51	40.2	80	63.0	13.257	0.0001*
Don't know	76	59.8	47	37.0		

***Significant (P<0.05)**

Table (III): Distribution of the community health nurses regarding their knowledge about water-borne diseases pre and post implementation of the self- learning module. There was a significant difference between pre and post SLM implementation as ($p < 0.05$). As regards to managing diarrhea, sign and symptom of diarrhea about (59.1% and 22.8% respectively) of CHN gave correct and complete answer in the pre-test compared to (81.1% and 47.2% respectively) in posttest. As regards to the primary concern in the management of a child with dehydration and the question related to which of the following signs and symptoms does not indicate dehydration in a patient with diarrhea and interrupted of breast feeding during diarrhea about (67.7 %, 81.9 % and 59.8% respectively) don't know in the pre-test compared to (29.1%, 67.7 % and 37.0% respectively) in the post-test.

Table (IV): Distribution of the environmental health technicians regarding their knowledge about water-borne diseases pre and post implementation of the self-learning module

Knowledge items	The studied environmental health technician (n=18)				χ^2	P
	Pre		Post			
	n	%	n	%		
1-**Which one of the following is considered as large scale water treatment? :**						
Complete	18	100	18	100	-	-
2-**Where should a latrine be located at relative to water sources?**						
Incorrect	11	61.1	8	44.4	1.003	0.317
Correct	7	38.9	10	55.6		
3-**Which one of the following is the right time to undertake a sanitary survey?**						
Incomplete	0	0	1	5.5	9.263	0.010*
Complete	4	22.2	12	66.7		
Don't know	14	77.8	5	27.8		

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

4-**Which one of the following disinfectant is most commonly used for water treatment?**						
Incomplete	18	100	14	77.8	4.500	0.034*
Complete	0	0	4	22.2		
5-**Which strategy is considered to be the best in the prevention and control of water - borne diseases?**						
Incomplete	9	50.0	8	44.4	0.111	0.738
Complete	9	50.0	10	55.6		
6-**The common methods of water treatment at household level:**						
Incomplete	5	27.8	3	16.7	0.643	0.423
Complete	13	72.2	15	83.3		

***Significant (P<0.05)**

Table (IV): Distribution of the environmental health technicians regarding their knowledge about water-borne diseases pre and post-implementation of the self-learning module. As regards to the large scale of water treatments, all of them correctly answered this item, as regard to the latrines locations, time of sanitary survey, preventive measure for water-borne diseases, and comments method of water treatment about (38.9%, 22.2%, 50 % & 72.2% respectively) correctly answered in the pre-test compared to (55.6%, 66.7%, 55.6% & 83.3% respectively) in the post-test. There were no statistically significant differences regarding all items of knowledge in pre and posttest for the environmental health technician except for disinfectant is the most commonly used for water treatment and the right time of undertaking sanitary survey as ($p \leq 0.034$ & 0.010 respectively).

Table (V): Distribution of the studied medical laboratory technician regarding their knowledge about water-borne diseases pre and post-implementation of the self-learning module

Knowledge items	Studied medical laboratory technician (n=15)				χ^2	P
	Pre		Post			
	N	%	N	%		
1-**The diagnosis of intestinal amoebiasis can be made by identifying:**						
Incorrect	1	6.7	2	13.3	0.370	0.543
Correct	14	93.3	13	86.7		
2-Which of specimens is not used for the diagnosis of Giardiasis:						
Incorrect	14	93.3	12	80.0	1.154	0.283
Correct	1	6.7	3	20.0		
3-**The 'gold standard' for the diagnosis of Giardiasis is:**						
Incomplete	3	20.0	3	20.0	0.000	1.000
Complete	12	80.0	12	80.0		
4-**In the diagnosis of intestinal amoebiasis, it is recommended to examine… before excluding the diagnosis:**						
Incorrect	5	33.3	2	13.3	1.677	0.195
Correct	10	66.7	13	86.7		
5-**Shigellae are:**						
Incomplete	15	100	2	13.3	22.941	0.0001*
Complete	0	0	13	86.7		

***Significant (P<0.05)**

Table (V): Distribution of the medical laboratory technicians regarding their knowledge about water-borne diseases pre and post-implementation of the self-learning module. As question-related to the diagnosis of giardiasis, amoebiasis, and definition of shigelloses (6.7%, 66.7% and 0% respectively) correctly answered on the pretest compared to (20%, 86.7% and 86.7% respectively) in post-test. There were no statistically significant differences regarding all items of knowledge except for diagnosis of shigelloses as (p = 0.0001).

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

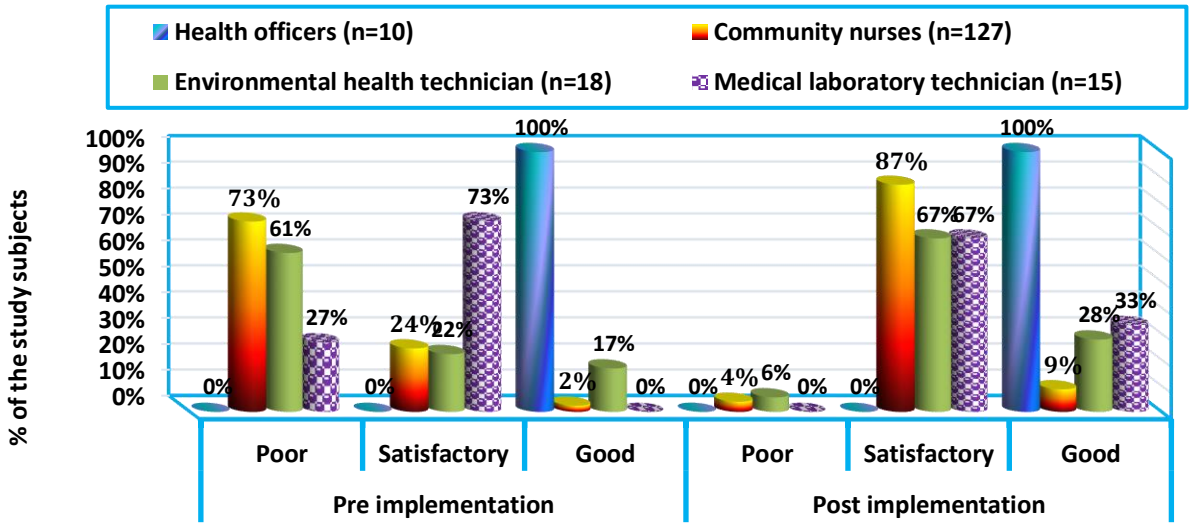

Figure (I): Levels of the total knowledge about water-borne diseases among the studied subjects pre and post-implementation of the self-learning module

Figure (I): Distribution of the studied health team according to their levels of total knowledge regarding water-borne diseases pre and post-implementation of self-learning module. The table shows that in pre and post-implementation of self-learning modules all health officers (100%) had good knowledge about the water-borne diseases. Concerning the community health nurses and environmental health technicians the table shows that in pre-implementation the majority of them (73.2 % & 61.1 % respectively) had poor knowledge about water borne diseases and the minority of them (2.4 % & 16.7 % respectively) had good knowledge while, in post-implementation the majority of them (87.4% & 66.7% respectively) became had fair knowledge about water borne diseases. As regards to the laboratory technicians in pre-implementation the majority of them (73.3%) had fair knowledge of the water-borne diseases and more than one-quarter (26.7%) of them had poor knowledge, while in post-implementation about two-thirds of them (66.7%) had fair knowledge and around one third (33.3%) had good knowledge about the water-borne diseases. There were statistically significant differences regarding the total knowledge of the studied health workers in pre and posttest as ($p< 0.05$).

Table (VI): Distribution of the health officer according to their Practices regarding the water-borne diseases pre and post-implementation of the self-learning module

Practice items	The studied health officers (n=10)				χ^2	P
	Pre		Post			
	N	%	N	%		
A-Diagnosis of water borne diseases:						
-Taking medical history:						
Not done	0	0	0	0	-	-
Done	10	100	10	100		
-Treatment of water borne diseases:						
Not done	0	0	0	0	-	-
Done	10	100	10	100		
-Perform required laboratory investigations:						
Not done	0	0	0	0	-	-
Done	10	100	10	100		
B-Treatment of water borne diseases:						
-Prescribe appropriate treatment for each case:						
Not done	0	0	0	0	-	-
Done	10	100	10	100		

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

-Give instructions to mothers about commitment with drug doses:						
Not done	8	80	4	40	3.333	0.068
Done	2	20	6	60		
- Give instructions to patients about importance of early diagnosis and treatment:						
Not done	10	100	9	90	1.053	0.305
Done	0	0	1	10		
C-Prevention and control of water borne diseases:						
-Continuous health education:						
Not done	9	90	9	90	0	1
Done	1	10	1	10		
-Coordinate for conducting campaigns for prevention and treatment:						
Not done	2	20	2	20	0	1
Done	8	80	8	80		
-Encourage the community to share in prevention through protection of water sources from pollution:						
Not done	9	90	9	90	0	1
Done	1	10	1	10		

***Significant (P<0.05).**

Table (VI): Distribution of the health officer according to their practices regarding the water-borne diseases pre and post-implementation of self-learning module. This table shows that there were no statistically significant differences of the practices of the health officers as regards to the diagnosis, treatment, prevention and control of water-borne diseases in pre and post-implementation of the self-learning module as ($p > 0.05$). All (100%) of the health officer diagnosed and treat the water-borne diseases in pre and post-implementation, while about 90% of them not participate in prevention and the control of water borne diseases.

(VII): Distribution of the community nurses according to their practice regarding the water-borne diseases pre and post-implementation of self-learning module.

Practice items	The studied community nurses (n=127)				χ^2	P
	Pre		Post			
	N	%	N	%		
A-Determining water borne diseases:						
-Taking medical history:						
Not done	127	100	127	100	-	-
Done	0	0	0	0		
-Take vital signs from patients:						
Not done	4	3.1	0	0	4.064	0.044*
Done	123	96.9	127	100		
-Evaluate signs of dehydration						
Not done	17	13.4	2	1.6	12.800	0.0001*
Done	110	86.6	125	98.4		
-Evaluate signs of malnutrition:						
Not done	114	89.8	88	69.3	16.347	0.0001*
Done	13	10.2	39	30.7		
B-Treatment of water borne diseases:						
-Give treatment to patients as prescribed by physician:						
Not done	0	0	0	0	-	-
Done	127	100	127	100		
-Instruct patients about importance of commitment with drug doses:						
Not done	17	13.4	4	3.1	8.773	0.003*
Done	110	86.6	123	96.9		
-Giving fluids and minerals in cases of dehydration:						
Not done	2	1.6	0	0	2.016	0.156
Done	125	98.4	127	100		

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

-Evaluate patient condition after treatment:	111	87.4	35	27.6	93.043	0.0001*
Not done						
Done	16	12.6	92	72.4		
-Instruct patients about importance of early diagnosis and treatment:						
Not done	96	75.6	116	91.3	11.411	0.001*
Done	31	12.4	11	8.7		
-Instruct patients about importance of follow up and visit health service outlet immediately when problem occur:						
Not done	114	89.8	113	89.0	0.041	0.839
Done	13	10.2	14	11.0		
C-Prevention and control of water borne diseases:						
-Continuous health education:						
Not done	78	61.4	51	40.2	11.483	0.001*
Done	49	38.6	76	59.8		
- Conducting campaigns for prevention and mass treatment:						
Not done	37	29.1	27	21.3	2.089	0.148
Done	90	70.9	100	78.7		
-Encourage the community to share in prevention through protection of water sources from pollution:						
Not done	120	94.5	105	82.7	8.759	0.003*
Done	7	5.5	22	17.3		

*Significant (P<0.05)

Table (VII): Distribution of the community health nurses according to their practices regarding the water-borne diseases pre and post-implementation of the self-learning module. This table report that there was statistically significant improvement of all items regarding the practices of community health nurses about water-borne diseases in post-implementation than pre-implementation of SLM as (p< 0.05) except the items related to giving fluids and minerals in cases of dehydration, instruct patients about importance of follow up and visit health service outlet immediately when problem occur and coordinate for conducting campaigns for prevention and mass treatment as p = (0.156, 0.839 and 0.148 respectively). Concerning the practices related to treatment and diagnosis of water-borne diseases about 89.8% of them not evaluate sign of malnutrition in pre implementation compare to 69.3% in post-implementation and all of them gave medication and fluids as doctor order, while about 87.4 % of them not evaluate the patient's condition after treatment in pre-implementation compare to 27.6% in post-implementation. Regarding the practices related to the prevention and the control about 61.4 % and 94.5% % respectively did not gave health education and did not encourage the community to participate in prevention of water diseases in pre-implementation compare to 40.2% and 82.7 % post-implementation of SLM respectively.

Table (VIII): Distribution of the environmental health technicians according to their practices regarding the water-borne diseases pre and post-implementation of self-learning module

Practice items	The studied environmental health technician (n=18)				χ^2	P
	Pre		Post			
	N	%	N	%		
A-Determining water borne diseases:						
-Asking about signs and symptoms of the diseases:						
Not done	11	61.1	10	55.6	0.114	0.735
Done	7	38.9	8	44.4		
-Evaluate environmental factors causing the diseases:						
Not done	1	5.6	1	5.6	0.000	1.000
Done	17	94.4	17	94.4		
B-Treatment of water borne diseases:						
-Give advice for early detection of diseases and taking suitable treatment:						
Not done	12	66.7	12	66.7	0.000	1.000
Done	6	33.3	6	33.3		

-Give advice about importance of fluids intake in cases of dehydration:						
Not done	11	61.1	9	50.0	0.450	0.502
Done	7	38.9	9	50.0		
- Give advice about early seeking medical care and attending immediately to health service outlet if there is health problem:						
Not done	4	22.2	2	11.1	0.800	0.371
Done	14	77.8	16	88.9		
C-Prevention and control of water-borne diseases: **-Investigation of different possible water supplies in the community:**						
Not done	2	11.1	1	5.6	0.364	0.546
Done	16	88.9	17	94.4		
-Continuous health education activities						
Not done	14	77.8	16	88.9	0.800	0.371
Done	4	22.2	2	11.1		
-Coordinate for conducting campaigns for prevention and mass treatment:						
Not done	3	16.7	1	5.6	1.125	0.289
Done	15	83.3	17	94.4		
4-Encourage community participation in prevention and control of the diseases through protection of water sources from pollution:						
Not done	13	72.2	10	55.6	1.084	0.298
Done	5	27.8	8	44.4		
5-Evalute possible sources of water pollution and its control:						
Not done	5	27.8	1	5.6	3.200	0.074
Done	13	72.2	17	94.4		
6-Periodic investigation of water samples and making protective measures:						
Not done	0	0	0	0	-	-
Done	18	100	18	100		

*Significant (P<0.05)

Table (VIII): Distribution of the environmental health technicians according to their practices regarding the water-borne diseases pre and post-implementation of the self-learning module. This table states that there were no statistically significant differences of all items regarding the practices of environmental health technicians about determining, treatment, prevention and control of water-borne diseases in pre and post-implementation of the self-learning module as (p = >0.05). As regards to the practice related to determining of water-borne disease, about 94.4% of them evaluated the environmental factor that causing disease while, more than half of them in pre and post-intervention (61.1% &55.6% respectively) was not asking about signs and symptoms of the diseases. Regarding the practices related to treatment of water-borne diseases about two-thirds (66.7 %) of them did not participate in treatment of water-borne diseases, while more than half (66.71 & 61.1% respectively) of them not give advice for early detection of diseases and taking suitable treatment or to importance of fluids intake in case of dehydrations compare to 66.71 & 50.0 % respectively in post-interventions but more than two-thirds of them (77.8 & 88.91% respectively) gave advice about early seeking the medical case if there is a health problem in pre and post-intervention. Concerning the practice related to the prevention and control of water borne disease, the majority (88.9% & 72.2% respectively) of them investigated different possible source of water and evaluated the possible source of water pollution and its control, while almost (100%) of them investigated water sample periodically.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

Table (IX): Distribution of the laboratory health technicians according to their practices regarding the water-borne diseases pre and post-implementation of the self-learning module

Practice items	The studied laboratory health technicians (n=15)				χ^2	P
	Pre		Post			
	N	%	N	%		
A-Determining water borne diseases:						
-Making laboratory investigations for diagnosis of causative organism:						
Not done	0	0	0	0	-	-
Done	15	100	15	100		
C-Prevention and control of water borne diseases:						
-Continuous participation in health education activities						
Not done	11	73.3	7	46.7	2.222	0.136
Done	4	26.7	8	53.3		
-Participation in conducting campaigns for early detection, prevention and treatment of the diseases:						
Not done	3	20.0	0	0	3.333	0.068
Done	12	80.0	15	100		

*Significant (P<0.05)

Table (IX): Distribution of the laboratory health technicians according to their practices regarding the water-borne diseases pre and post-implementation of the self-learning module. This table presents that there was no a statistically significant improvement of items related to determining, treatment, prevention and control of water-borne diseases among laboratory technicians in post-implementation. Concerning the response to the practical question about 100% of them made investigation to diagnosis the diseases, while more than one-quarter of them (26.7%) did not participate in the health education activity on pre-implementation compared to more than half (53.3%) in post-implementation. The majority (80%) of them participated in conducting campaigns pre-implementation and all of them (100%) participated in post implementation.

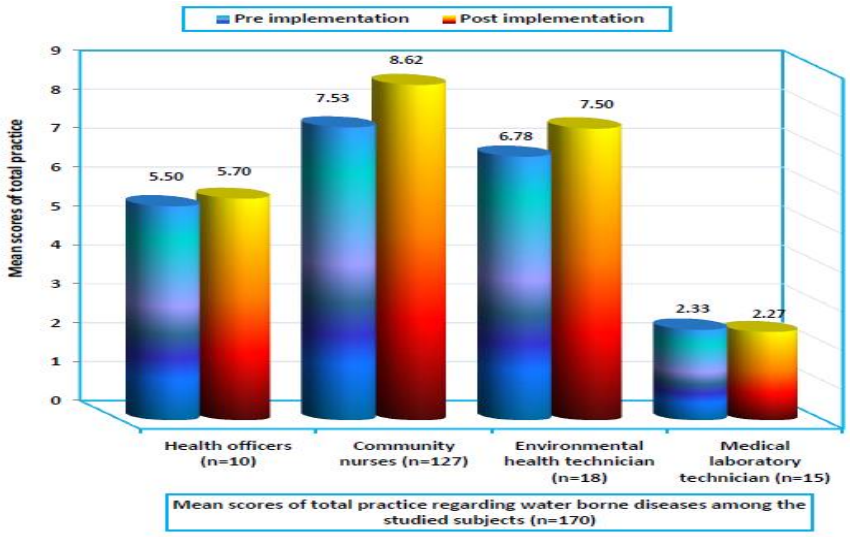

Figure (II): Levels of the total practices among the studied health team regarding the water-borne diseases pre and post-implementation of the self-learning module.

Figure (II): Distribution of the health team workers according to their level of total practices toward the water-borne diseases pre and post implementation of self-learning educational module. This table shows that in pre-implementation less than two-thirds (60%) of health officers had poor practices and less than one-third of them (30.0%) had fair practices regarding the water-borne diseases but in post-implementation about 70% had fair practices and less than one-thirds of them

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 5, Issue 3, pp: (607-627), Month: September - December 2018, Available at: www.noveltyjournals.com

(30.0%) had poor practices regarding the water-borne diseases. Concerning the community health nurses about half (48.8% &-49.6% respectively) of them had poor and fair practices in pre-implementation regarding the water borne diseases, while the minority of them (1.6%) had good practices, but in post- implementation the majority of them (82.7%) had fair practices about the water-borne diseases. As regard to the environmental health technicians in pre-implementation more than half of them (55.6%) had poor practices of the water-borne diseases compare to 16.7% in post-implementation, while in post-implementation the majority (83.3 %) of them had a fair practices regarding the water-borne diseases. As regard to the medical laboratory technicians in pre implementation about two-thirds (66.7%) of them had fair practices scores of the water-borne diseases compared to 73.3% in post-implementation. There were statistically significant differences of total practices regarding the water-borne diseases pre and post-implementation of the self-learning module for the community health nurses, environmental health technicians as p ($P < 0.05$), while there were no significant differences for health officers and laboratory technicians as p = (0.156 & 0.690 respectively).

Table (X): Correlation between the total knowledge and the practices post-implementation of the self-learning module.

	Total knowledge scores among the studied health team post implementation (n=170)			
	Health officers (n=10)	**Community nurses(n=127)**	**Environmental health technician(n=18)**	**Medical laboratory technicians (n=15)**
Total practices scores post implementation	**r P**	**r P**	**r P**	**r P**
Health officers	0.181 0.616			
Community nurses		0.214 0.015*		
Environmental health technician			0.020 0.937	
Medical laboratory technicians				0.047 0.869

***Significant (P<0.05)** **r=Coefficient**

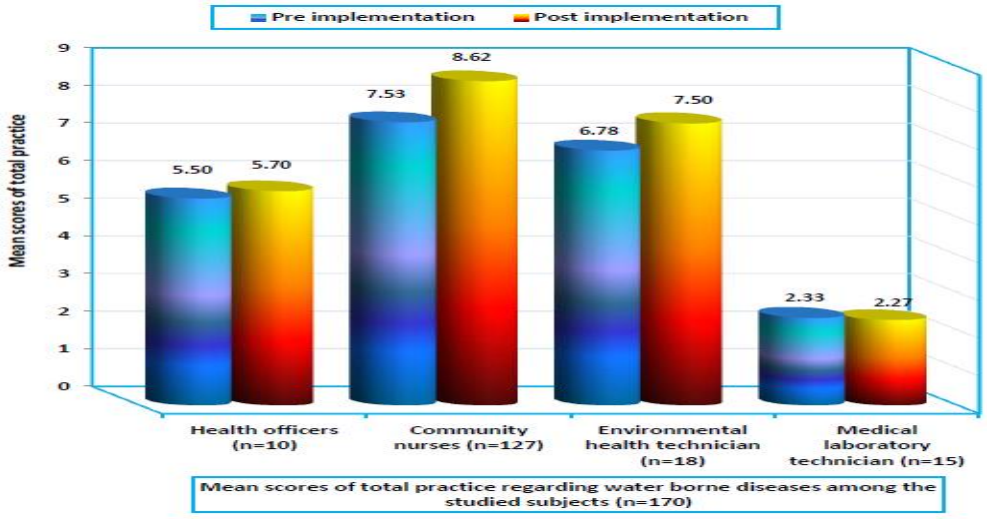

Table (X): Correlation between the total knowledge score and the total practices score pre and post-implementation of the self-learning module. This table shows that there was a significant positive correlation between the total knowledge score and the total score of practices in post-implementation for the community nurse as (p= 0.015) and (r =0.214), while there was no a significant correlation between the total knowledge score and the total practice score in post-implementation among the health officers, the environmental health technicians and the medical laboratory technicians as (p = 0.616, 0.937 and 0.869 respectively) and (r =0.181, 0.020 and 0.047 respectively).

IV. DISCUTION

Access to the safe and the clean water is an important component to the public health. Water represents an important route of transmission for human infections in both developed and developing countries as drinking water may not provide the

ideal microbiological quality that allows the presence of many pathogens [21]. Water-borne pathogens and related-diseases are a major public health concern worldwide, not only by the morbidity and mortality that they cause but by the high cost that represents their prevention and treatment. Water-borne disease is transmitted or spread through contaminated water with pathogenic microbes and some parasitic organisms that are responsible for various diseases [22].

The present study aimed to assess the effect of self-learning module on knowledge and practice of health team regarding the water borne diseases. Knowledge and practice surveys have been widely used in health and social science research over the past few decades. Some reasons for its popularity as a research methodology are that it provides a relatively low-cost mechanism to gather information on a fairly large target population in a relatively short time. Knowledge and practices surveys can be particularly useful as a tool for problem identification and implementation of the planning. Furthermore, when conducted prior to and then repeated after an implementation, it also helps establish a baseline for comparison with subsequent, post-implementation knowledge, attitude and practice surveys and serves as a useful tool for evaluation [23].

Self-learning educational module can be viewed as a key strategy in promotion of health care. Regarding the impact of the educational implementation, the present study revealed that there was a statistically significant positive improvement of the total knowledge and practices of the health workers related to water-borne diseases in post-implementation than pre-implementation. This fact was pointed out in other researches that studying the health workers knowledge and practice about a certain aspect of family health. Also, this positive impact of the health educational implementation was previously demonstrated by studied elsewhere [24, 25].

Regarding the socio-demographic characteristic, **(Table I),** the present study showed that about three-quarters of health workers were females, while males represented about one-quarter of the total samples. The higher percentage of females might be due to that most of the workers of the study sample were nurses which represent more than two-thirds of all study health team and in Egypt the differential role of gender in the health profession, where females are more likely to be nurses than male. This finding is in line with the study performed by **Abu Salam et. al**, **(2014)** [26], who mentioned that about three-quarters of health workers were female. Also this finding in agreement with a study done by **Nour-elden et.al, (2016)** [27], who revealed that about 82.9% of health workers were female.

The present study showed that the majority of the health workers were married and live in the rural area. This finding is similar to a study performed by **Alwutaib et.al., (2011)** [28], who mentioned that the majority of the health workers were married. Regarding the age, it is an important demographic element and it directly or indirectly influences human behavior. The present study showed that the age of health workers ranged from (23-60 years old) with Mean±SD (43.64±8.85 years). This finding is agreement with a study performed by **Mohanan et. Al., (2012)** [29],who mentioned that the Mean SD age of health workers was 45.5±10.7 years.

Education is a basic human right and very necessary for the social economic development of any nation. The educations help the workers to recognize its social, medical right and a good understanding of any subject. Concerning the level of the education, the present study revealed that more than half, less than one-third of health workers had a diploma and technical institute respectively. This result in accordance with a study performed by **Taylor et.al., (2008)** [30], who mentioned that the majority of the health workers had a diploma education.

Regarding the years of experience, the present study showed that the years of experience of health team were ranged from 3-42 years **(Table I)**. This might be due to that most the health workers working in MCH center and rural health unit having age more than fifty years old. This result in consistent with a study performed **by Chipwaza et.al., (2014)** [31], who mentioned that the experience years of the health workers ranged from 1-40 years.

As regards to the knowledge specified to health officers **(Table II)**, regarding the commonest cause of diarrhea among children under five years of age, the majority of the health officer was answered incorrectly in pre-test compared to more than two-thirds of them correctly answered in post-test. This not due to lake of knowledge but this was related to differences between their knowledge as some of them considered that the Rotaviruses are main cause of diarrhea, while others were considered that the main cause was giardiasis. This finding is in the line with a study done by **Tagbo et. al., (2013)** [32], who reported that most of the physicians were not aware of specific Rotavirus gastrointestinal diseases.

Concerning the response to the questions related to the diarrheal disease can cause malabsorption, treatment of amoebiasis and the giardiasis affect mainly children than adults, and all of the physicians were answered correctly. This result is in

contrast to the study done **by Iglesias et.al., (2010)** [33], who reported that the physicians were had a poor knowledge about giardiasis. Also this study is in contrast to another study done by **Galindo et. al., (2008)** [34], who stated that there was an inadequate perception of the physician about amoebiasis. The contrast between the present study and their study may be due to that in their study, the questions include more details about amebiasis and giardiasis.

With regard to the nurses' knowledge before the implementation of SLM **(Table III)**, the majority of them gave an incorrect and an incomplete answer to the questions about the signs and management of the dehydration, breast feeding should be interrupted for a child presenting with diarrhea or not. This finding is in the line with a study done by **Stephen, (2015)** [35], who found that there was an inadequate knowledge and practices among the health workers in the assessment of dehydration as a major manifestation of water borne diseases.

Regarding the specified part of knowledge for the environmental health technicians about water-borne diseases pre and post-test **(table IV)**, as regards to the latrines locations, time of the sanitary survey, about one-third of them correctly answered in pre-test compared to more than fifty percentages in post-test. About the preventive measures for the water diseases and the common methods of the water treatment about two-thirds of them correctly answered this question in pretest compare to more than three-quarters of them in post-test. This is in the line with a study performed by **Robles et. al., (2011)** [36], who reported that the minority of the participants recognized the need for the basic hygienic measures such as ensuring sufficient distance between latrine and the source of drinking water.

Concerning the specified part of knowledge for the medical laboratory technicians about water-borne diseases in pre and post-test **(Table V)**, Regarding the question about the specimen not used in the diagnosis of giardiasis, the minority of them correctly answered. As well the definition of shigelloses, all of the laboratory technicians did not answer it correctly in pre-test, while about more than three-quarters of them correctly answered in post-test. This finding goes in the line with a study done by **Hindi, (2014)** [37], who found that there was low awareness among both the physicians and medical laboratory technicians regarding the diagnostic techniques which were used in the examination of intestinal parasites.

After implementation of SLM, the present study revealed that there was a significant improvement of knowledge of the health team workers regarding the water-borne diseases **(Figure I)**. This in agreement with a study done by **Brown et. al., (2017)** [38], who reported that knowledge of the health workers improved after educational implementation.

In accordance with the self-reported practices of the health workers toward the water borne diseases, the present study revealed that, the level of practices of the health workers were varied but the lab technician was better in their performance than other health workers followed by the community health nurses, the environmental health technicians and the physician. It was surprising that the highest level of knowledge for the physician doesn't mean that they had good practices and this might be due to that the physicians gave more attention to curative aspect than preventive. This in contrast with a study done by **Leweis, (2004)** [39], who found that, good practices was a result of theoretical understanding that help the health care profession to acquires new skill as well as their improved practices.

Practice for all health care workers **(Tables V1-1X)** as lab technicians, physicians, nurses and the environmental health technicians had some strength point for example, in treating and diagnosis of water-borne diseases, as the majority of them take medical history, take vital sign, evaluate sign of dehydration, give treatment and perform require laboratory investigation. This finding is in the line with a study done by **Stephen, (2015)** [35], who assess the health workers' practice in the management of acute diarrhea among children aged 6-59 months admitted to Juba teaching hospital, and found that there were an inadequate practices among the health workers in assessment and documentation of the signs and symptoms of the dehydration in the children admitted with acute watery diarrhea.

All health team had poor practices in an area related to prevention and control of water-borne diseases in pre-implementation as the majority of health care workers were not give health education. This may be due to the health teams are occupying with complete patient related files and papers and the majority of the health nurses were older and the ability to give health education activity decrease. This result goes in the line with a study done by **Robles et. al., (2011)** [36], who found that the citizen reported that they never received any information from the health workers about water quality and water disease. On the other hand this result in contrast with the study done by **Choden, (2014)** [40], on communication and innovation studies (COM nurse-led health education on diarrheal prevention among the high-risk under-five children in Thimphu and

reported that the quality to health education which was given by the nurses varied between satisfactory and good. This difference could be related to different sample size.

Health education activity encourages behavior change and it was an important particularly in the control the infectious diseases. Therefore, the health care workers should collaborate in designing and implementing effective communication campaigns in an attempt to overcome water-borne disease and they should provide information on a full range of personal and households about the prevention strategies of water-borne disease. This supported by a study done by **Khan, (2009)**[41], who mentioned that the health campaigns and the awareness programmers are important means of communicating health information, reminding, reinforcing existing knowledge and encourage good behavior.

As regards to the level of the total practices of the health team workers toward the water-borne diseases in pre and post-implementation of the self-learning educational module **(Figure II)**. About two-thirds of the health officers had poor practices regarding the water-borne diseases in pre implementation. Concerning the community health nurses, about half of them had a poor and another half had satisfactory practices in pre-implementation. This finding goes in the line with the study done by **Babeker, (2013)** [42], who assess the nursing management of diarrhea and dehydration for children under five years at Wad Medani Pediatric Teaching Hospital and reported that the nurses were had poor practice regarding the child with diarrhea and dehydration.

The present study after educational implementation of SLM reveals that there was a significant improvement of practices of the health team workers regarding the water-borne diseases **(Figure I, II)**. This is in the line with a study done by **Alfaro, (2008)** [43], who assess the training program for Barangay health workers of the diagnosis and management of diarrheal diseases in children, and showed an improvement in the knowledge and self-reported practices of the health care workers regarding diagnosis and management of diarrheal diseases among children.

Knowledge and practices cannot be separated, as both are very critical to any professions. Another positive approach was also mentioned by **Ajani, (2011)** [44], who stated that, the theory and practice gap can never be sealed entirely, they always go by nature in dynamic tension which was essential for any change that occurs in clinical practice. This tension seen from a positive point can motivate health professionals to work on the issue and also provides room for avoiding stagnancy in the profession.

An individual requires a certain degree of knowledge to practice competently as health workers. This also assumes that this level of knowledge is directly related to the ability to provide safe and effective practice. The present study reveals that, among the health care workers, there was a significant correlation between the total knowledge score and the total score of practices in post-implementation for the community nurses **(table X)**. While, there was no significant correlation between the total knowledge score and the total score of practices in post-implementation among the health officers, the environmental health technicians, and the medical laboratory technicians. This finding goes in the line with a study done by **Zatton, (2003)** [45], who mentioned that there was a positive correlation between the nurses' knowledge and the performance. Also, this finding is in line with a study done by **Ogoinq, (2012)** [46], who reported that there was no a correlation between knowledge and the practices of the physicians and the lab technicians. The gap in knowledge and lack of practice regarding the water-borne diseases and its preventive measures is unacceptable for the health team workers and both items should be bridged as a matter of urgency.

VI. CONCLUSION

Based on the findings of the present study, it can be concluded that the self-learning module has a positive effect on improving knowledge and the practice level of health team workers regarding the water-borne diseases. The current study revealed that there was a positive correlation between the total knowledge score and the total practice score for community health nurses regarding water-borne diseases, while there was no significant correlation between knowledge and practice for health officers, environmental health technicians and laboratory technicians.

V. RECOMMENDATIONS

Based on the results of the presents study, the following recommendations are suggested:

1- More emphasis should be placed on the curriculum to provide adequate preparation for health care professions to engage in a broader level of health promotion as a whole, as well specific to the environmental issues such as water.

2- Pre in-services training and periodic refreshment in-service education and training through seminars & workshops should be regularly organized by MCH centers in collaboration with health administrators for health team workers in order to equip them with adequate knowledge and performance on early detection and prevention of water-borne diseases, also designed log book must be available in the unit.

3- Providing scientific booklet, publication, and journal about water-borne diseases, is highly recommended for health care professions.

4- Mass media programs are needed to help to disseminate information about water borne disease to a large sector of the community.

5- Public health researchers should market a continuing medical education module currently in development regarding the water borne diseases to medical providers.

6- Further researches are needed to investigate and prevent the prevalence of water borne diseases in Egypt.

VII. REFERENCES

[1] Addisie M. Assessment of drink water quality and determents of household potable water consumption in Simada district, Ethiopia. A Project Paper. Professional Studies. Cornell University.2012; 1-12.

[2] Kuberan A, Singh A. Water and sanitation hygiene knowledge, attitude, and practices among household members living in rural setting of India. Journal of natural science, biology and medicine.2015;6 (1):69 -74.

[3] Akoijam B. Knowledge of personal hygiene and waterborne diseases and practice of personal hygiene among students of Central Agricultural University, Manipur, India International Journal of Community Medicine and Public Health.2015;2(4):1-2 .

[4] Demen M. Water borne diseases for the Ethiopian heath center team. Haramay University, 2003; 29.

[5] Khalifa M, Ahmad K, Abdel-Hafeez , Mosllem A. present status of protozoan pathogens causing water borne diseases in northern part of El-mini government, Egypt. Ph. DSc. Thesis. Departments of Parasitology. El-Mania University, Egypt. 2014; 1-2.

[6] Ismail H, Elnaeem H. Epidemiology of water borne diseases and the knowledge, attitudes and practices of the basic school children towards them in el-Obeid, north Kordofan state, Sudan. Ph. DSc. thesis in Community Health, Department of Public and Environmental Health, Faculty of Medicine and Health Sciences, Kordofan University, Sudan ,2014: 1-2.

[7] Burden of disease and cost-effectiveness estimates. World Health Organization. Retrieved April 5, 2014; 1.

[8] Fonyuy B. Prevalence of water borne diseases within households in the Bamendankwe Municipality-North West Cameroon. Journal of Biosafety & Health Education, 2014; 14(5):2-3.

[9] WHO and Maternal and Child Epidemiology Estimation Group (MCEE) estimates, 2015; 1.

[10] Gargano W, Adam E, Collier S, Fullerton K, Feinman S, Beach M. Mortality from selected diseases that can be transmitted by water. United States, 2003–2009. Journal of Water Health. 2017; 15(3): 438-50.

[11] UNICEF and World Health Organization. Drinking Water: Equity, safety and sustainability, Geneva: UNICEF, WHO. 2011; 1.

[12] Helmy T. Water puality and health in Egyptian rural Aareas. Journal of Environment Protection an Sustainable Development. 2015;4 (1):2.

[13] Steinwachs C. Using a self-Learning module to teach nurses about caring for patients with eating disorders. MSc. Thesis in Advanced Practice Nursing, John Fisher College, Newark.2010; 19- 21.

[14] Dhamija N, Kanchan M. Effectiveness of self-Learning modules on the achievement and Retention of Undergraduate Students in Commerce. Dept of Education, Kurukshetra University. 2014; 3(2): 1-28.

[15] Wilson P. Public health nursing practice in relationship to water and its impact on health. Ph.Ds. Thesis in nursing. Lethbridge University, 2004; 1-17.

[16] ASchofield R, McGugan J, Dalla K, Betker C. Community health nursing vision for 2020: Shaping the future. Western Journal of Nursing Research.2011; 33(8):1047-1068

[17] McKenzie J, Pinger R, Kotecki J. An introduction to community health. United States of America. Jones & Bartlett Publishers.2011; 109- 112.

[18] Allender J, Rector C, Warner K. Community & public health nursing: promoting the public's health. Lippincott Williams & Wilkins.2013; 246- 250.

[19] Mtinda E. Sustainability of rural water supply and sanitation services under community management approach: The case of six villages in Tanzania.2007; 3- 5.

[20] Dawson D, Trapp G. Reading the medical literature: Basic & Clinical Biostatistics, 3rd ed. New York. McGraw – Hill. Medical Publication Division.2001; 161-218.

[21] Cantrell B. An evaluation of a water, sanitation, and hygiene program in rural communities Outside of Port-au-Prince, Haiti. Ph. DSc. Thesis in public health, Georgia State University, ATLANTA.2013;12-13.

[22] Ramírez Y, Loera A, Jacques M, Garneau P, Avelar J, Harel J, Guerrero L. Waterborne pathogens: detection methods and challenges. Pathogens.2015;4(2):307-334.

[23] White N. Survey on the knowledge, attitudes and practices on tuberculosis (TB) among health care workers in Kingston and St. Ph. DSc. Thesis department public health, Liverpool University.2011; 48-50.

[24] Rao C, Shetty P. Evaluative study on effectiveness of maternal and child health care participatory training program among staff nurses, auxiliary nurse midwives and lady health visitors. Journal of South Asian Federation of Obstetrics and Gynecology.2012; 4(2):120-122.

[25] Khanal S. A Study assessing the impact of academic detailing program on childhood diarrhea management among the primary healthcare providers in Banke Region. Ph. DSc. Thesis department Public Health, Sains University, Malaysia.2010;1-2.

[26] Salam A, El-Shazly A, Dewidar S. Infection control awareness among healthcare providers in family health settings in Shebin El-Kom district, Menoufia Governorate, Egypt. Menoufia Medical Journal, 2014; 27(4): 842-848.

[27] Nour-Eldein H, Mohamed A. Effect of Education Intervention on Prevention of Blood borne Infections for Health Care Workers in Family Medicine Centers, Suez Canal University in Ismailia City, Egypt. Middle East Journal of Family Medicine.2016; 7(10):6-11.

[28] Alwutaib H, Abdulghafour A, Alfadhl K, Makboul G, El-Shazl K. Knowledge and attitude of the physicians and nurses regarding blood-borne infections in primary health care, Kuwait. Greener Journal of Medical Sciences.2012; 2(4):109-112.

[29] Mohanan M, Vera-Hernández M, Das V, Giardili S, Goldhaber-Fiebert D, Rabin L, Seth A. The know-do gap in quality of health care for childhood diarrhea and pneumonia in rural India. JAMA pediatrics.2015; 169(4):351-353.

[30] Taylor M, Adams L, Ellis A. Gatekeepers of health: A qualitative assessment of child care center staff's perspectives, practices and challenges to enteric illness prevention and management in child care centers. Bio Med Central of Public Health,2008; 8(1):3.

[31] Chipwaza B, Mugasa P, Mayumana I, Amuri M, Makungu C, Gwakisa S. Community knowledge and attitudes and health workers' practices regarding non-malaria febrile illnesses in eastern Tanzania. Neglected tropical diseases, 2014; 8(5):2896.

[32] Tagbo N ,Ughasoro D, Omotowo I, Eneh I, Uwaezuoke A. Knowledge of rotavirus disease among health care poviders and their acceptance of rotavirus vaccines in South-East, Nigeria. J Vaccines.2013;315-355.

[33] Iglesias T, Almannoni A, Rodríguez E, Sánchez L, Pupo, M, Manzur J, Fonte L. Knowledge, perceptions and practice of dermatologists with respect to Giardia lamblia infection. Revista Cubana de Medicina Tropical.2010;62(1):36-41.

[34] Galindo F, Valdés S., Iglesias M, Goodridge M, Galindo F. Knowledge, believes and practices of physicians from Cienfuegos in relation to intestinal amebiasis: results of an intervention. Revista Cubana de Medicina Tropical.2003; 55(3):185-190.

[35] Stephen J. health workers practice in the management of acute diarrhea among children aged 6-59 months admitted to juba teaching hospital. South Sudan. Ph. DSc. Thesis of Pediatrics and Child Health, University of Nairobi, south Sudan.2015; 19-30.

[36] Robles A, Halvorsen E, Mayer A. Waterborne disease-related risk perceptions in the Sonora River Basin, Mexico. Society for Risk Analysis paper.2011; 866-878.

[37] Hindi I. The awareness of health professionals in diagnostic techniques for intestinal parasites in Gaza strip, Palestine. Annals of medical and health sciences research.2014; 4(1): 80-84.

[38] Brown B, Oluwatosin, A, Ogundeji O. Impact of training intervention on immunization providers' knowledge and practice of routine immunization in Ibadan, South-Western Nigeria: A primary health care experience. Pan African Medical Journal.2017; 26(216):1.

[39] Lewise S, Heitkemper M, Dirksen S. Medical Surgical Nursing: assessment and management of clinical problems, 6th ed, London, Elsevier Mosby.2004; 22-35.

[40] Choden K, de Bruin M. Communication and innovation studies (COM). Nurse-led health education on diarrheal prevention among the high-risk under-five children in Thimphu: Bhutan. MSc. Thesis department of Social Sciences, Wageningen University, Netherlands.2012; 25-50.

[41] Khan R. Knowledge of clinical case management of IMNCI among trained and untrained primary health care personnel in two districts of province Punjab in Pakistan. Ph. DSc. Thesis in Department of International Health, Tampere University, Pakistan.2009; 110-113.

[42] Babeker E. Assessment nursing management of diarrhea and dehydration for children under five years at Wad Medani Pediatric Teaching Hospital. Ph. DSc. thesis in pediatric nursing. Wad Medani University, Sudan.2012;1-2.

[43] Alfaro C. The training program for barangay health workers of the diagnosis and management of diarrheal diseases in children; an intervention Research.2008; 1 -3.

[44] Ajani K, Moez S. Gap between knowledge and practice in nursing. Journal of Procedia-Social and Behavioral Sciences.2011; 15(2):1-5.

[45] Zatton H. Assessment of Knowledge and Practice among Nurses Caring for Patient with Hepatitis. Master Thesis, Faculty of Nursing, Zagazig University.2003;1-10.

[46] Ogoina D, Pondei K, Adetunji B, Chima G, Isichei C, Gidado S. Knowledge, attitude and practice of standard precautions of infection control by hospital workers in two tertiary hospitals in Nigeria. Journal of infection prevention.2015; 16(1):16-22.