

Nurses Performance for Patient with Acute Organophosphate Poisoning

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Abstract

Background: Organophosphate (OP) compounds are agrochemical agents that have been frequently misused for deliberate self-harm in the world; the majority of the three million pesticides related poisonings worldwide are due to OP compounds. Early identification followed by effective management in the initial stages increases the rate of survival among patients with (OP) poisoning. **Aim of the study:** to assess nurses' performance (knowledge, practice and attitude) for patient with acute organophosphate poisoning. **Research Design:** A descriptive exploratory design was utilized. Method: A convenience sample of all available nurses (50 nurses) working in four units surgical ICU, Emergency unit, poisoning ICU, and poisoning unit in Tanta university hospital. Tools three tools used in the current study: self-administrated questionnaire, observational checklist, and nurses' attitude Likert scale. **Results:** 70% of studied nurses had unsatisfactory level of knowledge and 54% had incompetent practice regarding care of patient with acute organophosphate poisoning. 84% of nurses have negative attitude regarding care of patient with acute organophosphate poisoning. **Conclusion:** based on the results of the current study there was statistically significant correlation between the nurses' knowledge, practice and attitude regarding care of patients with acute organophosphate poisoning. **Recommendation:** Designing teaching program for nurses to improve nurses' knowledge, practice and attitude for care of patient with acute organophosphate poisoning. Developing simplified and comprehensive booklet including basic information about organophosphate poisoning.

Key Words: Organophosphate (op), Poisoning, Nurses' Knowledge, Practice, Attitude, Nurses' Performance.

Introduction

Organophosphate compounds (OPC) are agrochemical agent. It's easily available and causes rapid death for most patients exposed to organophosphates who come into contact with insecticides. The first organophosphate insecticide was created in the mid-1800s but was not widely used until after World War II. Organophosphates are used as

medications, insecticides, and nerve agents as a weapon. Symptoms include

increased saliva and tear production, diarrhea, nausea, vomiting, small pupils, sweating, muscle tremors, and confusion. The onset of symptoms is often within minutes, and it can take weeks to disappear. Organophosphate compounds are the most commonly used type of insecticides in Egypt (Aroniadou et al., 2020).

The pharmacological cornerstone of treatment are atropine, oxime-derivatives (pralidoxime and obidoxime), and potentially diazepam. Atropine acts

by competitive inhibition of acetylcholine receptor thus decreasing the downstream effects of excess acetylcholine at the receptor site. Oxime-derivatives, such as pralidoxime, displace the OPs from the ACHE thus enabling it to hydrolyze

acetylcholine again. However, by the time after exposure increases, the AChE run the risk of becoming irreversibly inhibited. This is particularly noticeable with Soman where pralidoxime is ineffective due to the rapid rate of aging (Chai et al., 2017).

Comprehensive management and proper nursing care in the hospital by dedicated staff, promote good prognosis in cases of OP poisoning cases. There is need to work with client and their families to assess the needs and draw up individualized care plan for the client and should get social welfare professionals help to improve with basic living skill including reflecting life style management skills and social activity to ensure that they lead a normal life as possible (Chendake & Mohite, 2013).

Nurses should be aware about the emergency management, evaluation, administration of antidote and supportive therapy for better management of patient. They should have knowledge regarding the prevention of organophosphate poisoning. The knowledge of nurses toward patient with organophosphate poisoning is important to those involved in the planning and delivery of care towards these clients groups. Patients may develop the complications like respiratory failure, neuropathy, seizures, muscle weakness, aspiration pneumonia. The nurses need to be knowledgeable to manage patients and prevent complications of organophosphate poisoning (Chendake & Mohite, 2013).

Significance of the study:

The incidence of organophosphate poisoning (OPP) has increased rapidly recently. The poisoning affects the patient's condition quickly, and the patient's life can be endangered if there is a delay in transporting him to a place of treatment. Integral resuscitation

knowledge and sensitive judgment are vital to patient care (Sun et al., 2016).

According to WHO that estimated three million cases of organophosphorus compound (OPC) poisoning and 2.5 million deaths worldwide annually. In Egypt, OPP is a common cause of morbidity and mortality and represents more than 50% of patients with insecticide poisoning (El-Sheikh, Hashem, Elgohary, Elfadl, & Lashin, 2017).

An estimated 3 million or more people worldwide are exposed to organophosphates each year, accounting for about 300,000 deaths. In the United States, there are around 8000 exposures per year with very few deaths. While most often the exposure occurs from an agricultural pesticide, there are household items, such as ant and roach spray, that also contain organophosphate compounds (Dardiotis et al., 2019).

Aim of the study:

The present study was conducted to fulfill the study aim:

Assessing nursing performance for patient with acute organophosphate poisoning through the following:

1. Assess nurses' level of knowledge for patient with acute organophosphate poisoning
2. Assess nurses' level of practice for patient with acute organophosphate poisoning
3. Assess nurses' level of attitude toward patient with acute organophosphate poisoning

Research Questions:

This study was conducted for answering the following questions:

1. What are nurses' levels of knowledge for patient with acute organophosphate poisoning?

2. What are nurses' levels of practice for patient with acute organophosphate poisoning?

3. What are nurses' levels of attitude toward patient with acute organophosphate poisoning?

Subjects and Methods:

Subjects and methods for this study were portrayed under the four main designs as the following

I- Technical design:

The technical design includes research design, setting, subjects, and tools for data collection used in this study.

A) Research design:

A descriptive exploratory design was followed to achieve the aim of this study.

B) Setting:

The study was conducted in four units surgical ICU, Emergency unit, poisoning ICU and poisoning unit at Tanta university hospital.

C) Subjects:

A convenience sample of all available nurses (50 nurses) in the previously mentioned settings at the time of data collection was recruited in this study.

D) Tools of data collection:

Three tools were used in current study for data collection as following:

1) Nurses' Self-Administered Questionnaire:

The self-administered questionnaire was used to nurses' level of knowledge regarding care patient with acute organophosphate poisoning it was developed by the researcher in simple Arabic language after reviewing the relevant and recent literatures (Fallon, 2018) (Ahmad, Rahman, Ashrafuzzaman, Chowdhury, & Ali, 2009).

The questionnaire consisted of 45 questions in the form of multiple choices questions (MCQ), true/false questions.

It composed of two parts as follows:

The questionnaire included two parts as follow:

Part one: Demographic data sheet: it aimed to assess the nurses demographic characteristics including age, gender, level of education, social status, and years of experience, place of works, and courses.

Part two: this part was used to assess nurses' level of knowledge regarding patient with acute organophosphate poisoning. It was consisted of 38 true or false which were divided into two sections as follow:

The first section: nursing general knowledge about organophosphate poisoning and it consist of (21) true or false questions. **The second section:** nursing practical knowledge about management patients with organophosphate poisoning and it consist of (17) true or false questions

Scoring system:

Regarding scoring system of the nurses' questionnaire: it included 38 questions. The response for each question was either by choosing the true or false. Each correct answer was given one grade and the incorrect answer was given zero. The total scores for every section and for whole knowledge assessment questionnaire was summed up (38 grades). The percentage of the total scores was calculated then categorized as follow:

$\geq 80\%$ = satisfactory level of knowledge which equal ≥ 31 grades.

$< 80\%$ = unsatisfactory level of knowledge which equal < 31 grades.

2- Nurses' practices observational checklists:

It's used to assess actual nurses' practice regarding care patients with acute organophosphate poisoning. It was developed by the researcher in simple Arabic language after reviewing the relevant and recent literatures (**Daly, Little, & Murray, 2006**) it included an observational checklist and consisted of three sections as follow:

Section (1): to assess nurses emergency management for patient with acute organophosphate poisoning consist of five steps: airway (6items), breathing (4items), circulation (6items), neurological status (3items), and given medications (3items).

Section (2): to assess medical history for patient with acute organophosphate poisoning this includes (8items).

Section (3): to assess nurses' practice for skin and gut decontamination for patient with acute organophosphate poisoning this includes (4items).

Scoring system:

Scoring system of the Nurses' practices observational checklists was regarding caring patient with acute organophosphate poisoning which composed of three sections. Each step that was done correctly was given one grade and each step that was not done or unanswered or incorrect was given zero. The total score for practice observational checklist was (34) score. It was graded into:

$\geq 85\%$ = competent level of practice which equal ≥ 29 grades.

(<85 %) = incompetent level of practice which equal <29 grades.

3- Nurses attitude likert scale:

It's used to assess nurses' attitude regarding care patients with acute organophosphate poisoning. It included (14 likart scale statements) categorized as (agree, uncertain, disagree). It is adopted from **Daly, Little, & Murray (2006)**, and modified by the researcher.

Scoring system:

Scoring system of the Nurses' attitude was regarding to Nurses positive attitude was given two degree , one grade for natural, and zero degree for negative attitude toward care patient with acute organophosphate poisoning. The total score for nurses' attitude (14 question) were summed up (28 marks) it was categorized as follows:

$\geq 75\%$ = it considered positive attitude which equal ≥ 21 marks.

(75-70%) it considered natural attitude which equal <21 to 17 marks

< 70% = it considered negative attitude which equal <17 marks

II- Operational design:

The operational design includes preparatory phase, content validity, pilot study and field work.

Preparatory phase:

It includes reviewing current and past, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Tools validity and reliability:

Content validity was tested through panel of seven experts from different academic categories

(3professors, 3assistant professors, one lecture) of medical surgical nursing at the faculty of nursing Ain Shams University. The experts reviewed the tools for format, simplicity, consistency, clarity, accuracy and relevance, validity for comprehensiveness and minor modification was done.

The reliability of the tools was done statistically by using Cronbach's Alpha for self-administered questionnaire was reliable at (0.84), observational checklist was reliable at (0.76) and the nurses' attitude was reliable at (0.95).

Pilot study:

Before performing the actual study, pilot study was carried out on 10% of nurses from the study subjects to test the clarity, applicability, feasibility, and relevance of the tools used to determine the needed time for the applications of the study tools. The necessary modifications on tools were done according to result of the pilot study and the nurses who included in the pilot study excluded from five out of fifty nurses.

Field work:

The aim of this stage is to assess the knowledge, practices and attitude of nurses regarding care of patients with acute organophosphate poisoning through collecting the data using the study tools after confirming its validity and reliability and explaining the aim or purpose of the study simply by the researcher to the studied subjects and obtaining their written permission for data collection prior to data collection. All the available subjects (50 nurses) were included in the study.

Data collection took about six months started from the beginning of five months from February (2019) to June (2019). The data were collected by the

researcher through four days per week (Saturday, Sunday, Wednesday and Thursday) in the morning and evening shifts (from 8 A.M to 8 P.M) at the surgical, toxicology ICU units and emergency unit at Tanta university hospital

III- Administrative design:

An official letter was issued from the faculty of nursing Ain Shams University to the medical and nursing director of The Tanta university hospital at which the study was conducted, and explaining the purpose of the study. A brief explanation of the study was given to the participants that the information obtained will be treated confidentially, used only for the purpose of the study, will not cause any harm to the participants and informed that their participation is voluntary. The participants were informed that they are allowed to choose whether to participate or withdraw from the study at any time.

Ethical considerations:

The ethical research considerations in this study included the following:

Approval to carry out this study was obtained from ethical committee in faculty of nursing at Ain Shams University before starting the study. The researcher clarified the objective and the aim of the study to the nurses including in the study. The researcher assured maintaining anonymity and confidentiality of the subjects' data. Nurses were informed that they allowed choosing either to participate or not in the study and that they have the right to withdraw from the study at any time without given any reason.

Results:

Table (1): revealed that 68% of studied nurses were younger than 30 years with a mean age of 30.52 ± 9.25 , 70% of them were female, 78% of them were married, 42% of them were working in surgical ICU, 36% of them working in toxicology ICU, 34% of them were graduated from technical nursing institute also faculty of nursing constitute the same proportion. The table also show that 42% of studied nurses had 3-5 years' experience with a mean 6.76 ± 3.29 , 100% of studied nurses had attend CPR course and 98% of nurses attended first aid course.

Figure (1): illustrated that 30% of studied nurses have satisfactory level of knowledge regarding care of patients with acute organophosphate poisoning. While 70% of them had unsatisfactory level of

knowledge regarding care of patients with acute organophosphate poisoning.

Figure (2): shows that 54% of studied nurses had competent level of practice regarding care of patients with acute organophosphate poisoning, while 46% of them had incompetent level of practice regarding care of patients with acute organophosphate poisoning.

Figure (3): shows that 84% of studied nurses had negative and neutral attitude regarding care of patients with acute organophosphate poisoning. While 16% of them had positive attitude regarding care of patients with acute organophosphate poisoning.

Table (2): reveals that there was a high statistically significant relationship between nurses' total level of knowledge, total level of practice and total level of attitude regarding caring of patients with acute organophosphate poisoning.

Table (1): Nurses' demographic characteristics (n = 50).

Characteristics		N	%
Age:	20- 29 years old	34	68.00
	30- 39 years old	10	20.00
	40 - 49 years old	2	4.00
	50 years and above	4	8.00
	Mean \pmSD	30.52 \pm 9.25	
Gender:	Male	15	30.00
	Female	35	70.00
Social status:	Married	39	78.00
	Single	11	22.00
The unit of working:	Surgical ICU	21	42.00
	Toxicology ICU	18	36.00
	Emergency ward	6	12.00
	Toxicology unit	5	10.00
Academic Qualification:	Nursing Diploma	5	10.00
	Diploma of Nursing Technician Institute	17	34.00
	Faculty of Nursing	17	34.00
	Postgraduate studies (master or doctorate) degree	11	22.00
Years of experience in the current unit	3- 5 years	21	42.00
	5- 8 years	17	34.00
	8- 10 years	5	10.00
	More than 10 years	7	14.00
	Mean \pmSD	6.76 \pm 3.29	
CPR course:	No		
	Yes	0	0.00%
Crises and disasters course:	No	50	100.00
	Yes	9	18.00
First aid course:	No	41	82.00
	Yes	1	2.00
Infection control diploma:	No	49	98.00
	Yes	13	26.00
Quality and management hospitals	No	37	74.00
	Yes	12	24.00
Courses related to the current filed.	No	38	76.00
	Yes	38	76.00

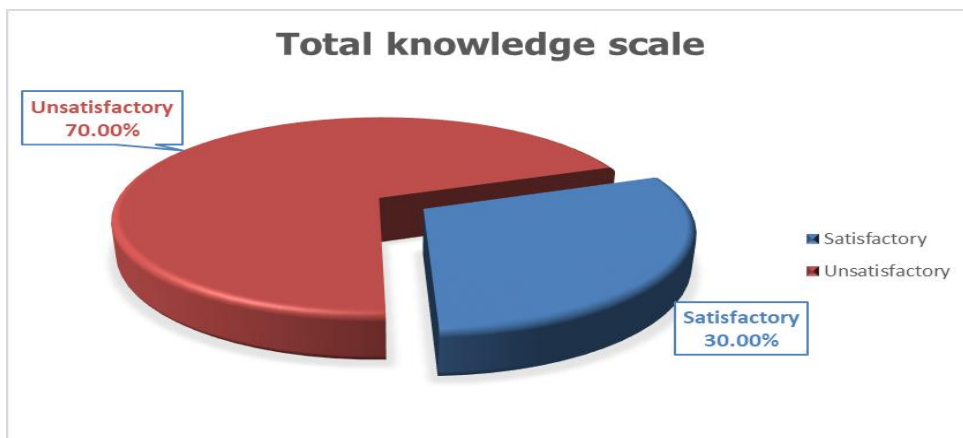


Figure (1): percentage distribution of the studied nurses' as regarded their total level of knowledge (general, practical knowledge) regarding care of patients with acute organophosphate poisoning, (N=50).

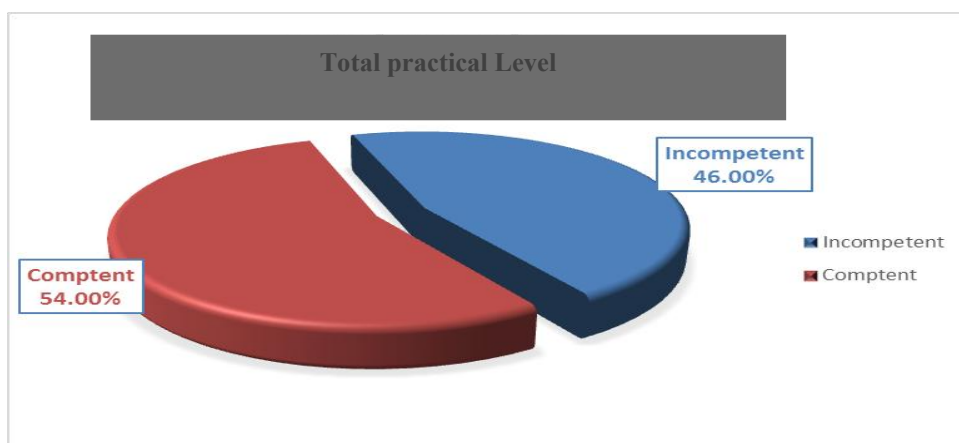


Figure (2): Percentage distribution of the studied nurses' level of practice regarding care of patients with acute organophosphate poisoning, (N=50).

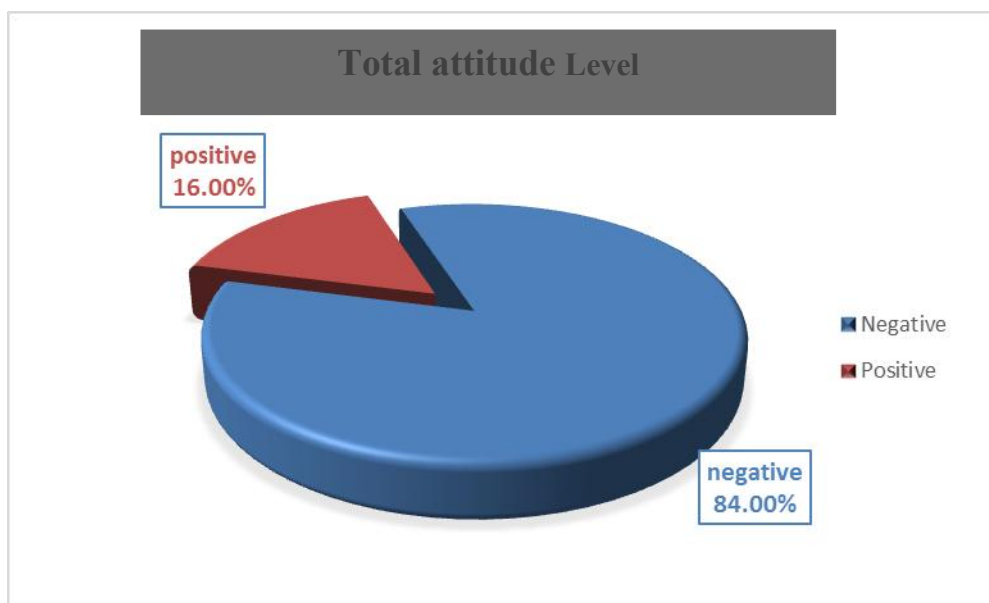


Figure (3): Frequency and percentage distribution of the studied nurses' level of attitude regarding care of patients with acute organophosphate poisoning (N=50)

Table (2): The overall correlation between nurses' level of knowledge, practice and attitude regarding care of patients with acute organophosphate poisoning, (N=50).

		Knowledge	Attitude	Practice
Knowledge	r #		0.517	0.472**
	P value		0.001*	0.001
Attitude	r #	0.517		-0.409
	P value	0.001*		<0.001*
Practice	r #	0.472**	0.409	
	P value	<0.001*	<0.001*	

#Pearson Correlation

Discussion:

Discussing the findings of the current study is categorized under five main parts. **The first Part** is Concerned with Demographic characteristics of nurses, the **second parts** is concerned with the total level of knowledge, **the third parts** is concerned with the total

level of practice and **the forth parts** is concerned with the total level of attitude of nurses included in the study.

The five parts is related to the relations between nurses' demographics characteristics, knowledge, practice and

attitude, and relations between knowledge, practice and attitude regarding care of patients with acute organophosphate poisoning. Part I: Demographic characteristics of the studied nurses.

Part I: Demographic characteristics of the studied nurses

Regarding the age of the nurses, the results in current study revealed that more than two thirds of the studied nurses' ages were less than thirty years. This explains that most of these nurses were newly graduated; young and tolerated the nature of work in the critical care unit. This finding is agreed with **Abebe, Kassaw, & Shewangashaw, (2019)** study entitled "Assessment of knowledge and practice of nurses on initial management of acute poisoning in Dessie referral hospital Amhara region, Ethiopia, 2018" revealed that more than three quarters ages were less than thirty years. Also study done by **Sayed et al ., (2015)** study entitled "Nurses knowledge and practice regarding detection and management of acute drug poisoning at Cairo university hospital ". Showed that more than two third of the studied sample at the age group of 21 - 40 years. In the other hand this finding is disagreed with **Rutto, Chepchirchir, & Odera (2012)** study entitled "Assessed nurse's knowledge, attitude and practice on the initial management of acute poisoning among adult casualties: Study at Kenyatta national hospital, Kenya". Revealed that the mean age of participants was more than thirty years. Majority of them were aged between 30 to 39 years

Related to gender, Regarding the gender, the present study results showed that ,the majority of the studied nurses were females this might elaborated the

current situation due to females continue to dominate the profession and men are still a minority among those who practice nursing. This in agreement with **Upvall & Leffers (2014)** study entitled "Global health nursing "which revealed that, nursing in Egypt is primarily a female occupation and very few men are admitted to nursing programs in the university sector. This finding is in congruent with **Abebe, Kassaw, & Shewangashaw, (2019)** study entitled "Assessment of knowledge and practice of nurses on initial management of acute poisoning in Dessie referral hospital Amhara region, Ethiopia, 2018" which revealed that one third of them were male.

Regarding the marital status the present study results showed that more than three quarters of the studied nurses were married this due to suit the living conditions and this is traditional in live . This finding is consistent with **Sayed et al., (2015)**. Who showed that more than two thirds of the studied sample was married.

Regarding unit of working the present study results showed that two fifth of the studied nurses working in surgical ICU. This due to the comprehensive of this unit to caring these patients. And staff qualification due to different diagnoses cases admitted to this word.

Regarding the educational level, the present study results indicated that more than one third of the studied nurses had technical nursing institute and the same proportion bachelor degree The researcher point of view this might be due to a lot of bedside nurses in governmental hospital had technical nursing degree

while bachelor degree working ahead nurse and administrator position. This finding goes hand in hand with (Egyptian Nursing Syndicate, 2012). In this regards the nursing syndicate revealed that 240,000 nurses in Egypt are registered at the nursing syndicate, of these the majority are technical institute nurses. Also study done by Abebe, Kassaw, & Shewangashaw, (2019) ,who revealed that more than two thirds of them were faculty of nursing .This finding is disagreed with Khalil et al ., (2019) who reported that below three forth of the studied nurses were had diploma in nursing.

Regarding years of experience the present study results found that two fifth of studied nurses having 3-5 years of experience ,according to the researcher point of view this may be due to most of those nurses were newly graduated and were more interested to work in critical care units. This finding is consistent with Lekei et al ., (2017) study entitled" knowledge and practices relating to acute pesticide poisoning among health care providers in selected regions of Tanzania" who found that more than half of participation experience in medical services ranged from 1 to more than 24 years. Although the largest category had experience of 5 years or less.

This finding disagree with Nofal et al ., (2018) study entitled " Knowledge, attitudes, and practices of emergency department staff towards disaster and emergency preparedness at tertiary health care hospital in central Saudi Arabia", who found that more than half of the participants had a clinical experience of more than 5 years

Concerning attending courses the present study results showed that all nurses of this study attended CPR courses and first aid courses as this courses is important for handling and management patients with acute organophosphate poisoning and for life saving. This finding is in agreement with (Rutto, Chepchirchir, & Odero, 2012),who showed more than three quarters of nurses attended basic life support training (BLS) , Two thirds of nurses had been attended trained in advance cardiac life support (ALS), and the quarters of nurses attended course in accident and emergency nursing. While less than half of nurses had been formally trained in management of acute poisoning after their basic nursing qualifications .

On the other hand this finding disagreed with Khalil et al ., (2019), who showed that more than half not attending previous training course in disaster, also study done by Sayed et al ., (2015) ,who reported that all nurses of the studied sample did not receive any training courses about nursing managements of patients with poisoning.

Part II: Nurses 'knowledge regarding care of patients with acute organophosphate poisoning .

Regarding the total level of nurses' knowledge the results of the current study indicate that nearly three quarters of the studied nurses had unsatisfactory knowledge regarding care of patients with acute organophosphate poisoning. This inadequacy of nurses' knowledge reflects the fact that one third of the studied nurses had technical nursing diploma, recently graduated and not having a special degree in ICU nursing so they are not prepared or

knowledgeable enough to provide evidence based or specialty nursing care. And majority of nursing suspected organophosphate poisoning like any poisoning and don't know the fatality of this type of poisoning, and management protocols to organophosphate poisoning. This finding agreed with **Abebe, Kassaw, & Shewangashaw, (2019)**, who showed that nearly three quarters of nurses had unsatisfactory knowledge on initial management of acute poisoning. This finding is disagree with **Hakami et al ., (2018)** in a study entitled "Assessment of Knowledge toward Initial Management of Acute Poisoning among Medical Students in Riyadh City KSA, 2017 " who indicated that more than three quarters of students had good knowledge regarding the care of patients with acute poisoning as definition, symptom and signs of early stages as well as the initial management procedures.

Part III: Nurses 'practice regarding care of patients with acute organophosphate poisoning.

Concerning the total nurses' level of practice, the present study results showed that more than half of the studied nurses had competent level of practice regarding care of patients with acute organophosphate poisoning. This due to the majority of nurses working in the intensive care unit had adequate practice in management sever cases and due to recurrent and multiple cases of poisoning and adequate experience in critical care unit and carefully to life patients saving. Finding in the current study also supported by **Lekei et al ., (2017)** ,who stated that most of nurses are knowledgeable about the first aid care and treatment in cases of pesticide poisoning that included washing the

contaminated area with water, inducing vomiting if ingested and giving the poisoned victims fresh milk.

This finding is disagreed with **Joseph et al., 2014)** ,who showed that inadequate level of practice among medical students, even junior doctors may be incapable of performing the first aid skills for patients attending to emergency department with acute poisoning

Part IV: Nurses 'attitude regarding care of patients with acute organophosphate poisoning.

Concerning the nurses' level of attitude the current study results found that more than three quarters of studied nurses had negative attitude toward care of patients with organophosphate poisoning due to fear of nurses from decontamination and frustration from the mortality rate of this type of poisoning. In accordance with current study finding **Jones et al., (2015)**. In a study entitled "Nurses' attitudes and beliefs to attempted suicide in Southern India", who reported that the nurses had negative attitudes toward those who self-harm.

This finding is contradicted with **Ramberg, Di Lucca, & Hadlaczky, (2016)** in a study entitled "The impact of knowledge of suicide prevention and work experience among clinical staff on attitudes towards Working with suicidal Patients and Suicide Prevention" which revealed that more than half of nurses' staff that considers them sufficiently trained for work with suicidal patients and management and not anxious when dealing with poisoned patients.

Part V: Relations between nurses' demographic characteristics, nurses' knowledge, practice, and attitude regarding care of patients with acute organophosphate poisoning.

Regarding relation between nurses knowledge, practice and attitude the results of the current study, revealed that there are highly statistically significant relation between nurses' level of knowledge, practice, and attitude regarding nurses performance for patients with acute organophosphate poisoning. This is might be the nurses should be have knowledge to provide care for poisoned patient and if nurses uncomfortable or had negative attitude this will effect on care patient and not understand this fatality of case of patient and three domain of performance(knowledge, practice, attitude) not achieved .

This finding is consistent with **Ibrahim, (2014)** who revealed that a highly significant difference of nurses practice level and knowledge level regarding disaster preparedness This finding is consistent with **Ramberg, Di Lucca, and Hadlaczky, (2016)** ,who revealed that there is a strong correlation between the nurses attitude for sufficiently trained for work with patients and clarity, simply in this work and previous skills who considered being sufficiently of care able to trust their own knowledge and were less affected by unclear routines. And this lead to apply better care for poisoned patients.

Conclusion

Based on the findings of the current study, it can be concluded that nearly three quarters of the studied nurses

had unsatisfactory knowledge and more than half of them had competent level of practice regarding care of patients with acute organophosphate poisoning. Meanwhile, about more than three quarters of the studied nurses had negative attitude regarding care of patients with acute organophosphate poisoning.

As well as there are statistically significant difference between the nurses' knowledge, level of practice and attitude and their demographic characteristics: (age, gender. level of education, unit and years of experience in critical care unit). Regarding care of patients with acute organophosphate poisoning, and statistically significant difference between the nurses' performance three domain (knowledge, practice and attitude)

Recommendations

The results of this study the following suggests on going and regular in-service educational and training programs to improve their knowledge, practice and attitude regarding care of patients with acute organophosphate poisoning in the critical care units.

References

- Abebe, A. M., Kassaw, M. W., & Shewangashaw, N. E. J. B. n. (2019).** Assessment of knowledge and practice of nurses on initial management of acute poisoning in Dessie referral hospital Amhara region, Ethiopia, 2018 journal of Nursing – Pikeville Medical Center. 18(1), 60.
- Ahmad, M., Rahman, F. N., Ashrafuzzaman, M., Chowdhury, D. K. P., & Ali, M. J. J. o. A. F. M. C., Bangladesh. (2009).** Overview

- of Organo-phosphorus Compound Poisoning in Bangladesh and Medico-legal Aspects Related to Fatal Cases. *Journal of Armed Forces Medical College, Bangladesh* 5(1), 41-45.
- Aroniadou-Anderjaska, V., Figueiredo, T. H., Apland, J. P., & Braga, M. F. (2020).** Targeting the glutamatergic system to counteract organophosphate poisoning: A novel therapeutic strategy. *Neurobiology of Disease*, 133, 104406.
- Chai, P. R., Boyer, E. W., Al-Nahhas, H., & Erickson, T. B. (2017).** Toxic chemical weapons of assassination and warfare: nerve agents VX and sarin. *Toxicol Commun*, 1(1), 21-23.
- Chendake, M. B., & Mohite, V. R. (2013).** Study of organophosphorus poisoning in hospitalized subjects. *Indian Journal of Scientific Research*, 4(2), 49-59.
- Daly, F., Little, M., & Murray, L. J. E. m. j. (2006).** A risk assessment based approach to the management of acute poisoning. *Emergency Medical Journal* 23(5), 396-399.
- Dardiotis, E., Aloizou, A.-M., Siokas, V., Tsouris, Z., Rikos, D., Marogianni, C., . Tsatsakis, A. J. T. (2019).** Paraoxonase-1 genetic polymorphisms in organophosphate metabolism. *411*, 24-31. PubMed
- Egyptian Nursing syndicated (2012).** Outcomes and competencies for graduates of practical/vocational, diploma, baccalaureate, and master's practice doctorate, and research doctorate programs in nursing. Washington (DC): National League of Nursing; 2012.
- El-Sheikh, A., Hashem, A., Elgohary, M., Elfadl, A. A., & Lashin, H. J. T. M. J. (2017).** Evaluation of the potential cardiotoxic effects in acute organophosphate toxicity as a prognostic factor. *Tanta Medical Journal* 45(3), 115.
- Fallon Nevada: FAQs (2018):** Organophosphates". Centers for Disease Control and Prevention, Department of Health and Human Services. Archived from the original on 2018-03-12. Retrieved 2018-03-11.
- Hakami, F. A. A., Alqubaysi, A. I., Bilal, A. A., & Alharbi, M. G. J. T. E. J. o. H. M. (2018).** Assessment of Knowledge toward Initial Management of Acute Poisoning among Medical Students in Riyadh City KSA, 2017. *The Egyptian Journal of Hospital Medicine* 70(3), 503-506.
- Ibrahim, F. A. A. J. A. J. o. N. S. (2014).** Fatma Abdelalim Abdelghany Ibrahim Nurses' knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness–Saudi Arabia. *American Journal of Nursing Science* 3(2), 18-25.
- Jones, S., Krishna, M., Rajendra, R. G., & Keenan, P. J. J. o. m. h. (2015).** Nurses attitudes and beliefs to attempted suicide in Southern India. *Journal of Mental Health* 24(6), 423-429.
- Joseph, N., Kumar, G., Babu, Y. R., Nelliyanil, M., Bhaskaran, U. J. A.**

- o. m., & research, h. s. (2014).** Knowledge of first aid skills among students of a medical college in Mangalore city of South India. *Annals of Medical and Health Sciences Research* 4(2), 162-166.
- Khalil, N.S.; Atia, A.S.M.; Moustafa, M.F.; Soliman, H.T.T. (2019)** Emergency nurses' knowledge and practice regarding preparedness of disaster management at a university hospital, *Egypt. Nurs. Healthc. Int. J.* 2019, 3, 1–12.
- Lekci, E., Ngowi, A. V., Mkalanga, H., & London, L. (2017).** Knowledge and practices relating to acute pesticide poisoning among health care providers in selected regions of Tanzania. *Environmental health insights*, 11, 1178630217691268.
- Nofal, A., Alfayyad, I., Khan, A., Al Aseri, Z., & Abu-Shaheen, A. J. S. m. j. (2018).** Knowledge, attitudes, and practices of emergency department staff towards disaster and emergency preparedness at tertiary health care hospital in central Saudi Arabia. 39(11), 1123.
- Ramberg, I.L., Di Lucca, M. A., & Hadlaczky, G. (2016).** The impact of knowledge of suicide prevention and work experience among clinical staff on attitudes towards working with suicidal patients and suicide prevention. *International journal of environmental research and public health*, 13(2), 195.
- Rutto, J., Chepchirchir, A., & Odero, T. (2012).** Nurse's knowledge, attitude and practice on the initial management of acute poisoning among adult casualties: Study at Kenyatta National Hospital, Kenya. *Open Journal of Nursing*, 2012, 2, 149-156.
- Sayed, Y. E., Youssef, W., Alshekhepy, H. A., & Elfeky, H. (2015).** Nurses' Knowledge and Practices regarding Detection and Management of Acute Drug Poisoning at Cairo University Hospitals. *Egyptian Journal of Nursing*, 10(1).
- Sun, L., Tan, H., Peng, T., Wang, S., Xu, W., Qian, H., ... & Fu, Z. (2016).** Developmental neurotoxicity of organophosphate flame retardants in early life stages of Japanese medaka (*Oryzias latipes*). *Environmental toxicology and chemistry*, 35(12), 2931-2940.
- Upvall, M. J., & Leffers, J. (2014).** Global health nursing: Building and sustaining partnerships: Springer Publishing Company, 164-167.