

## Nurses' Expectations toward Toxoplasmosis during Pregnancy

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### ABSTRACT

The protozoan parasite *Toxoplasma gondii* (*T. gondii*) causes infection in humans all around the world. Infection with *T. gondii* is often acquired by ingesting food or water contaminated with oocyst shed by cats or by eating raw or undercooked meat containing tissue cysts. **AIM:** Aim of the study was to investigate nurses' expectations toward toxoplasmosis during pregnancy. **Setting:** the study was conducted at obstetric department at Benha University and Benha Teaching hospital. **Design:** was descriptive. **Sampling Type:** Convenient sample consisted of 110 nurses. **Tools of Data Collection:** three tools were used for collecting data; Structured interview questionnaire, likert scale and expectation tool. **Results:** more than two thirds of the studied nurses had incorrect knowledge toward toxoplasmosis during pregnancy, nearly half of the studied nurses had not expected and more than half of the studied nurses had negative attitude toward toxoplasmosis during pregnancy. The present study findings illustrated that there was a positive statistically significant correlation between total expectations scores, total attitude and total knowledge. **Conclusion& Recommendations:** the majority of nurses had incorrect knowledge and negative attitude toward toxoplasmosis during pregnancy. Continuous pre – service, in service and on job training should be designed to improve nurses' knowledge, expectations and attitude.

**Key words:** Toxoplasmosis, Knowledge, Attitude, Expectations.

### Introduction

The protozoan parasite *Toxoplasma gondii* (*T. gondii*) causes infection in humans all around the world. Infection with *T. gondii* is often acquired by ingesting food or water contaminated with oocyst shed by cats or by eating raw or undercooked meat containing tissue cysts. However, *T. gondii* infection can also be acquired by blood transfusion and organ transplantation. Dissemination of *T. gondii* occurs via blood flow to a large variety of body organs. Primary infection during pregnancy may lead to congenital

disease. Reactivation of *T. gondii* infection in immuno-compromised women may cause a life-threatening disease of the central nervous system. Signs and symptoms of toxoplasmosis usually include retinochoroiditis, enlargement of cervical lymph nodes, or encephalitis (*Esquivel et al., 2016*).

Congenital toxoplasmosis is a serious disease that occurs when the *T. gondii* parasite crosses the placental barrier and affects the fetus during pregnancy. The severity of the disease may be associated with the type of strain acquired the immune

status of the woman, and the gestational period in which maternal infection and fetal transmission occurs (*Pomares and Montoya, 2016*).

The likelihood of the fetus being affected is significant, if toxoplasmosis infection in women is contracted prior to or during the period following pregnancy in the first trimester. Infection of fetus during first trimester can lead to severe organ damage, because the main organs in fetus, start forming during this period. The transmission of infection from pregnant women to fetus is the highest during the third trimester. However, since vital organs have already formed and considerable fetal development taken place by then, the risk to major organs in the fetus is minimized (*Hide, 2016*).

Also, nurse should instruct pregnant woman the following basic rules while cooking and consuming food, such as:carefully washing vegetable.Washing food utensils and cutting boards before and after use.Cooking meat to the required temperature to kill any microorganisms.Keeping food items covered, stored properly.Washing hands before eating, or immediately after handling raw meat. Avoiding Sample tasting of meat while cooking and still undercooked (*Trotta et al., 2016*).

Expectation is defined as believing that something is going to happen or believing that something should be a certain way.**Expectation** means what one thinks will happen in the future and what one wants to happen in the future. Expectations seek to prevent disappointment by establishing in advance what can realistically be achieved or delivered by a project, undertaking, course of actions (*Collins, 2014*).

### **Significance of study**

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Toxoplasmosis has been estimated that one third of the world population has been infected with *T.gondii*. With 213 million

pregnancies worldwide in 2012 and the global burden of congenital toxoplasmosis estimated at 190,100 new cases and 1.20 million disability-adjusted life years (*Sedgh et al., 2014; Torgerson and Mastroiacovo, 2013*). According to a World Bank report published in 2012, rural population in Egypt was last reported at 57.2%, there are working on farms with an increasing number of poor people. A previous study has shown a 57.9% sero-prevalence rate of *T. gondii* among pregnant women in Egypt (*Abdelaziz et al., 2013*). Nurses have important role for promotion of pregnant woman health to prevent toxoplasmosis and no previous studies were conducted at obstetrics and woman health nursing department at faculty of nursing in Benha University evaluated nurses' expectations toward toxoplasmosis during pregnancy.

### **Aim of The Study**

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The aim of this study is to investigate nurses' expectations toward toxoplasmosis during pregnancy.

#### **The aim of this study achieved through:**

- 1) Assessing of nurses' knowledge toward toxoplasmosis during pregnancy.
- 2) Evaluating of nurses' attitude toward toxoplasmosis during pregnancy.

#### **Research Questions**

What are nurses' expectations toward toxoplasmosis during pregnancy?

What are the knowledge and attitude among nurses toward toxoplasmosis during pregnancy?

#### **Subjects And Methods**

**Research design:** A descriptive design was used.

**Setting of study:** This study was conducted at obstetric department in both Benha University and Teaching Hospital.

**Samping**

**Sample Type:** A convenient sample was obtained.

**Sample size:** All nurses at previously mentioned setting who were total (110) nurses at obstetric department (80 nurses working at Benha University Hospital and 30 nurses working at Benha Teaching Hospital) were included in the study +11nurses was used for purpose of pilot study.

**Tools of data collection**

The following tools were designed and used after reviewing related literatures. It was written in Arabic language in the form of closed and open ended questions. Three tools were used for collecting data.

**Tool I: Structured interviewing schedule included** two parts as the following:

**Part I:** Nurses general characteristics of the studied nurses included work place, age, educational level, years of experience, residence, previous training about prevention of toxoplasmosis.

**Part II:** Nurses' knowledge regarding toxoplasmosis during pregnancy included twelve questions (definition, risk group, predisposing factors, mode of transmission, life cycle, signs and symptoms, clinical diagnosis, prevention, maternal complications, fetal complications, treatment and nursing care.).

**Scoring system for nurses' knowledge**

Correct answer was scored (2) while incorrect answer was scored (1).The total knowledge score ranged from 1- 24.The

score of total knowledge was classified into two levels:

- Correct knowledge  $\geq 60\%$
- Incorrect knowledge  $< 60\%$

**Tool II: Likert scale to assess nurses' attitude toward toxoplasmosis during pregnancy:**

This tool was designed by the researcher after reviewing of literatures (*CDC, 2013; Mario et al., 2013*). It consisted of ten items (complications of toxoplasmosis is serious, starting treatment of toxoplasmosis as early as possible during pregnancy protect fetus from complications ....etc.)

**Scoring system for likert scale:**

Each item of nurses' attitude evaluated as agree (3), uncertain(2), disagree(1). For the purpose of this study agree was considered positive attitude while uncertain and 'disagree was considered negative attitude. So, the total score of nurses' attitude was classified into:

- Positive attitude  $\geq 60\%$
- Negative attitude  $< 60\%$

**Tool III: Assessed nurses' expectations toward toxoplasmosis during pregnancy:**

This tool was designed by the researcher after reviewing of literatures (*Michele and Marcia, 2012;Parlak et al., 2015*) .It consisted of twenty statements included toxoplasmosis leads miscarriage of pregnant woman, immune system in the human body has a role in the prevention of injury or disease with toxoplasmosis and hand washing protects against infection with toxoplasmosis .....etc.).

### **Scoring system for nurses' expectations:**

Each statement of nurses' expectations was scored as expected(3), uncertainly expected (2) and not expected (1). For the purpose of this study uncertainly expected and not expected was considered not expected. The total score of nurses' expectation ranged from 1- 60.The total score of nurses' expectation was classified into:

Expected  $\geq 60\%$

Not expected  $< 60\%$

### **Tools validity and reliability**

Content validity was tested by a panel of three experts in the field of maternity health nursing. The questionnaire was modified according to the panel's judgment on clarity of sentences and appropriateness of content. Simple modifications were considered such as omission of some repeated sentences and rephrasing some sentences.

### **Ethical considerations**

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Ethical aspect be considered before starting the study as the following

- Before interviewing nurses the aim of the study was explained before applying the tools gain nurses` confidence and trust to participate in the study.
- An oral consent was obtained from each nurse to participate in the study.
- Questionnaire did not include any immoral statement that contradicts nurse's beliefs, customs, religious, cultural aspect and traditions.
- No harm for participants.

- Maintain confidentiality, dignity and self –esteem.
- The nurses were assured that data collected was confident and was used only for research and all data burned after statistical analysis.
- Freedom to withdraw from participation in the study at any time.

### **Operational Design**

Operational design for the study included pilot study and field work.

#### **Pilot study**

Pilot study was conducted on 10 % of total sample (11 nurses) to evaluate clarity and applicability of tools used for data collection as well as estimation of the time needed to fill questionnaire. Modifications were done so nurses in pilot study were excluded from the main studied sample.

#### **Field work**

The study was implemented for six months from the beginning of May 2015 to the end of November 2015. The researcher visited Benha University hospital three days per week (Sunday, Monday and Wednesday) from 9 a.m. to 6 p.m. to interview nurses utilizing interview questionnaire. Duration of each interview was 25mintes.

Firstly, the researcher introduced herself and explained the purpose of study to the nurses to gain trust. Oral consent was obtained to participate in the study then each nurse was assessed by interviewing questionnaire schedule to evaluate level of knowledge. Then, likert scale applied to each nurse and finally, nurses' expectations were evaluated. This was repeated three times per week till all nurses were included in the studied nurses.

After that, the researcher started to visit Benha Teaching hospital also three days per week from 9 a.m. to 6 p.m. to interview nurses' knowledge, attitude and expectations regarding toxoplasmosis .

### Administrative Design

An official letter was sent from the dean of Benha Faculty of Nursing to the directors of Benha Teaching and Benha University hospitals explained the aim of the study and time of data collection to obtain official permission to conduct the study.

### Statistical Design

Data were verified prior to computerized entry. The statistical package for social sciences (SPSS version 20) was used for that purpose, followed by data tabulation and analysis. Descriptive statistics were applied (e.g., means, standard deviation, frequencies and percentages). Test of significance (chi-square, fisher exact test and Pearson correlation test) were used. A significant difference was considered when  $P \leq 0.05$  and a highly statistical significance difference when  $P \leq 0.001$ .

### Results:

Table (1) Distribution of the studied nurses according to general characteristics (n=110).

General characteristics	No.	%
<b>Age (years)</b>		
< 20	6	5.5
20 < 25	14	12.7
25 < 30	19	17.3
≥ 30	71	64.5
<b>Mean ±SD</b> 37.77 ± 11.10		
<b>Qualification</b>		
Diploma	90	81.8
Technical	14	12.7
Bachelor	6	5.5
<b>Experience (years)</b>		
<5	7	6.4
5<10	15	13.6
≥10	88	80.0
<b>Mean ±SD</b> 18.68 ± 10.06		
<b>Residence</b>		
Rural	49	44.5
Urban	61	55.5
<b>Attending any training program regarding toxoplasmosis during pregnancy</b>		
No	110	100.0

Table (1) shows general characteristics of the studied nurses, 64.4% of the studied nurses were ≥ and equal 30 years old with the mean age 37.77 ± 11.10 years. Regarding qualification, 81.8% of the studied nurses had diploma and more than three quarters 80.0% of them had >10 years of experience with mean experience year 18.68 ± 10.06 and 55.5 % were from urban area. Moreover,

100.0% of the studied nurses hadn't attended any training program regarding toxoplasmosis during pregnancy.

**Table (2) Distribution of the studied nurses according to knowledge regarding toxoplasmosis during pregnancy (n=110).**

Knowledge items about toxoplasmosis	Correct answer		Incorrect answer	
	No	%	No	%
Definition of toxoplasmosis.	40	36.4	70	63.6
Risk group.	33	30.0	77	70.0
	28	25.5	82	74.5
Predisposing factors.				
Transmission of toxoplasmosis.	30	27.3	80	72.7
	20	18.2	90	81.8
Life cycle				
Signs and symptoms.	15	13.6	95	86.4
Clinical diagnosis.	35	31.8	75	68.2
	42	38.2	68	61.8
Prevention.				
	70	63.6	40	36.4
Maternal complications.				
	17	15.5	92	83.6
Fetal complications.				
	32	29.1	78	70.9
Treatment.				
Nursing care.	44	40.0	66	60.0

Table (2) reveals that the studied nurses had incorrect knowledge regarding definition, risk group, predisposing factors, transmission, life cycle, signs& symptoms, clinical diagnosis, prevention, fetal complications, treatment and nursing care of toxoplasmosis during pregnancy (63.6%, 70.0%, 74.5%, 72.7%, 81.8%, 86.4%, 68.2%, 61.2%, 83.6%, 70.9%, 60.0%) respectively. Meanwhile 63.6% of the studied nurses had correct knowledge regarding maternal complications of toxoplasmosis during pregnancy.

**Table (3) Distribution of the studied nurses according to attitude toward toxoplasmosis during pregnancy (n=110).**

Items	Agree		Uncertain		Disagree	
	No	%	No	%	No	%
Complications of toxoplasmosis are serious.	35	31.8	20	18.2	55	50.0
Starting treatment of toxoplasmosis as early as possible during pregnancy protect fetus from complications.	56	50.9	24	21.8	30	27.3
Health education about toxoplasmosis can lead to safe pregnancy and childbirth.	66	60.0	10	9.1	34	30.9
Preventing breeding animals inside the house to control infection.	24	21.8	21	19.1	65	59.1
Knife must be washed with soap and water thoroughly after chopping meat to avoid the disease.	13	11.8	26	23.6	71	64.5
Pregnant woman should be aware about washing kitchen surfaces to avoid toxoplasmosis.	6	5.5	28	25.5	76	69.1
Toxoplasmosis can be transmitted to the fetus.	9	8.2	21	19.1	80	72.7
There is protection against toxoplasmosis.	36	32.7	11	10.0	63	57.3
When touching eyes or mouth by hands after washing meat lead to toxoplasmosis.	16	14.5	19	17.3	75	68.2
Nurse should advise infected woman to avoid pregnancy until treatment.	70	63.6	17	15.5	23	20.9

Table (3) clarifies that 50.9%, 60.0% and 63.6% of the studied nurses agreed about starting treatment of toxoplasmosis as early as possible during pregnancy protect fetus from complications, health education about toxoplasmosis can lead to safe pregnancy and childbirth, and nurse should advise infected woman to avoid pregnancy until treatment respectively. Meanwhile 64.5%, 72.7% and 68.2% of the studied nurses disagreed about knife must be washed with soap and water thoroughly after chopping meat to avoid the disease, toxoplasmosis can be transmitted to the fetus, when touching eyes or mouth by hands after washing meat lead to toxoplasmosis respectively.

**Table (4) Frequency distribution of the studied nurses according to expectations toward toxoplasmosis during pregnancy (n=110).**

Items	Expected		Uncertain		Not expected	
	No	%	No	%	No	%
Toxoplasmosis causes miscarriage of pregnant woman.	70	63.6	17	15.5	23	20.9
Toxoplasmosis does not cause any danger on pregnancy.	50	45.4	29	26.4	31	28.2
Toxoplasmosis causes complications for mother and fetus during pregnancy and birth.	10	9.1	20	18.2	80	72.7
Toxoplasmosis causes complications for the newborn after birth.	9	8.2	11	10.0	90	81.8
Immune system in the human body has a role in the prevention of injury or disease with toxoplasmosis.	60	54.5	39	35.5	11	10.0
Toxoplasmosis is extremely contagious.	41	37.3	19	17.3	50	45.5
Conducting tests of toxoplasmosis to is necessary.	38	34.5	12	10.9	60	54.5
Hand washing protects against infection with toxoplasmosis.	30	27.3	10	9.1	70	63.6
Educating about cooking meat well protecting from infection with toxoplasmosis.	25	22.7	20	18.2	65	59.1
Eating burger leads to toxoplasmosis.	51	46.4	14	12.7	45	40.9
Toxoplasmosis is a serious disease leading to the death of embryos.	9	8.2	16	14.5	85	77.3
Infection control measures are important for preventing from toxoplasmosis.	24	21.8	7	6.4	79	71.8
Toxoplasmosis has medical treatment.	35	31.8	25	22.7	50	45.5
There is an important role for nurse to control toxoplasmosis.	65	59.1	35	31.8	10	9.1
IgG and IgM analyses are enough to diagnose toxoplasmosis.	19	17.3	14	12.7	77	70.0
High rate of IgM indicates the presence of toxoplasmosis in body at the present time of analysis.	23	20.9	7	6.4	80	72.7
High rate of IgG indicates an earlier infection with toxoplasmosis.	28	25.5	45	40.9	37	33.6
Stability of the percentage IgM rate indicates no infection with toxoplasmosis.	22	20.0	12	10.9	76	69.1
Cats have a role in the pathogenesis of toxoplasmosis.	56	50.9	15	13.6	39	35.5
Eating un washed vegetables and fruits displays to toxoplasmosis.	18	16.4	19	17.3	73	66.4

IgM Immunoglobulin M & IgG Immunoglobulin G

Table (4) illustrates that 63.6%, 54.5% and 50.9% of the studied sample expected about toxoplasmosis causes miscarriage of pregnant woman, immune system in the human body has a role in the prevention of injury or disease with toxoplasmosis and cats have a role in the pathogenesis of toxoplasmosis respectively. Meanwhile, 81.8%, 71.8% and 66.4% of the studied sample didn't expect about "Toxoplasmosis causes complications for the newborn after birth, infection control measures are important for preventing from toxoplasmosis and eating unwashed vegetables and fruits displays to toxoplasmosis" respectively.

**Table (5):- Correlation coefficient between studied nurses' total knowledge and expectations scores (n = 110).**

Variable	Total expectations score	
	r	P-value
Total knowledge score	0.767	0.000**

(\*\*) Correlation is significant at the 0.01 level.

Table (5) demonstrates that there was a positive statistically significant correlation between total knowledge and total expectations scores ( $p \leq 0.001$ ).

**Table (6): Correlation coefficient between studied nurses' total knowledge and attitude scores (n = 110).**

Variable	Total attitude score	
	r	P-value
Total knowledge score	0.645	0.000**

(\*\*) Correlation is significant at the 0.01 level.

Table (6) reveals that there was a positive statistically significant correlation between total knowledge and total attitude scores ( $p \leq 0.001$ ).

**Table (7):- Correlation coefficient between studied nurses' total attitude and expectations scores (n = 110).**

Variable	Total expectations score	
	r	P-value
Total attitude score	0.623	0.000**

(\*\*) Correlation is significant at the 0.01 level.

Table (7) presents that there was a positive statistically significant correlation between total attitude score and total expectations scores ( $p \leq 0.001$ ).

### **Discussion:**

The present study was aimed to investigate nurses' expectations toward toxoplasmosis during pregnancy. This aim was answered through the present study research questions. **In relation to nurses' expectations toward toxoplasmosis during pregnancy**, the result of the present study revealed that more than half of nurses did not have expectations toward toxoplasmosis during pregnancy. This was due to lack of knowledge and ongoing training which reflected on negative attitude of nurses during providing care to pregnant women.

So, this was acquiring nurses with essential knowledge regarding toxoplasmosis during pregnancy, complications and methods of prevention to promote health of pregnant women.

Also, nurses should attend training programs about toxoplasmosis during pregnancy to expand expectations about dangerous effect of having toxoplasmosis to woman before and during pregnancy. Nurse should expect emotional status of pregnant woman due to miscarriage of pregnancy or any congenital abnormalities to newborn. So, the result of the present study revealed that less than three quarters of nurses expected

that toxoplasmosis causes complications for mother and fetus during pregnancy and at birth. This result of the present study agreed with *Schluter et al., (2014)* who studied animals are key to human toxoplasmosis and described that the trans-placental transmission of *T. gondii* following maternal infection results in the birth of neonate with congenital toxoplasmosis, including retinochoroiditis, hydrocephalus, convulsions, and intracerebral calcification.

The finding of the present study illustrated that more than half of nurses expected that immune system in the human body has a role in the prevention of injury or disease with toxoplasmosis. This agreed with *El Fakahany et al., (2012)* who studied comparative study between Elisa IgG, IgM and PCR in diagnosing and studying toxoplasmosis in Qualyobia Governorate, Egypt and mentioned that immune system play an important role in positive serology with congenital toxoplasmosis.

Related to hand washing protects against infection with toxoplasmosis, the result of the present study reported that less than two thirds of nurses did not expect that. This result disagreed with *Dubey, (2010)* who studied toxoplasmosis in humans and mentioned that hand washing habits had been proven to be a protective factor associated with *T. gondii* sero-prevalence. Also, this result disagreed with the study of *Qing et al., (2015)* who studied sero-prevalence of toxoplasma gondii antibodies and associated risk factors among pregnant women in Shandong and Jilin provinces, China and mentioned that keeping good personal hygiene was definitely crucial way for pregnant women to protect from *T. gondii* infection. This was evident that hand hygiene was considered the first action done to protect infection with toxoplasmosis. So, this was essential for each nurse to apply hand hygiene before any procedure.

While, the finding of the present study revealed that more than two thirds of nurses didn't expect that infection control measures are important for preventing transmission of toxoplasmosis. This result disagreed with *Saleh et al., (2014)* who studied that screening of toxoplasma gondii infection among childbearing age females and assessment of nurses' role in prevention and control of toxoplasmosis and mentioned that almost half of the nurses had satisfactory levels of knowledge to toxoplasmosis infection control measures. Moreover, adherence to strict infection prevention measures was a must to eliminate exposure to toxoplasmosis infection. Pregnant woman was high risk to toxoplasmosis infection due to weak immune system.

The result of the present study revealed that more than two thirds of nurses didn't expect that IgG and IgM analysis are enough to diagnose toxoplasmosis. This result was in agreement with *Dhakala et al., (2015)* who studied significance of a positive toxoplasma immunoglobulin M test result in the United States and mentioned that positive toxoplasma IgM and IgG test results obtained at non reference laboratories cannot accurately distinguish between acute and chronic infections. Generally speaking, variations in sero-positivity results were expected worldwide because of different diagnostic methods on diverse.

Regarding general characteristics of the studied sample, the findings of the present study showed that more than three quarters of nurses had diploma. This disagreed with *Ebrahimi et al., (2015)* who stated that nurses at different levels of scientific knowledge had different levels of information about toxoplasmosis. Highly qualified nurses heard much more about toxoplasmosis. The findings of the present study illustrated that three quarters of nurses had experience more than 10 years with mean experience years  $18.68 \pm 10.06$  years. The results of the present study demonstrated that

more than half of nurses were living in urban area. The results of the present study was agreed with *Snedeker et al., (2012)* who studied a survey of Canadian public health personnel regarding knowledge, practice and education of zoonotic diseases and stated that the most common work location of the health personnel was reported urban locations. Over half of the health personnel had at least 10 years of experience in the public health sector.

Considering the second research question was what are the knowledge and attitude among nurses toward toxoplasmosis during pregnancy? This was significance answered through the present study research findings.

**Concerning nurses' knowledge about toxoplasmosis during pregnancy,** the results of the present study revealed that less than two thirds of the studied nurses had incorrect knowledge regarding toxoplasmosis during pregnancy. This result was in the same line with *Dorcias et al., (2015)* who studied that knowledge of nurses about toxoplasmosis and mentioned that there was a decline in the number of correct answers about toxoplasmosis. Also, the results of the present study supported by *AL-Sheyab et al., (2015)* who studied toxoplasmosis-related knowledge and preventive practices among nurses in Jordan and showed that 68.6% of nurses had little information about toxoplasmosis. Overall, there was a lack of awareness about toxoplasmosis, risk factors, symptoms, and timing of infection, and preventive practices.

Moreover, the results of the present study was agreed with *Raghubir et al., (2014)* who studied evaluation of knowledge about toxoplasmosis among nurses in Kolkata (West Bengal) and observed that 50% of nurses had little knowledge about toxoplasmosis. Also, the results of the present study was consistent with *Toninato et al., (2014)* who studied toxoplasmosis: an examination of knowledge among health

professionals and pregnant women in a municipality of the State of Parana and stated that the health professionals (physicians and nurses) who worked directly with the pregnant women in this community had little knowledge about this zoonotic disease and complications. Additionally, the results of the present study was in accordance with *Alrashada et al., (2016)* who studied Toxoplasmosis among nurses in Al-Ahssa, Kingdom of Saudi Arabia: awareness and risk factors and demonstrated that there was low awareness about toxoplasmosis, danger and risk factors among nurses.

As regards, the findings of the present study illustrated that less than two thirds of nurses had incorrect answer regarding definition of toxoplasmosis during pregnancy. This result was in the same line with *Ahmadi et al., (2015)* who studied that evaluating the prior knowledge of toxoplasmosis among nurses of Ferdowsi University of Mashhad and suggested that only a few nurse had heard about toxoplasmosis (35.7%). From the point of view there was a lack of knowledge among nurses to become professionals, demonstrating the need for plundering the theoretical knowledge through ongoing training to enhance nurse's knowledge attitude and expectations toward toxoplasmosis.

In relation to nurses' attitude toward toxoplasmosis during pregnancy, the findings of the present study illustrated that more than half of nurses had negative attitude toward toxoplasmosis. This result disagreed with *Saleh et al., (2014)* who studied that screening of toxoplasma gondii infection among childbearing age females and assessment of nurses' role in prevention and control of toxoplasmosis and mentioned that almost half of the nurses had positive attitude toward toxoplasmosis.

Related to correlation coefficient between studied nurses' total knowledge and expectations scores demonstrates that there

was a positive statistically significant correlation between total knowledge and total expectations scores. The results of the present study was in agreement with *Alshehri et al., (2015)* who studied Sero-positivity and awareness of toxoplasmosis among nurses and mentioned that there was statistically significant positive correlation between the level of nurses' expectations about toxoplasmosis and knowledge about the disease .

Concerning correlation coefficient between studied sample total attitude and expectations scores, the findings of the present study illustrated that there was a highly statistically significant difference between nurses' attitude and expectations because nurses' attitude had reflected up on nurses' expectations, where the majority of nurses hadn't expected that toxoplasmosis causes complications for mother and fetus during pregnancy and at birth, hand washing protects against infection with toxoplasmosis and eating un washed vegetables and fruits displays to toxoplasmosis.

### **Conclusion**

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Results of the present study concluded that; the majority of nurses had incorrect knowledge toward toxoplasmosis during pregnancy, where the majority of nurses had negative attitude toward toxoplasmosis during pregnancy, nearly half of the studied nurses had not expected toward toxoplasmosis during pregnancy. Also, there was highly statistical significant relation between total knowledge score, total attitude score and total expectations score with general characteristics of the studied nurses. The above mentioned findings have mainly answered the study questions.

### **Recommendations:**

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In the light of the current study findings, the following recommendations are suggested:

- Continuous pre –service, in service and on job training should be designed by the hospital administration to improve nurses` knowledge, expectations and attitude.
- Provosion of booklet for nurses about toxoplasmosis.

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