



RESEARCH ARTICLE

KNOWLEDGE AND ATTITUDE OF WOMEN REGARDING TOXOPLASMOSIS DURING PREGNANCY AND MEASURES TO OVERCOME IT IN SLUMS AREAS

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ARTICLE INFO

Article History:

Received 18th January, 2013
Received in revised form
26th February, 2014
Accepted 13th March, 2014
Published online 23rd April, 2014

Key words:

Knowledge,
Attitude,
Pregnancy,
Toxoplasmosis,
Slums Areas.

ABSTRACT

Objective: to assess knowledge and attitude of women regarding toxoplasmosis during pregnancy in slums area and provide women the health measures to prevent toxoplasmosis before and during pregnancy.

Design and Methods: The study was carried out at two health centers: The fourth healthy center at Tanta first sector, which served "Tal-Elhadadine neighborhood and Gambiat Al-Qurashi slums" and the sixth healthy center which served "Seeger's slums at Tanta second sector"

The subjects of the study consisted of 302 women attending the health care centers. The tools were used to collect data: The first, structured interview sheet concerning socio-demographic data and knowledge of women regarding toxoplasmosis. Second tool, it was comprise of items related to women attitude regarding toxoplasmosis infection during pregnancy. Third tool, brochure was developed including information needed for women about toxoplasmosis during pregnancy.

Results: Of this study revealed that more than two thirds (69.54%) of the women had poor knowledge, nearly one fifth (20.53%) had moderate knowledge and (9.93%) of them had good knowledge regarding toxoplasmosis. The results also illustrated that the majority of the studied sample (84.11%) had positive attitude. A significant positive correlation was found between the total knowledge score and the total attitude score of women, which denote that women who had a better knowledge were holding more positive attitudes. Based on the results of this study; an educational program about toxoplasmosis infection and measures to prevent it should be designed in slums areas for all women during their reproductive age.

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INTRODUCTION

Toxoplasmosis is a disease caused by protozoan parasite called *Toxoplasma gondii* (T. gondii) (Yazar *et al.*, 2006). The infection is worldwide, particularly in warm and moist climates (Al-Qurashi *et al.*, 2001). One third of the human world population is infected with this parasite (Kijlstra and Jongert 2008). Cats are the definitive hosts, shedding oocysts that become infective a few days later. Many animals may be infected to become intermediate hosts, carrying infective cysts in various organs including muscles. Closing the cycle, cats typically become infected when eating those animals which contain cysts (Sagel and Krämer 2013).

Humans can acquire infection by three principal routes. First from ripe oocysts that cats have passed in their feces. Second, by eating raw or inadequately cooked meat of infected animals (e.g. pork, mutton, and wild game meat or eat uncooked foods that have come in contact with infected meat). Third, transplacentally from infected woman to her unborn

fetus. In adults, the incubation period ranges from 10 to 23 days from ingestion of undercooked meat, and from 5 to 20 days from ingestion of oocysts from cat feces (Jones *et al.*, 2001; Doudou *et al.*, 2014). The prevalence of toxoplasmosis infection varies among different countries depending on their habits, hygienic conditions, the presence of infected cats and the surrounding climate (Walle *et al.*, 2013). The poor socio-economic level of the third world countries in Latin America, Asia and Africa has been the primary risk factor as it has been associated to the high prevalence finding in these countries (Swai and Schoonman 2009).

In Egypt, there is limited data on the seroprevalence of *T. gondii* or the proportion of women at risk of acquiring *Toxoplasma* infection during pregnancy (Ibrahim *et al.*, 2009). However, some studies were carried out to investigate the prevalence of *Toxoplasma*-specific IgG among pregnant women in different geographic areas in Egypt: Sharkia Province (Saleh *et al.*, 2006), Alexandria (2008) and Menoufia (2012). According to the World Bank Report published in 2012, poor rural population in Egypt was last reported at 57.2%, most of them are working on farms. Also it was shown a 57.9% seroprevalence rate of *T. gondii* among Egyptian pregnant women (2001). This high seroprevalence rate of *T.*

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gondii may be responsible for a significant number of early miscarriages among this population (2013). The symptoms of infection caused by *Toxoplasma gondii* range from asymptomatic or mild to severe infection in pregnant women, which results in severe congenital infection, abortion or fetal still birth (Dabritz and Conrad 2010; Wang *et al.*, 2011). Transmission of toxoplasmosis infection to the fetus is less than 5% when maternal infection occurs before the 12th week of pregnancy, but it increases with gestation and the risk becomes higher than 80% in the final phase of the pregnancy. It is obvious that the risk of fetal transmission depends on the moment of infection, early diagnosis and treatment during pregnancy. So these risks should be communicated clearly to women and their families. (Many and Koren 2006).

There are approximately 16 million people who live in Egypt's 1105 slums areas which represent approximately 30% of residential areas. The availability of utilities, health care and social services are severely limited in that areas (WHO 2010-2014). The pregnant women who lived in slums areas had approximately two times increased risk of being infected for each risk factor such as contact with host animals (Avelino *et al.*, 2004). In general, women in slums remain unaware of their own reproductive health problems occurring during pregnancy. Further risk involved in repeated pregnancies and proper utilization of antenatal and postnatal care is another concern (Mishra and Gupta 2011). Efforts to prevent *Toxoplasma* infection during pregnancy are often successful and greatly reduce the incidence of congenital toxoplasmosis and its serious effects (Many and Koren 2006). Health care providers should make preconception, prenatal and natal investigations and health education to prevent toxoplasmosis as standard of care for pregnant women. Educational materials that contain messages on how to prevent pregnant women from becoming infected have resulted in reducing rates of seroconversion (Gollub *et al.*, 2008).

Effective prevention of congenital toxoplasmosis depends on avoidance of infection during pregnancy (Remington *et al.*, 1999). Ways to minimize exposure risk include wearing gloves while gardening or otherwise interacting with soil or disposing of cat litter, and washing hands after these activities. It is important to wash kitchen knives and hands after they have been used to cut raw meat, fruits, and vegetables (Nash *et al.*, 2005). There is no much information about the frequency of practice preventive behaviors for toxoplasmosis infection among pregnant women. While knowledge is an important determinant to establish behavioral change, accurate knowledge may not lead to appropriate preventive behavior. Attitudes of pregnant women towards changing their behavior, and their perception about the likelihood of contracting the infectious disease during their pregnancy may also be important contributors to establish behavioral change (Pereboom *et al.*, 2013). Toxoplasmosis is a serious infection which may be led to fatal events for the fetus. Therefore, this study was conducted to assess the knowledge and attitude of women living in slums areas regarding toxoplasmosis *gondii*.

Aim of the study

The aim of this study was to assess knowledge and attitude of women regarding toxoplasmosis during pregnancy in slums

area. Provide the women with the health measures to prevent exposure to toxoplasmosis before and during pregnancy.

Research Questions

- 1- What is the knowledge and attitude of women living in slums areas regarding toxoplasmosis during pregnancy?
- 2- Is there a relationship between knowledge, attitude regarding toxoplasmosis during pregnancy and the socio-demographic characteristics of women living in slums areas?

Subjects and methods

Study design: Descriptive design was used in carrying out this study.

Setting: The study was conducted at two healthy sectors: The fourth healthy center at Tanta first sector, which served (Tal-Elhadadine neighborhood and Gambiat Al-Qurashi) and the sixth healthy Center which served Seger's slums are at Tanta second sector.

Subjects: The study included a convenient sample of women who attended the healthy care centers at the period from 1/6/2013 to 30/9/2013 two days/week, the total number of women interviewed by the researchers were 370 women, 30 women of them represented the sample of the pilot study and 38 women refused to participate in this study or incompatible to the study criteria. So the remind number who actually involved in this study was 302 selected according to the following criteria.

- Living in slums areas.
- Age group ranged from 15-49 years old.
- Are willing to participate in this study.

Tools of data collection

Three tools of the study were developed by the researchers based on the previous studies and literature review to obtain the necessary data

Tool I. Structured interview sheet

Collect the basic data; it included the following 2 parts

Part 1: Socio-demographic data of the studied subjects such as, name, age, residence, marital status, level of education and occupation.

Part 2: Women's knowledge regarding toxoplasmosis such as: definition, causative agent, host for toxoplasmosis, knowledge about parasites, signs and symptoms, high risk group, methods of transmission, diagnosis, effect on pregnancy and treatment.

Women's knowledge was scored as follow

The scoring system of the answers

- Correct answer was take (2) score.
- Incorrect and don't know answers were taken (1) score.

The total score level was as follow

- Good level of knowledge (≥ 23.25) $\geq 75\%$.
- Fair level of knowledge ($15.5 < 23.25$) $50\% < 75\%$.
- Poor level of knowledge ($0 < 15.5$) $< 50\%$.

Tool II: Three point Likert's scale to assess the attitude of the women. It was comprised of items related to women attitude such as, preparation and cooking of meat, healthy ways to deal with cats, healthy way to wash fruits and vegetables, procedures to protect pregnant woman from toxoplasmosis infection and procedures for early discover of toxoplasmosis infection among pregnant women.

The scoring system of the women's attitude answers

Women's attitude was measured used three point Likert's scale; agree = 3, neutral = 2, and disagree =1. Total score of attitude considered positive attitude if the total score is equal or more than 45 points (equal 75%) and considered negative attitude if the total score less than 45 points.

Tool III: Brochure was developed by the researchers using simple Arabic language and illustrated pictures. Including the following:

-Information needed for women about toxoplasmosis during pregnancy, which included in tool I, part 2 like definition, causative agent, host for toxoplasmosis, knowledge about parasites, signs and symptoms, high risk group, methods of transmission, diagnosis, effect on pregnancy, treatment and the preventive measures of toxoplasmosis infection.

Methods

- 1- Subjects of this study were interviewed during their attendance in the healthy care centers at both settings. Ethical considerations of the study included approval to collect the data from the previous mentioned settings, as well as getting the subjects' consent to participate in the study after explaining the purpose of the study and reading loudly of the informed consent.
- 2- Before embarking on actual study, a pilot study was carried out on thirty women attending the both healthy centers, 15 women from each one. Those women were excluded from the study sample.
- 3- The tools were revised submitted to five experts in obstetric and gynecology nursing and community health nursing from faculty of nursing.
- 4- Opinion of experts on tools of the study was analyzed face validity 95% content validity 97%.

Data collection

- **Tool I**, part 1&2 administered individually to each woman of the study sample to collect data about the socio-demographic characteristics of the women and their knowledge regarding toxoplasmosis.
- **Tool II**, was used to collect data of women attitude regarding toxoplasmosis infection.
- **Tool III**, was provided to the women after finishing collecting the necessary data of the study, it was a Brochure contains illustrated pictures and important information regarding toxoplasmosis during pregnancy.

Statistical analysis

The data were computerized and verified using SPSS (Statistical package for social science) version 18 to perform tabulation qualitative variables were described in frequency and percentages, while quantitative variables were described by means and standard deviation. Analysis of collecting data was done through the use of several statistical tests as: Chi-square (χ^2). P values of < 0.05 were considered statistically significant.

RESULTS

This study aimed to assess knowledge and attitude of women regarding toxoplasmosis during pregnancy in slums area and provide women the health measures to prevent exposure to toxoplasmosis before and during pregnancy. The results will be presented under the following headings:

Table 1. Socio – demographic characteristics of studied women

| Socio – demographic characteristics | N | % |
|-------------------------------------|-----|-------|
| Age | | |
| 15-24 | 85 | 28.15 |
| 25-34 | 136 | 45.03 |
| 35-44 | 65 | 21.52 |
| 45-49 | 16 | 5.30 |
| Marital status | | |
| Married | 275 | 91.06 |
| Divorced | 18 | 5.96 |
| Widow | 9 | 2.98 |
| Education | | |
| illiterate | 51 | 16.89 |
| Preparatory | 90 | 29.80 |
| Secondary | 100 | 33.11 |
| University | 61 | 20.20 |
| Occupation | | |
| Work | 42 | 13.91 |
| House wife | 260 | 86.09 |

Table (1), shows the socio – demographic characteristics of studied women, it was clear that 45.03 % of the women aged 25-34 years. While the majority of study participants were married and one third (33.11%) of them had secondary level of education. On the other hand 16.89% were illiterate and the majority (86.09%) of them was house wives.

Table (2), shows that the majority of women (82.78%) reported that they heard about toxoplasmosis. On the other hand only more than two fifths (42.80%) know what toxoplasmosis meant. Also, the table illustrates that the minority (11.92%) of women reported that toxoplasmosis caused by toxoplasmosis Gondi parasite and 65.23% of them determine that the cats are the main host for toxoplasmosis. The table also illustrates that more than one quarter (26.82%) of women know the methods of toxoplasmosis parasite transmission, on the other hand only (9.93% & 2.25% respectively) of them reported that toxoplasmosis infection can be transmitted from mother to fetus and to infant through breast feeding. Nearly half of the sample (46.79%) determines the symptoms associated with toxoplasmosis infection. Nearly three quarters of them (74.83% & 73.20% respectively) reported that pregnancy is risk for toxoplasmosis infection and it can be treated by medication.

Table 2. Knowledge of the studied women regarding toxoplasmosis

| Knowledge items | N | % |
|---|-----|-------|
| Do you know toxoplasmosis? | | |
| Yes | 250 | 82.78 |
| No | 52 | 17.22 |
| If the answer yes, what is meant by toxoplasmosis? (n=250) | | |
| I don't know | 11 | 4.40 |
| Disease infects human and animals | 107 | 42.80 |
| Disease infects only human being | 118 | 47.20 |
| Disease infects only animals | 6 | 2.40 |
| A disease that affects pregnant women | 3 | 1.20 |
| All the above | 5 | 2.00 |
| The name of toxoplasmosis causative agent | | |
| I don't know | 247 | 81.79 |
| Toxoplasma Gondi parasite | 36 | 11.92 |
| Toxoplasma Gondi virus | 8 | 2.65 |
| Toxoplasma Gondi bacteria | 11 | 3.64 |
| The main host for toxoplasmosis | 85 | 28.15 |
| I don't know | 94 | 31.13 |
| The cats | 197 | 65.23 |
| The human being | 11 | 3.64 |
| Methods of transmission : | | |
| Direct contact with infected cats | 94 | 31.13 |
| Eating or drinking contaminated by parasite | 65 | 21.52 |
| From infected mother to fetus | 30 | 9.93 |
| From mother to infant through breast feeding | 37 | 12.25 |
| Eating infected uncooked well meat | 48 | 15.89 |
| Touch the nose or mouth after washing infected vegetables, fruits or/and meat | 21 | 6.95 |
| Exposure to patient's coughing sneezing | 20 | 6.62 |
| All the above | 81 | 26.82 |
| Symptoms of toxoplasmosis: (n=109) | | |
| Symptoms like common cold | 54 | 49.54 |
| Inflammation of lymph nodes | 4 | 3.67 |
| All the above | 51 | 46.79 |
| High risk group of toxoplasmosis: | | |
| I don't know | 64 | 21.19 |
| Women during pregnancy | 226 | 74.83 |
| People who suffer from a lack of the body's immunity | 87 | 28.81 |
| Previous infection and formation of antibodies | 5 | 1.66 |
| The effect of toxoplasmosis on fetus: (n=120) | | |
| Congenital anomalies for both eyes and brain | 17 | 14.17 |
| Habitual abortion | 53 | 44.17 |
| Intra uterine fetal death | 22 | 18.33 |
| Newborn death immediately after delivery | 10 | 8.33 |
| No thing from the above | 3 | 2.50 |
| All the above | 48 | 40.00 |
| The methods of toxoplasmosis treatment? (n=153) | | |
| I don't know | 36 | 23.53 |
| medical treatment | 112 | 73.20 |
| Surgical treatment | 4 | 2.61 |
| Radiotherapy | 1 | 0.65 |

Table 3. The source of women's knowledge regarding toxoplasmosis

| Source of women knowledge | N | % |
|--------------------------------|-----|-------|
| Physicians | 63 | 20.86 |
| Mass media | 61 | 20.20 |
| Friends and relatives | 141 | 46.69 |
| The contents of the Curriculum | 8 | 2.65 |
| Books and magazines | 14 | 4.64 |
| Teachers | 11 | 3.64 |
| Sons | 13 | 4.30 |
| Neighbors | 101 | 33.44 |

Table (3), shows the distribution of the source knowledge among women in this study, about half of the sample (46.69%)

got information from friends and relatives, followed by one third of them (33.44%) obtained the knowledge from their neighbors.

Table 4. Attitude of studies women regarding toxoplasmosis

| Attitude items | Agree | | Not sure | | Disagree | |
|---|-------|-------|----------|-------|----------|-------|
| | N | % | N | % | N | % |
| • Better to avoid eating dried meat. | 261 | 86.42 | 28 | 9.27 | 13 | 4.30 |
| • Shouldn't avoid eating freeze meat. | 176 | 58.28 | 102 | 33.77 | 24 | 7.95 |
| • It is necessary to cook the meat well in high temperatures. | 253 | 83.77 | 43 | 14.24 | 6 | 1.99 |
| • Touching cats and play with them does not lead to toxoplasmosis. | 46 | 15.23 | 79 | 26.16 | 177 | 58.61 |
| • is necessary to wear gloves when cutting raw meat. | 118 | 39.07 | 123 | 40.73 | 61 | 20.20 |
| • I think it is necessary to wash hands with soap and warm water after handling meat. | 242 | 80.13 | 53 | 17.55 | 7 | 2.32 |
| • Better wash hands with soap and water after playing with cats. | 252 | 83.44 | 42 | 13.91 | 8 | 2.65 |
| • Is not necessary to wear gloves when washing vegetables and fruits. | 91 | 30.13 | 116 | 38.41 | 95 | 31.46 |
| • Eating raw fresh eggs is very good for the health. | 67 | 22.19 | 111 | 36.75 | 124 | 41.06 |
| • Need to wash the place cutting meat slicer with soap and warm. | 206 | 68.21 | 71 | 23.51 | 25 | 8.28 |
| • Flying insects do not transmit toxoplasmosis. | 29 | 9.60 | 131 | 43.38 | 142 | 47.02 |
| • Best not to use exposed water when you go to a picnic or camp. | 186 | 61.59 | 98 | 32.45 | 18 | 5.96 |
| • It is necessary to wear gloves when you sit in a public park. | 70 | 23.18 | 124 | 41.06 | 108 | 35.76 |
| • Playing in public parks is not lead to the spread of toxoplasmosis. | 66 | 21.85 | 131 | 43.38 | 105 | 34.77 |
| • It is essential that woman conducts laboratory testing to detect toxoplasmosis infection before pregnancy. | 224 | 74.17 | 69 | 22.85 | 9 | 2.98 |
| • Unlikely that pregnant woman's become infected with toxoplasmosis. | 38 | 12.58 | 103 | 34.11 | 161 | 53.31 |
| • Pregnant woman should goes to the doctor when feeling symptoms of flu and not be ignored. | 249 | 82.45 | 48 | 15.89 | 5 | 1.66 |
| • Need for ultrasound at eighteenth week of pregnancy to excluded fetus abnormalities. | 207 | 68.54 | 86 | 28.48 | 9 | 2.98 |
| • Necessary to perform laboratory examination of toxoplasmosis for women more than once during pregnancy. | 180 | 59.60 | 106 | 35.10 | 16 | 5.30 |
| • It is important to use iron and folic acid daily during pregnancy to strengthen the woman body's immunity and protects her against toxoplasmosis. | 207 | 68.54 | 91 | 30.13 | 4 | 1.32 |

Table (4), illustrates that the majority of studied women (86.42%) reported that toxoplasmosis found in dried meat. On

the other hand, nearly three fifth (58.28%) of the sample reported that toxoplasmosis found in freeze meat. Nearly one third (31.46%) of women reported that wearing gloves when washing vegetables and fruits prevent infection. While 30.13% of the women reported that wearing gloves when washing of fruits and vegetables don't prevent infection. The study also illustrates that nearly two third (68.54%) of the studied women reported the importance to use iron and folic acid daily during pregnancy and perform ultrasound at eighteenth week of pregnancy.

Table 5. The total score level of women's knowledge and attitude regarding toxoplasmosis (n=302)

| The total score level of women's knowledge regarding toxoplasmosis (n=302) | | N | % |
|--|--|-----|--------|
| Poor | | 210 | 69.54 |
| Moderate | | 62 | 20.53 |
| Good | | 30 | 9.93 |
| Total | | 302 | 100.00 |
| The total score level of women's attitude regarding toxoplasmosis (n=302) | | N | % |
| Negative | | 48 | 15.89 |
| Positive | | 254 | 84.11 |
| Total | | 302 | 100.00 |

Table (5), presents the total score level of women's knowledge and attitude regarding toxoplasmosis. It was found that more than two third (69.54%) of the studied sample had poor knowledge and only 9.93% of them had good knowledge regarding toxoplasmosis. The table also shows the total score level of women's attitude regarding toxoplasmosis. It was found that the majority of the studied sample (84.11%) had a positive attitude and 15.89% of them had a negative attitude regarding toxoplasmosis.

Table 6. Relationship between the knowledge level of studied women regarding toxoplasmosis and their socio-demographic characteristics (n=302)

| Socio-demographic characteristics | | knowledge level of studied women regarding toxoplasmosis (n=302) | | | | | Test | |
|-----------------------------------|-------------|--|-------|--------|---|-------|--------|---------|
| | | N | % | Mean | ± | SD | t/F | P-value |
| Age | 15-24 | 85 | 28.15 | 13.024 | ± | 5.688 | 2.582 | 0.054* |
| | 25-34 | 136 | 45.03 | 11.890 | ± | 5.205 | | |
| | 35-44 | 65 | 21.52 | 13.123 | ± | 5.700 | | |
| | 45-49 | 16 | 5.30 | 9.625 | ± | 3.667 | | |
| Marital status | Married | 275 | 91.06 | 12.356 | ± | 5.526 | 0.070 | 0.932 |
| | Divorced | 18 | 5.96 | 12.611 | ± | 3.146 | | |
| | Widow | 9 | 2.98 | 11.778 | ± | 6.534 | | |
| Education | Elementary | 51 | 16.89 | 9.039 | ± | 4.490 | 17.341 | <0.001* |
| | Preparatory | 90 | 29.80 | 11.811 | ± | 4.709 | | |
| | Secondary | 100 | 33.11 | 12.420 | ± | 5.105 | | |
| | University | 61 | 20.20 | 15.820 | ± | 5.772 | | |
| Occupation | Work | 42 | 13.91 | 16.214 | ± | 5.998 | 5.171 | <0.001* |
| | House wife | 260 | 86.09 | 11.731 | ± | 5.078 | | |

Table 7. Relationship between the attitude of studied women regarding toxoplasmosis and their socio-demographic characteristics (n=302)

| Socio-demographic characteristics | | attitude | | | | | Test | |
|-----------------------------------|-------------|----------|-------|--------|---|-------|-------|---------|
| | | N | % | Mean | ± | SD | t/F | P-value |
| Age | 15-24 | 85 | 28.15 | 48.824 | ± | 4.124 | 0.294 | 0.830 |
| | 25-34 | 136 | 45.03 | 48.919 | ± | 4.112 | | |
| | 35-44 | 65 | 21.52 | 48.646 | ± | 4.761 | | |
| | 45-49 | 16 | 5.30 | 49.750 | ± | 4.450 | | |
| Marital | Married | 275 | 91.06 | 49.015 | ± | 4.259 | 2.093 | 0.125 |
| | Divorced | 18 | 5.96 | 48.056 | ± | 3.842 | | |
| | Widow | 9 | 2.98 | 46.333 | ± | 4.717 | | |
| Education | Elementary | 51 | 16.89 | 47.039 | ± | 4.600 | 7.317 | <0.001* |
| | Preparatory | 90 | 29.80 | 48.344 | ± | 4.152 | | |
| | Secondary | 100 | 33.11 | 49.310 | ± | 4.196 | | |
| | University | 61 | 20.20 | 50.492 | ± | 3.567 | | |
| Occupation | Work | 42 | 13.91 | 50.214 | ± | 4.393 | 2.203 | 0.028* |
| | House wife | 260 | 86.09 | 48.662 | ± | 4.213 | | |

Table (6), shows the relationship between the knowledge level of studied women regarding toxoplasmosis and their socio-demographic characteristics. It was observed that there are significant differences between women knowledge and their socio-demographic characteristics except their marital status. As regarding their age, the mean score of knowledge was significant higher between women ranged from 15-24 and 35-44 years old (13.024 ± 5.688 & 13.123 ± 5.700 respectively). As regarding the educational level and occupation, the mean score of knowledge is significant higher among university educated and worked women (15.820 ± 5.772 & 16.214 ± 5.998 respectively) in comparison to that among women not graduated from Elementary Schools and house wives.

Table (7), shows the relationship between the attitude of studied women regarding toxoplasmosis and their socio-demographic characteristics. It was obvious that there are no significant differences between women attitude and their age and marital status. Statistically significant differences were detected between women's attitude and their educational level and occupation. As regarding the educational level and occupation, the mean score of attitude was significant higher among university educated and worked women (50.492 ± 3.567 & 50.214 ± 4.393 respectively) in comparison to that among women not graduated from Elementary Schools and house wives.

Table 8. Correlation between the studied women knowledge and attitude towards toxoplasmosis (n= 302)

| Correlations | | |
|--------------|-----------|---------|
| | Knowledge | P-value |
| Attitude | 0.258 | <0.001* |

Table (8), reflects the correlation between the studied women knowledge and attitude towards toxoplasmosis. A significant positive correlation was detected between the total knowledge and attitude of women, which denoted that women who had a better knowledge were holding more positive attitudes.

DISCUSSION

Toxoplasmosis gondii is serious infectious disease specially in case of affecting the women short time before or during pregnancy, it may lead to serious congenital anomalies for fetus or fetal loss. Primary prevention of toxoplasmosis among pregnant women by increasing their awareness regarding the causative agent, methods of transmission and the healthy preventive measures may decrease its potentially tragic outcome for both fetus and newborn. (Ross *et al.*, 2006) Studies from the United States and Egypt have shown that most women of childbearing age and pregnant women had a limited knowledge of methods to prevent toxoplasmosis (Jones *et al.*, 2003; Mohamed and Ibrahim 2012). This study aimed to assess knowledge and attitude of women regarding toxoplasmosis during pregnancy and measures to overcome it in slums areas. The finding of the present study revealed that the majority of the studied women heard about toxoplasmosis. This is contradicted with the finding of Jones *et al.* (2003), who assessed the toxoplasmosis-related knowledge and practices among pregnant women in the United States, revealed that less than half of their sample were heard or seen information about toxoplasmosis (Jones *et al.*, 2003).

As regarding the source of information about toxoplasmosis, depended on the results of this study it was obvious that friends and relatives play an important role followed by neighbors in informing women about toxoplasmosis as many women reported having received information about toxoplasmosis from their friends and relatives followed by their neighbors. This is contradicted with the finding of Pereboom *et al.* (2013), who assessed pregnant women's knowledge and behavior to prevent toxoplasmosis revealed that the majority of their subjects gain information about toxoplasmosis from their care providers or read about these in printed media or on the Internet. This is from the researchers' point of view was due to the shortage of health facilities in slums areas in the present study but in the study of Pereboom *et al.* (2013), the sample was national survey into primary care midwifery in the Netherlands where there was available health facilities. This result is not also consistent with the finding of Mohamed *et al.* (2012), who evaluated the health education program about toxoplasmosis infection among pregnant women in Qena University, stated that more than two fifth of their sample got information regarding toxoplasmosis from newspapers and the minority of them received information from family and friends. This may due to that more than three fifth of the sample of that study graduated from secondary and university education and lived in urban area, but in our study nearly half of this studied sample was illiterate or graduated from preparatory education and lived in slums areas.

Regarding the women knowledge related to toxoplasmosis, the present study revealed that women had poor knowledge regarding the meaning of toxoplasmosis, causative agent and

the methods of transmission. On the other hand they had good knowledge regarding cats as the main host of the disease and pregnancy as more susceptible time for toxoplasmosis infection. This result is consistent with a study carried by Jones *et al.* (2003), who stated that the highest level of knowledge was about cats and toxoplasmosis gondii and there was a low level of knowledge about other risk factors. The present study shows that there was a positive correlation between women knowledge and their socio-demographic characteristics except their marital status, the mean score of knowledge was significant higher between women ranged from 35-44 years old, university educated and worked women. This result contradicts with the study of Mohamed *et al.* (2012), who found that there is a negative correlation between age and educational level of pregnant women under study and their total score of knowledge before the program. As regarding the women attitude in the direction of toxoplasmosis, the finding of the study illustrated that the majority of the studied women had a positive attitude regarding the preparation and cooking of meat, importance to washing hand by using soap and water after handling meat, vegetables and playing with cats. This result contradicts with the study of Mohamed *et al.* (2012), who found that nearly the third of their studied sample reported that toxoplasmosis can be found in raw meat. On the other hand they had a negative attitude in the present study regarding wearing gloves during cutting meat, washing vegetables or setting in public park. This study also illustrated that the minority of the study sample had a negative attitude regarding the importance of laboratory investigation performance before and more than once during pregnancy and the use of folic acid and iron during pregnancy. This result from the researchers' point of view that slums areas characterized by the open social relations, that enable the inhabitants of these areas of information and experiences exchange, therefore, most of the studied women were receiving the information from their friends and relatives followed by neighbors.

Conclusion

Women lived in slums had poor knowledge about toxoplasmosis infection during pregnancy. Many women were properly avoiding risk behaviors, without realizing what they are avoiding. In the current study the researchers concluded that there are significant differences between women's knowledge and their socio-demographic characteristics except their marital status. On the other hand, they had a positive attitude regarding toxoplasmosis. It was obvious that there are no significant differences between women age, marital status and their attitude. Statistically, significant differences were detected between women attitude and their educational level and occupation. Also there is a positive correlation between women who had good knowledge and their attitude toward toxoplasmosis infection.

Recommendation

- An educational program about toxoplasmosis infection and measures to prevent it should be designed in slums areas for all women during their reproductive age.
- Mass media should make public awareness regarding toxoplasmosis infection and its effect on pregnancy outcomes.

- Advising women in reproductive age regarding positive attitude and life-style habits to prevent toxoplasmosis as infectious disease still imperative and information about preventive practices need to be complete and sufficient.

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