Original Article

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Assessment of knowledge about toxoplasmosis among nursing college students

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ABSTRACT

Background: Toxoplasmosis is a parasitic disease caused by *Toxoplasma gondii*. Humans acquire toxoplasmosis by consuming infected meat containing cysts of T. gondii or through contact with cat feces. Toxoplasmosis is known to cause miscarriage, also referred to as spontaneous abortion or pregnancy loss, which pertains to an unviable intrauterine pregnancy occurring during the first trimester and is the most common type of miscarriage. **Aim**: The aim of this study is to assess the level of knowledge of nursing students about toxoplasmosis. **Methods**: A questionnaire was administered to 90 nursing students. The self-completed questionnaire consisted of 17 questions covering the parasite, its diagnosis, clinical symptoms, and prevention of toxoplasmosis. **Results**: There was no significant relationship between participants' knowledge and any of the demographic variables. Regarding participants' knowledge, 28.9% demonstrated poor knowledge, 70% showed moderate knowledge, and only 1.1% exhibited good knowledge. **Conclusion**: The knowledge of nursing students regarding toxoplasmosis was found to be unsatisfactory.

Keywords: assessment, nursing, toxoplasmosis, knowledge

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INTRODUCTION

Toxoplasmosis is a parasitic disease caused by *T. gondii*, first described by Nicolle and Manceaux in 1908.[1] Humans acquire toxoplasmosis primarily through the consumption of infected meat containing cysts of *T. gondii* or through exposure to cat feces. When food contaminated with cysts enters the intestine, the cysts invade the intestinal epithelial cells, multiply there, and then spread to the mesenteric lymph nodes and other organs of the body. The symptoms depend on the extent of tissue necrosis, especially when critical organs such as the heart, eyes, and adrenals are affected.[2]

Toxoplasmosis is also known to cause miscarriage, also referred to as spontaneous abortion or pregnancy loss. This pertains to an unviable intrauterine pregnancy that occurs most commonly during the first trimester.[3]

Due to the severity of the disease and the growing interest in owning and raising cats in homes in Iraq—factors that may contribute to an increased risk of toxoplasmosis infections—there is a need to explore nurses' knowledge about toxoplasmosis. It requires significant efforts to enhance awareness regarding the pathogen, its methods of transmission, and prevention strategies.

Health education for pregnant women and healthcare staff represents the first step in the strategic control of congenital toxoplasmosis.[4]

This study aims to assess the knowledge of nursing students regarding toxoplasmosis.

MATERALS AND METHODS

A cross-sectional study was conducted from October 2023 to April 2024, involving 90 students from the College of Nursing at the University of Basrah who were available during the data collection period.

The Alvarado-Esquivel (2017) scale for toxoplasmosis was used after modifications were made, following the review and approval of an expert panel. The modified scale was then distributed to fourth-stage students in both the morning and evening programs.[5]

The first section covers socio-demographic characteristics, including age, sex, job, and address. The second section consists of a questionnaire designed to assess the students' knowledge, comprising 17 items. Data were analyzed using frequencies, percentages, and the chi-square test with SPSS (Statistical Package for Social Sciences), version 20.

Ethical clearance was obtained from the Ethical Clearance Committee of the college of nursing, Basrah University (Reference number: 7/39/324). Participants were informed about the objectives of the study, and verbal informed consent was obtained from each participant before data collection commenced.

RESULTS

The majority of participants (91.1%) were aged between 20 and 25 years. Females represented 70% of the sample, while males accounted for only 30%. Most participants (90%) were students and not employed. Regarding residence, 51.1% of participants lived in the city center, while 48.9% resided in the city suburbs (Table 1).

Regarding participants' knowledge (Table 2), 28.9% demonstrated poor knowledge, 70% exhibited moderate knowledge, and only 1.1% showed good knowledge.

There was no significant relationship between participants' knowledge and any of the variables. Moderate knowledge was most common among participants aged 20–25 years. Additionally, female students residing in the countryside exhibited moderate knowledge (Table 3).

Participants correctly answered questions 1, 3, 4, 5, 9, 11, 13, and 14, which were related to the following topics: the type of pathogen *T. gondii*, the ability of toxoplasmosis to cause health problems for the fetus, the definitive host of toxoplasmosis, the fact that most cases of toxoplasmosis in individuals with strong immunity do not show symptoms, the potential effects of toxoplasmosis on a fetus of a pregnant woman, the ability of toxoplasmosis to affect the inner tissues of the eye, methods of transmission, and other modes of transmission, respectively. Conversely, the highest percentages of incorrect answers were observed in questions 2 (83.3%), 7 (67.8%), 10 (66.7%), and 12 (71.1%), which were related to the following topics: whether toxoplasmosis can cause health problems in adults, the highest risk period for transmission of toxoplasmosis, the potential effects of toxoplasmosis on a fetus of a pregnant woman, and one of the severe symptoms of toxoplasmosis, respectively (Table 4).

Table 1: Demographic characteristics of the participants (n=90).

Variables		Frequency	Percentage
Age	20–25 years	82	91.1
	>25 years	8	8.9
Type of study	Day study	45	50
	Night study	45	50
Sex	Male	27	30
	Female	63	70
Occupation	Student	81	90
	Employee	9	10
Residence	City center	46	51.1
	City suburbs	44	48.9

Table 2: Frequency and percentage of participants' knowledge.

Knowledge	Frequency	Percent
Poor knowledge	26	28.9
Moderate knowledge	63	70.0
Good knowledge	1	1.1
Total	90	100

Table 3: Relationship between knowledge and variables (n=90).

Variables		Knowledge			Total	Asymp. Sig. (2-sided)
		Poor knowledge	Moderate knowledge	Good knowledge		
Age	20–25 years	25	56	1	82	0.5
	More than 25 years	1	7	0	8	
Sex	Male	12	15	0	27	0.09
	Female	14	48	1	63	
Type of study	Day study	13	31	1	45	0.6
	Night study	13	32	0	45	
Occupation	Student	24	56	1	81	0.8
	Employee	2	7	0	9	
Residence	Center	15	31	0	46	0.4
	Countryside	11	32	1	44	

Table 4: Percentage of correct and incorrect answers regarding items of the questionnaire.

No.	Item	Answer	
		Incorrect %	Correct %
1	The pathogen *T. gondii* is…	20	80
2	Can toxoplasmosis cause health problems in adults?	83.3	16.7
3	Can toxoplasmosis cause health problems in the fetus?	13.3	86.7
4	The definitive host of toxoplasmosis is…	34.4	65.6
5	Do most cases of toxoplasmosis in people with strong immunity not show symptoms?	41.1	58.9
6	Does a human vaccine for toxoplasmosis exist?	55.6	44.4
7	The highest risk period for transmission of toxoplasmosis can be observed in:	67.8	32.2
8	Do you know when congenital toxoplasmosis is determined?	56.7	43.3
9	Toxoplasmosis in the fetus causes…	8.9	91.1
10	Toxoplasmosis may cause the fetus to…	66.7	33.3
11	Toxoplasmosis affects the tissues of the inner parts of the eye.	40	60
12	One of the most severe symptoms of toxoplasmosis is…	71.1	28.9
13	Infection can occur through…	25.6	74.4
14	Infection can sometimes occur through…	28.9	71.1
15	To prevent infection with toxoplasmosis, women should take the following precautions…	64.4	35.6
16	This is among the treatments given to pregnant women infected with *T. gondii*…	52.2	47.8

DISCUSSION

T. gondii is one of the most common parasitic infections worldwide, affecting both humans and animals from the Arctic to the tropics. Immunocompromised individuals and pregnant women are the most vulnerable groups.[4]

The results of the current study show that the highest percentage of participants (91.1%) were aged 20–25 years, with 70% of them being female.

Regarding the participants' knowledge, the highest percentage (70%) demonstrated moderate knowledge, while 28.9% had poor knowledge, and only 1.1% exhibited good knowledge. In the study by Hamou et al. (2021)[6] in Morocco, 42.6% of university students were aware of toxoplasmosis. The results of Mahfouz et al.[7] indicated that more than three-quarters (79.1%) of the students had insufficient knowledge about toxoplasmosis. Similarly, a study by Senosy in Egypt found that only 3.2% of students had good knowledge.[8]

In the current study, there was no significant relationship between participants' knowledge and any of the variables (age, sex, type of study, occupation, or residence). Moderate knowledge was most prevalent among the 20–25 age group and among female students living in the countryside. This contrasts with the findings of Mahfouz et al.,[7] who reported that urban populations had higher knowledge levels than rural populations.

A study by Senosy in Egypt[8] found that female students from the Health Care faculty and those from rural areas had a significantly higher rate of good knowledge. Similarly, the study by Hamou et al. (2021) in Morocco examined the relationship between sex and students' knowledge of the disease, reporting that more female students (47.2%) than male students (36.9%) were aware of it.[6] In contrast, Nematollahi et al. (2011) found that male students had a higher knowledge rate (41%) compared to female students (13.9%).[9] Likewise, Ebrahimi et al. (2015) reported that more male students (17.3%) were aware of the disease than female students (13.8%).[10]

Participants correctly answered questionnaire items related to toxoplasmosis being caused by the parasite *T. gondii*, the cat as its definitive host, the risks of toxoplasmosis to pregnant women, and its modes of transmission. However, the highest percentages of incorrect answers were related to topics such as health problems caused by toxoplasmosis in adults, the highest-risk period for transmission, the potential effects of toxoplasmosis on a fetus, and the severe symptoms of the disease.

The study by Hamou et al. (2021) in Morocco found that 36.5% of students identified *T. gondii* as the causative parasite of toxoplasmosis, while 32.1% were aware that the definitive host is the cat.[6] In contrast, studies conducted in Yemen and Iran reported that 50% of students recognized toxoplasmosis as a parasitic disease caused by *T. gondii*, and 64% were aware of the cat's role as the definitive host.[11] In Saudi Arabia, awareness levels were lower, with only 25.1% of students identifying *T. gondii* as the causative agent and 50.25% recognizing the role of cats in disease transmission.[12] Meanwhile, a study by Mansour Ebrahimi et al. in Mashhad found that 64% of students correctly identified cats as the definitive host. However, there was significant misunderstanding regarding routes of transmission and potential sources of infection, with 45.3% and 65.1% of students, respectively, answering these questions incorrectly.[13]

Few students (13.9%) were aware of the mode of transmission of toxoplasmosis in the study by Hamou et al.[6] in Morocco. Additionally, most participants in the same study misunderstood the period of highest transmission and severity during pregnancy. Only about 14% of respondents correctly identified the trimesters in which transmission and severity are highest. Less than half of the respondents in the Moroccan study recognized toxoplasmosis as an opportunistic disease in immunocompromised individuals, despite it being largely asymptomatic in immunocompetent individuals. Furthermore, nearly one-third of participants mistakenly believed that toxoplasmosis always presents with symptoms.

In the study by Senosy[8] in Egypt, only 25.6% of participants agreed that toxoplasmosis infection can occur during pregnancy. Indeed, vertical transmission of *T. gondii* can occur during pregnancy (in utero) or during delivery. This is the primary cause of congenital toxoplasmosis. The infection can be passed from a pregnant woman to her fetus, potentially leading to serious health problems for the child.[11]

CONCLUSIONS

The knowledge of nursing students regarding toxoplasmosis was not satisfactory.

Based on these findings, the study recommends that graduate nursing students receive workshop training and continuing education sessions on toxoplasmosis at the beginning of their hospital careers. Additionally, further studies should be conducted to assess pregnant women's knowledge and behaviors related to toxoplasmosis prevention.

Limitations: This study was conducted exclusively at the College of Nursing, University of Basrah; therefore, the findings cannot be generalized to other settings.

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