Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 02, pp.65017-65023, February, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

HEALTH INTERVENTION IN IMPROVING THE KNOWLEDGE AND ATTITUDE ON TOXOPLASMOSIS AMONG PREGNANT WOMEN WITH TOXOPLASMOSIS IN AL-NAJAF PROVINCE-IRAQ

[1,*]Atheer K. Ibadi, [2]Titi R. Hamedon and [3]Abdulkareem A. Mahmood

[1]Department of Pharmacy, Kufa Institute, Al-Furat Al-Awsat Technical University, 31001 Kufa, Al-Najaf, Iraq
[2]Department of Community Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia
[3]College of Medicine, Kufa University, Iraq

ARTICLE INFO

Article History:
Received 29th November, 2017
Received in revised form
23rd December, 2017
Accepted 05th January, 2018
Published online 18th February, 2018

Key words:
Knowledge,
Attitudes,
Practices,
Pregnant Women,
Toxoplasmosis.

ABSTRACT

Objectives: To determine the effectiveness of health intervention in improving the knowledge and attitude on toxoplasmosis among pregnant women with toxoplasma infection.
Methods: Using randomized control trial study on pregnant women who attended the three randomly selected obstetric and gynecological clinics governmental hospitals in Al-Najaf. Respondents are divided into two groups; the Experiment and Control group. Data collection used self-administered questionnaire in the Arabic language and result analyzed using SPSS Version 21.
Results: Out of a total 340 respondents, majority of them have low knowledge on almost all question items. There was not significant statistical difference in the level of knowledge between the two groups at baseline stage. At first post-test and second post-test, the knowledge score for the Experimental Group become better for all question items, compared to the Control Group. The difference in score improvement between the two groups was statistically significant. As for the attitudes, at baseline, the Experiment Group have more positive attitude compared to the Control Group (Experiment 52.4% and Control 47.6%), and there was not statistical significant difference between groups. At first post-test and second post-test, the level of attitudes for the Experimental Group become better, compared to the Control Group. The difference in the levels improvement between the two groups was statistically significant.
Conclusion: Health intervention given to the Experimental Group was effective in increasing the score of knowledge and improve the attitude on toxoplasmosis compared to the Control Group.

Citation: Atheer K. Ibadi, Titi R. Hamedon and Abdulkareem A. Mahmood. 2018. "Health intervention in improving the knowledge and attitude on toxoplasmosis among pregnant women with toxoplasmosis in al-najaf province-iraq", *International Journal of Current Research*, 10, (02), 65017-65023.

INTRODUCTION

Toxoplasmosis is caused by protozoa named Toxoplasma gondii (Khudair, 2013). This parasite can be transmitted from pregnant woman to her fetus. Infection by this disease can occur through ingestion of viable tissue cysts in undercooked meat or contact withoocysts excreted by cats in the environment (Cook *et al*., 2000). Toxoplasmosis can caused many illnesses during primary infection, especially if infection occurs during the first trimester. In early pregnancy the transmission of this disease is rare, but it increases with duration of gestation. In the first trimester the frequency of transmission is about 15%, in the second trimester 30% and in the third trimester it can goes up to 60% (Feldman, Timms, and Borgida, 2010).

Corresponding author: **Atheer K. Ibadi,**
Department of Pharmacy, Kufa Institute, Al-Furat Al-Awsat Technical University, 31001 Kufa, Al-Najaf, Iraq.

Infection during the first trimester can result in congenital chorioretinitis, deafness, microcephaly, developmental delay and even stillbirth (McAuley, 2014; Pereboom, Manniën, Spelten, Schellevis, and Hutton, 2013). However, when the fetuses are exposed to infection during the third trimester of gestation, it will be more likely to be asymptomatic at birth (Feldman *et al*., 2010). Pregnancy complications associated with Toxoplasma gondii can be prevented by simple precautions and behaviors of pregnant women (Cannon *et al*., 2012; Pereboom *et al*., 2013). A high number of women, especially those who are pregnant are not aware of the risk of developing toxoplasmosis diseases during of pregnancy because they do not have adequate knowledge about the disease. So, they have no preventive strategies against it (Coonrod *et al*., 2008; Paquet *et al*., 2013; Pereboom *et al*., 2013). A number of studies that have been conducted in the United States had shown that the majority of pregnant women

and women of childbearing age had limited knowledge about the methods to prevent of toxoplasmosis infection (Jones *et al*., 2001; Paquet *et al*., 2013; U.S. National Center for Health Statistics, 1994). However, the studies did not mention any figures regarding the respondents' preventive practices against toxoplasmosis. Having good knowledge is considered as a crucial factor for behavior change even though it may not be enough to ensure preventive practices. Changing the behavior of pregnant women and their perception on the likelihood to getinfectious diseases are closely connected with their attitudes and considered significant as contributors in changing their behavior (Lopez, Dietz, Wilson, Navin, and Jones, 2000; Pereboom *et al*., 2013; Vyth *et al*., 2009). Toxoplasmosis is endemic in Iraq and presents serious problem.In Al-Najaf province, Aziz and Drueish, (2011) showed that the prevalence of toxoplasmosis was 41.8% among women who had a previous abortion. In the same year (2011) it was found that about half of pregnant women in Al-Najaf had positive toxoplasma antibody (Samaka, Alhatami, and Mohammed, 2013) and 35% of newborns were infected with congenital toxoplasmosis(Al-haris, Saheb, and Abdul-Sada, 2015). This study is part of a bigger study that was carried out to determine the knowledge, attitudes, and practices related to toxoplasmosis among pregnant women in Al-Najaf province Iraq. Other study objectives are to determine the differences in the level of knowledge and attitude before and after health intervention.

METHODS

Study period and Area

The respondents are randomly selected pregnant women with toxoplasmosis, taken from three O&G clinics of governmental hospitals in Al-Najaf Iraq. The research had permission from the study location authory and written from each respondent. Using single blinding the researcher divided the respondents into two groups, Experiment and Control Group. Data collection used pre-tested self-administered questionnaires in Arabic language. Each respondent took about 10 to 15 minutes to answer the questionnaireat each stage. Data collections from both groups (at baseline, first and second posttests) began in June and finished in October 2015. At the first posttest, the Experiment Group were given 30 minutes' health education lecture on toxoplasmosis (definition of toxoplasmosis, commonest signs,and symptoms, transmission of the disease, complications, and prevention) using Power Points. We collected the first posttest data immediately after the health intervention. For the Control Group we gave health education for half an hour, but on subject other than toxoplasmosis (on iron deficiency anemia), then we collect the posttest data. The second posttest data collection was done after three months.

Inclusion and Exclusion criteria

Inclusion Criteria

The inclusion criteria are pregnant women with positive laboratory evidence of infection with toxoplasmosis (IgG +ve or IgM +ve) who are living in the study area during the study period.

Exclusion Criteria

Pregnant women who have negative laboratory evidence of toxoplasmosis (IgG +ve or IgM +ve) and pregnant women with past medical history such as hypertension.

Survey Instrument

A self-administrated, pre-tested questionnaire was administered to each respondent. The questionnaire comprised of six sections, namely;

Part A on sociodemographic characteristics
Part B contains questions on the housing conditions, pet ownership, cooking preferences and kitchen hygiene
Part C on the sources of infection
Part D on past obstetric history
Part E on past medical history, and
Part F contains questions regarding knowledge, attitude, and practices related to toxoplasmosis.

Data Analysis

We entered raw data into the computer database, carefully verified and checked it. Data was coded, processed and analyzed using Statistical Package for Social Sciences (SPSS) version 22.0. The researcher checked normality of numerical data using Kolmogorov Smirnov test. We analyzed the date presented both descriptively (measures of central tendencies and dispersion) and analytically (such as independent T test to compare groups). We used repeated ANOVA to compare measures between more than two groups. The level of significance is set at $p > 0.05$.

Ethical Considerations

Universiti Putra Malaysia (UPM) Ethics Committee for Research Involving Human Subjects has given their ethical approval for this study (letter reference: UPM/TNCPI/ RMC/1.4.18.1 (JKEUPM)/F2). In addition, the permission to do this research in the study location study was given by Al-Najaf Health Directorate-Center of Training and Development of Staffs (letter reference: No.18223). As written earlier, written consent was also taken from all the respondents before conducting the interview or distributing the questionnaire.

RESULTS

The number of respondents in this study was340 pregnant women and all of them answered the questionnaire, giving a responds rate of 100%. All statistical analysis was done based on 340 respondents.Sociodemographic characteristics of respondents are described in Table 3.1. At baseline, the knowledge score on toxoplasmosis of respondents in both groups are normally distributed. Table 3.2 shows the summary of knowledge score characteristics at baseline for respondents in both groups. The cut-off points to classify the scores of knowledge into two classes (high and low) is according to the mean of sum score. The score that is equal or more than the mean value is classified as having high score, whereas the score that are under than the mean score are classified as having low scores.Table 3.3 shows the summary of the level of score and the statistical differences in both groups. At the first post test, this test was conducted directly after the intervention was given to the respondents (health education lecture about toxoplasmosis for the Experiment group and lecture about iron deficiency during pregnancy for the Control group) to the respondents. This table shows that the most of therespondents in the first post-test, in the Experimental group have high level of knowledge for all items.

Table 3.1 Sociodemographic characteristics of respondents (Experiment and Control groups)

Sociodemographic characteristics			Statistical results		
	Experiment	Control	t- test	χ^2 value	p- value
Age (mean ± sd)	25.9 ±7	28.9 ±8	-1.962		0.060
Monthly income (mean ± sd)	528 ± 272	719 ±271	-1.617		0.107
Level of education (primary level)	62.4%	64.7%		3.437	0.329
Occupation (Housewife)	95.3%	86.4%		9.954	0.127
Place of living (Urban)	71.8%	75.3%		0.735	0.391

*Significant level is set at <0.05
(Atheer and Titi, 2015)

Table 3.2. Characteristics score of knowledge on toxoplasmosis of respondents in both groups at baseline

	Groups			
Question items	Experiment		Control	
	Range of score	Mean ± sd	Range of score	Mean ± sd
Transmission of toxoplasmosis	0 - 4	1.3 ± 1.1	0 - 4	1.1 ± 1.0
Commonest sign and symptoms	0 - 3	0.2 ± 0.6	0 - 3	0.3 ± 0.7
Serious complication	0 - 8	2.0 ± 2.7	0 – 8	2.0 ± 1.9
Toxoplasmosis prevention	0 – 8	2.6 ± 1.5	0 - 8	2.6 ± 1.3
Source of toxoplasmosis infection	0 – 9	3.4 ± 0.6	0 – 9	3.5 ± 0.6

Table 3.3. Knowledge levels for both groups at baseline

Items	Level of	Frequencies		Statistical results		
	Scores	Experiment	Control	χ^2- test	df	p- value
Animals can transmit toxoplasmosis				6.387	1	0.011*
	High level	68	46			
	Low level	102	124			
Commonest signs and symptoms				11.824	1	0.001*
	High level	15	38			
	Low level	155	132			
Serious complications of toxoplasmosis				1.869	1	0.073
	High level	65	53			
	Low level	105	117			
Prevention of toxoplasmosis				0.460	1	0.499
	High level	106	112			
	Low level	64	58			
The sources of toxoplasmosis infection				1.511	1	0.219
	High level	70	59			
	Low level	100	111			

Randomized control trial study, levels of knowledge at baseline stage
*significant at the 0.05 level

Table 3.3. That there is not astatistical significant difference between these two groups at baseline
Table 3.4. Knowledge levels of respondents at first post test

Items	Level of scores	Frequencies		Statistical results		
		Experiment	Control	χ^2- test	df	p- value
Animals can transmit of toxoplasmosis				129.1	1	0.001*
	High level	71.2	10.6			
	Low level	28.8	89.4			
Commonest signs and symptoms				261.9	1	0.001*
	High level	91.2	3.5			
	Low level	8.8	96.5			
Serious complications of toxoplasmosis				59.7	1	0.001*
	High level	80.0	38.8			
	Low level	20.0	61.2			
Ways of prevention of toxoplasmosis				17.9	1	0.001*
	High level	86.5	67.1			
	Low level	13.5	32.9			
Sources of toxoplasmosis infection				11.4	1	0.001*
	High level	55.9	37.6			
	Low level	44.1	62.4			

Randomized control trial study, levels of knowledge at first post-test stage
*significant at the 0.05 level

This situation is totally different than in Control group. It also shows that there is a statistical significant difference between these two groups for all items of knowledge. This part of the results was gathered three months after the first post test.In this table, the results of this study show that the high level of knowledge still more than the low level for the Experimental group, but less than the knowledge score of the first post test.

The situation in the control group is different. The low level of knowledge still more than thehigh level for almost of items. However, there is astatistical significant difference between these two groups for all items of knowledge. Table 3.6 shows that at baseline, the most of therespondents in the Experimental and Control groups have positive level of attitudes (89) and (103) respectively.

Table 3.5. Knowledge levels of respondents at second post test

Items	Level of scores	Frequencies		Statistical results		
		Experiment	Control	χ^2 test	df	p- value
Animals can transmit of toxoplasmosis				17.2	1	0.001*
	High level	94	56			
	Low level	76	114			
Commonest signs and symptoms				8.7	1	0.003*
	High level	88	61			
	Low level	82	109			
Serious complications of toxoplasmosis				9.4	1	0.002*
	High level	87	59			
	Low level	83	111			
Ways of prevention of toxoplasmosis				13.6	1	0.001*
	High level	69	103			
	Low level	101	67			
Sources of toxoplasmosis infection				16.1	1	0.001*
	High level	98	61			
	Low level	72	109			

Randomized control trial study, levels of knowledge at second post-test stage
*significant at the 0.05 level

Table 3.6. Attitudes levels of respondents at three different times of data collections

Stage of data collection	Groups	Attitudes Level	Frequencies	χ^2 test	df	p- value
Baseline	Experiment (n=170)	Positive level	89	2.34	1	0.126
		Negative level	81			
	Control (n=170)	Positive level	103			
		Negative level	67			
First Post-Test	Experiment (n=170)	Positive level	106	3.08	1	0.079
		Negative level	64			
	Control (n=170)	Positive level	90			
		Negative level	80			
Second Post-Test	Experiment (n=170)	Positive level	114	6.944	1	0.011*
		Negative level	56			
	Control (n=170)	Positive level	91			
		Negative level	79			

Randomized control trial study, levels of attitudes at three stages
*significant at the 0.05 level

Table 3.7. Differences in knowledge and attitudes scores within the stages of the study

Items	Statistical results		
	f- test	df (error)	p- value
Transmission of toxoplasmosis	159.9	1(338)	0.001*
Commonest signs and symptoms of the disease	440.9	1(338)	0.001*
The serious complications of toxoplasmosis	191.5	1(338)	0.001*
Ways to the prevention of toxoplasmosis	69.2	1(338)	0.001*
Sources of toxoplasmosis infection	66.3	1(338)	0.001*
Attitudes toward toxoplasmosis	111.9	1.69 51.5	0.001*

Two-way ANOVA, *significant at the 0.05 level

It also shows that there is not statistical significant difference between them. At first post-test, also most of therespondents the Experimental and Control groups have positive level of attitudes (106) and (90) respectively, and there isnotstatistical significant difference between these groups. At the second post-test, the results were and there is a statistical significant difference between groups. According to the results of two-way ANOVA, there is astatistically significant difference within the three stage of data collection and between groups for all items of knowledge and attitudes.

DISCUSSION

The accurate knowledge of toxoplasmosis infection in this study is not only essential to decrease its infection rates, but it is also important to dispel erroneous traditions and customs that can further perpetuate the risk of infection(Babikian *et al*., 2004; Boyer, Tschann, and Shafer, 1999). Knowledge alone does not change attitudes (Macintyre, Rutenberg, Brown, and Karim, 2004).

The lack of knowledge about toxoplasmosis is essential factors in the lack of realization of prevention goals. It has also been shown that people require a continuous and accurate knowledge about toxoplasmosis and its transmission ways. The goodknowledge and social education are important in changing attitudes of the people and preventing toxoplasmosis (Tung, Ding, and Farmer, 2008). The findings of this study show that the level of knowledge about animals that transmit toxoplasmosis infection in both groups are almost similar. Most of the respondents in both groups have low level of knowledge (102) for the Experiment group and (124) for the Control group, however, there is a statistically significant difference between these groups towards the Control group (p-value 0.011). In Ethiopia, one study was conducted in 2015 to assess the knowledge, attitudes, and practices of pregnant women infected with toxoplasmosis, which reported findings similar to ours. It was found that the majority of these pregnant women (92.9%) have a low level of knowledge about toxoplasmosis infection (Desta, 2015).

In Niteroi, Rio de Janeiro- Brazil, another study was conducted to evaluate the level of knowledge related to toxoplasmosis among pregnant women infected with toxoplasmosis. This study also reported results similar to ours; it was found that 72.2% had no knowledge on toxoplasmosis infection (Millar *et al*., 2014). These two studies and their reported results were similar to ours. This similarity might be due to a few factors, such as the majority of pregnant women from Brazil not having completed primary education (88.1%). Similarly, 69.2% pregnant women from Ethiopia did not complete primary education, half of them lived in rural areas, and are from the older age group (31-40). Moreover, the majority of pregnant women in the current study are young lowly educated housewives.

The score of knowledge for the item of the commonest signs and symptoms of toxoplasmosis (feeling they have the flu, swollen lymph glands, and muscles aches and pains) was also low (155 for Experiment and 132 for Control), and was significantly different between the groups (p-value 0.001). In Ethiopia, a study was conducted in 2015 to assess the knowledge, attitudes, and practices of pregnant women infected with toxoplasmosis, and it was found that the majority (84%) lack knowledge about the commonest signs and symptoms of toxoplasmosis(Desta, 2015). A study was conducted in Thailand, the Philippines, and Malaysia in 2014 on the knowledge and practices about toxoplasmosis infection among pregnant women. The result of this study is also similar to our findings; it was found that most of these women (90.1%) had alow level of knowledge about the signs and symptoms of toxoplasmosis (Andiappan *et al*., 2014). All these studies were compared to ours. According to the item of serious complications of toxoplasmosis (miscarriage, stillbirth, deformity birth, premature delivery, encephalitis, mental disability, blindness and loss of hearing),the most of respondents in both groups have low level of knowledge (105 for the Experiment group and 117in the Control group). However, there was notstatistically significant difference between them towards the control group (p-value =0.172). The findings of our study was comparable to the results of one study conducted in Al-Hassa, Saudi Arabia in 2013, where 76.4 % of pregnant Saudi women infected with toxoplasmosis have little knowledge about the serious complications of toxoplasmosis on them and their unborn child(Amin, Ali, Alrashid, Al-Agnam, and Al Sultan, 2013). However, a US study done in 2002 to determine the knowledge and practices of pregnant women with toxoplasmosis about toxoplasmosis infection showed that the respondents possess moderate knowledge (58%) about the complications associated with toxoplasmosis(Jones *et al*., 2003). This difference may be related to the difference in the education of respondents or to the source of information about toxoplasmosis. Most of the respondents in both groups had high level of knowledge on prevention of toxoplasmosis (106 for Experiment group and 112 for Control group). However, there was nosignificant difference between the Experiment and Control groups (p-value 0.498). In contrast, our findings are not similar to the ones reported by a study in the USA. This study found that 61% of pregnant women infected with toxoplasmosis have no knowledge about its prevention(Jones *et al*., 2003). This outcome was also confirmed by Branco and others in Parana, Brazil, in 2012. They found that 83.8% of pregnant women with toxoplasmosis had low level of knowledge on its prevention (Branco, de Araújo and Falavigna-Guilherme, 2013).

Another study was conducted in a gynecological clinic in the city of Fortaleza, Brazil, by Costa, *et al*., 2010. They also found that 83.7% of pregnant women have a low level of knowledge about the prevention of toxoplasmosis (Costa, *et al*., 2012). The knowledge score of the respondents about the sources of toxoplasmosis infection in both groups indicated that the most of therespondents have low level of knowledge about that (100 in the Experimental group and 111in the Control group). However, there is no statistically significant difference between the Experiment and Control groups (p-value 0.219). This result was not similar to what found by one study was conducted in Canada in 2013, it found that most of the respondents have low level of knowledge about the source of toxoplasmosis infection (Paquet *et al*., 2013). This study did not agree with our results at this point, and the Canadian respondents have a high level of knowledge about the source of toxoplasmosis infection, while the respondent in our study reported thelow level of knowledge. This difference may be related to the difference in the source and the type of information on the source of toxoplasmosis infection. Multiple studies confirmed the result about the knowledge of respondents regarding the source of toxoplasmosis infection. Studies from the United States have shown that most women of childbearing age and pregnant women infected with toxoplasmosis in Minnesota had limited knowledge about the sources of toxoplasmosis infection(Ogunmodede, Scheftel, Jones, and Lynfield, 2005; Ross, Victor, Sumartojo, and Cannon, 2008).

Attitudes on Toxoplasmosis

In this study, the score of attitudes toward toxoplasmosis shows that most of thepregnant women in the Experimental group (89) at baseline have a positive level of attitudes. While, 103 of Control group have positive level of attitudes. In addition, there is not statistically significant difference between the Experiment and Control groups (p-value 0.126). However, pregnant women from Malaysia and Thailand appear to exhibit excellent precaution and preventive practices against toxoplasmosis when compared to their Filipino counterparts. This could be due to them being more educated (≥tertiary level of education), which confirms that they are aware of toxoplasmosis (Andiappan *et al*., 2014). Moreover, Jones, *et al*., 2003, in the United States, have also confirmed our results. They found that 80% of pregnant women have a positive level of attitudes toward toxoplasmosis (Jones *et al*., 2003), whereas pregnant women in our study are mostly educated only up to the primary level. The attitudes of pregnant women in exchange practices and perception about the likelihood of contracting infectious diseases during their pregnancy period might also be significant contributors to establish behavioral change (Vyth *et al*., 2009; Peadon *et al*., 2011). The hygiene pregnant women are considered conducive to the prevention of toxoplasmosis (Pawlowski *et al*., 2001). At the first post test,the score of attitudes toward toxoplasmosis shows that most of the respondents (106) in the Experiment group have positive level of attitudes compared to the Control group (90). Also, there is notsignificant statistical difference between these groups (p-value = 0.079). At second post-test,the level of attitudes toward toxoplasmosis shows that most of the respondents in both groups have a positive level of attitudes score (114 for Experiment and 91 for the Control group). It also shows that there is a statistically significant difference between these group (p-value = 0.011). The results of the attitudes score of this study show that there is a statistically

significant difference between baseline, first post-test, and second post-test as we show in table 3.7. Many other researchers confirmed the effectiveness of knowledge intervention (Hess and Whelan, 2009; Rosenthal, Werner and Dubin, 2004; Hazzard *et al*, 2000; Schlichting *et al*., 2007; Ferreira *et al*., 2005).

Conclusion

Health intervention given to the Experimental Group is effective in increasing the score of knowledge and improve the attitude on toxoplasmosis compared to the Control Group. It is suggested that health education on toxoplasmosisis given to pregnant women during their antenatal visit in Al-Najaf Iraq to reduce the incidence of toxoplasmosis.

REFERENCES

Al-haris, F. M., Saheb, H. S. and Abdul-Sada, K. M. 2015. Investigation of Toxoplasmosis in Cord Blood of Newborns at Al-Najaf Province, Iraq by Searching for IgG and IgM Antibodies. *Int. J. Curr. Microbiol. App. Sci*, *4*(2), 314-321. Available athttp://www.ijcmas.com/Accessed on June 8, 2016.

Amin, T. T., Al Ali, M. N., Alrashid, A. A., Al-Agnam, A. A. and Al Sultan, A. A. 2013. Toxoplasmosis preventive behavior and related knowledge among Saudi pregnant women: an exploratory study. *Global journal of health science*, *5*(5), 131. Available athttp://www.ccsenet.org/ journal/html/gjhs/articles/27592.htmlAccessed on January 4, 2016.

Andiappan, H., Nissapatorn, V., Sawangjaroen, N., Khaing, S. L., Salibay, C. C., Cheung, M. M. M., ... & Mat Adenan, N. A. 2014. Knowledge and practice on Toxoplasma infection in pregnant women from Malaysia, Philippines, and Thailand. *Frontiers in Microbiology*, *5*, 291. Available athttp://www.ncbi.nlm.nih.gov/pubmed/24966855Accessed on January 4, 2016.

Aziz, F. M. and Drueish, M. J. 2011. Toxoplasmosis: serious disease during pregnancy. *Baghdad Sci J*, *8*, 91-5.Available at http://csw-journal.org/full/57.pdf Accessed on June 10, 2016.

Babikian, T., Freier, M. C., Hopkins, G. L., DiClemente, R., McBride, D. and Riggs, M. 2004. An assessment of HIV/AIDS risk in higher education students in Yerevan, Armenia. *AIDS and Behavior*, *8*(1), 47-61. Available at http://link.springer.com/article/10.1023/B:AIBE.0000017525.92015.5d Accessed on May 9, 2016.

Boyer, C. B., Tschann, J. M. and Shafer, M. A. 1999. Predictors of risk for sexually transmitted diseases in ninth grade urban high school students.*Journal of Adolescent Research*, *14*(4), 448-465. Available at http://jar.sagepub.com/content/14/4/448.full.pdf Accessed on May 9, 2016.

Cannon, M. J., Westbrook, K., Levis, D., Schleiss, M. R., Thackeray, R. and Pass, R. F. 2012. Awareness of and behaviors related to child-to-mother transmission of cytomegalovirus. *Preventive Medicine*, *54*(5), 351-357. Available at http://www.ncbi.nlm.nih.gov/p mc/ articles/PMC4494733/ Accessed on June 9, 2016.

Cook, A. J. C., Holliman, R., Gilbert, R. E., Buffolano, W., Zufferey, J., Petersen, E. and Dunn, D. T. 2000. Sources of toxoplasma infection in pregnant women: European multicentre case-control study Commentary: Congenital toxoplasmosis—further thought for food. *BMJ*, *321*(7254), 142-147. Available athttp://www.bmj.com/co ntent/321/ 7254/142.short Accessed on June 10, 2016.

Coonrod, D. V., Jack, B. W., Stubblefield, P. G., Hollier, L. M., Boggess, K. A., Cefalo, R. & Lu, M. C. 2008. The clinical content of preconception care: infectious diseases in preconception care. *American journal of obstetrics and gynecology*, *199* (6), S296-S309. Available athttp://dx.doi. org/10.1016 /j.ajog.2008.08.062Accessed on December 15, 2015.

Costa, F. F., Gondim, A. P. S., de Lima, M. B., Braga, J. U., de Souza Vieira, L. J. E. and Araújo, M. A. L. 2012. Preventive behavior for toxoplasmosis in pregnant adolescents in the state of Ceara, Brazil. *BMC Public Health*, *12*(1), 1. Available athttp://bmcpublichealth. biomedcentral. com/articles/10.1186/1471-2458-12-73 Accessed on January 4, 2016.

Desta, A. H. 2015. Knowledge, Attitude and Practice of Community Towards Zoonotic Importance of Toxoplasma Infection in Central Afar Region, North East Ethiopia. International *Journal of Biomedical Science and Engineering*, *3*(6), 74–81. Available athttp://www.sciencep ublishinggro up.com/j/ijbseAccessed on February 17, 2016.

Feldman, D. M., Timms, D. and Borgida, A. F. 2010. Toxoplasmosis, parvovirus, and cytomegalovirus in pregnancy. *Clinics in laboratory medicine*, *30*(3), 709-720. Available at http://ezproxy.upm.edu.my:2099/ 10.1016/ j.cll.2010.04.009Accessed on June 10, 2016.

Ferreira, M. R., Dolan, N. C., Fitzgibbon, M. L., Davis, T. C., Gorby, N., Ladewski, L. & Bennett, C. L. 2005. Health care provider-directed intervention to increase colorectal cancer screening among veterans: results of a randomized controlled trial. *Journal of Clinical Oncology*, *23*(7), 1548-1554. Available at https://jco.ascopubs.org/ content/23/ 7/1548.full Accessed on May 9, 2016.

Hazzard, A., Dabrow, S., Celano, M., McFadden-Garden, T. and Melhado, T. 2000. Training residents in pediatric literacy: impact on knowledge, attitudes and practice. *Ambulatory Child Health*, *6*(4), 237-246. Available at http://onlinelibrary.wiley.com/doi/10.1046/j.1467-0658.2000.00085.x/abstract Accessed on May 9, 2016.

Hess, J. and Whelan, J. S. 2009. Making health literacy real: adult literacy and medical students teach each other. *Journal of the Medical Library Association: JMLA*, *97*(3), 221. Available at http://www.ncbi.nlm.nih.gov/ pmc/ articles/PMC2706439/ Accessed on May 9, 2016.

Hughes, J. M., Colley, D. G., Lopez, A., Dietz, V. J., Wilson, M., Navin, T. R. and Jones, J. L. 2000. Preventing congenital toxoplasmosis. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 57-75. Available at http://www.jstor.org/stable/42000708Accessed on June 10, 2016.

Ibadi, A. K. and Hamedon, T. R. 2016. Sociodemographic characteristics of pregnant women with toxoplasmosis in Al-Najaf-Iraq. Malaysian Journal of Public Health Medicine, Vol. 16 (3).

Jones, J. L., Kruszon-Moran, D., Wilson, M., McQuillan, G., Navin, T. and McAuley, J. B. 2001. Toxoplasma gondii infection in the United States: seroprevalence and risk factors. *American journal of epidemiology*, *154*(4), 357-365. Available at https://aje.oxfordjournals.org/content /154/4/357.fullAccessed on June 10, 2016.

Jones, J. L., Ogunmodede, F., Scheftel, J., Kirkland, E., Lopez, A., Schulkin, J. and Lynfield, R. 2003. Toxoplasmosis-related knowledge and practices among pregnant women in the United States. *Infectious diseases in obstetrics and*

gynecology, *11*(3), 139-145. Available athttp://www. hindawi.com/journals/idog/2003/612152/abs/Accessed on January 4, 2016.

Khudair, F. W. 2013. Knowledge of Prenatal Care Nurses toward Management of Toxoplasmosis in Pregnant Women.Iraqi National Journal of Nursing Specialties, 26(1):58–62. Available athttp://iasj.net/iasj?func= article& aId=76726 Accessed on June 10, 2016.

Macintyre, K., Rutenberg, N., Brown, L. and Karim, A. 2004. Understanding perceptions of HIV risk among adolescents in KwaZulu-Natal. *AIDS and Behavior*, *8*(3), 237-250. Available at http://link.springer.com/article/10.1023/ B:AIBE. 0000044072.71361.b3 Accessed on May 9, 2016.

McAuley, J. B. 2014. Congenital toxoplasmosis. *Journal of the Pediatric Infectious Diseases Society*, *3*(Suppl 1), S30-S35. Available athttp://jpids.oxfordjour nals.org/content/3/suppl _1/S30.shortAccessed on June 8, 2016.

Millar, P. R., Moura, F. L. D., Bastos, O. M. P., Mattos, D. P. B. G. D., Fonseca, A. B. M., Sudré, A. P. & Amendoeira, M. R. R. 2014. Toxoplasmosis-related knowledge among pregnant and postpartum women attended in public health units in Niteroi, Rio de Janeiro, Brazil. *Revista Do Instituto de Medicina Tropical de São Paulo*, *56*(5), 433-438. Available at http://dx.doi.org/10.1590/S0036-466520140 00500011 Accessed on May 9, 2016.

National Center for Health Statistics (US). 1994. *Plan and operation of the third National Health and Nutrition Examination Survey, 1988-94.* Series 1: programs and collection procedures. *Vital and Health Statistics. Ser. 1, Programs and Collection Procedures*, (32), 1–407. Available at https://www.cdc.gov/nchs/ Accessed on May 9, 2016.

Ogunmodede, F., Scheftel, J., Jones, J. L. and Lynfield, R. 2005. Toxoplasmosis prevention knowledge among pregnant women in Minnesota.*Minnesota Medicine*, *88*(2), 32-34. Available athttp://europepmc.org/ab stract/med/17886796Accessed on January 4, 2016.

Paquet, C., Yudin, M. H., Allen, V. M., Bouchard, C., Boucher, M., Caddy, S. & van Schalkwyk, J. 2013. Toxoplasmosis in pregnancy: prevention, screening, and treatment. *Journal of Obstetrics and Gynaecology Canada*,*35*(1), 78-79. Available athttp://citeseerx.ist.psu.edu/view doc/down load?doi=10.1.1.661.6294&rep=rep1&type=pdfAccessed on December 15, 2015.

Pawlowski, Z. S., Gromadecka-Sutkiewicz, M., Skommer, J., Paul, M., Rokossowski, H., Suchocka, E. and Schantz, P. M. 2001. Impact of health education on knowledge and prevention behavior for congenital toxoplasmosis: the experience in Poznan, Poland. *Health education research*, *16*(4), 493-502. Available athttp://her.oxford journals.org/content/16/4/493.longAccessed on January 4, 2016.

Peadon, E., Payne, J., Henley, N., D'antoine, H., Bartu, A., O'Leary, C., & Elliott, E. J. 2011. Attitudes and behaviour predict women's intention to drink alcohol during pregnancy: the challenge for health professionals. *BMC Public Health*, *11*(1), 1. Available athttp://bmcpublic health.biomedcentral.com/articles/10.1186/1471-2458-11-584Accessed on January 4, 2016.

Pereboom, M. T., Manniën, J., Spelten, E. R., Schellevis, F. G. and Hutton, E. K. 2013. Observational study to assess pregnant women's knowledge and behaviour to prevent toxoplasmosis,listeriosis and cytomegalovirus.*BMC pregnancy and childbirth*, *13*(1), 1. Available athttp://www.ncbi.nlm.nih.gov/pubmed/23627427Accessed on June 8, 2016.

Rosenthal, M. S., Werner, M. J. and Dubin, N. H. 2004. The effect of a literacy training program on family medicine residents. *FAMILY MEDICINE-KANSAS CITY-*, *36*(8), 582-587. Available at https://www.stfm.org/ fmhub/ fm2004/September/Marjorie582.pdf Accessed on May 9, 2016.

Ross, D. S., Victor, M., Sumartojo, E. and Cannon, M. J. 2008. Women's knowledge of congenital cytomegalovirus: results from the 2005 HealthStyles™ survey. *Journal of women's health*, *17*(5), 849-858. Available at http://online.lieb ertpub.com/doi/abs/10.1089/jwh.2007.0523Accessed on January 4, 2016.

Samaka, H. M., Alhatami, A. O. and Mohammed, K. G. 2013. Evaluation of the toxocell latex agglutination test as screening test and distribution of toxoplasma antibodies among sexually active people in Najaf city. Kufa Journal for Nursing Sciences. Oct 3;2(1). Available at http://www.kuiraq.com/journals/index.php/kjns/article/view /139Accessed on June 8, 2016.

Schlichting, J. A., Quinn, M. T., Heuer, L. J., Schaefer, C. T., Drum, M. L. and Chin, M. H. 2007. Provider perceptions of limited health literacy in community health centers. *Patient education and counseling*, *69*(1), 114-120. Available at http://www.sciencedirect.com/science/article/pii/S07383991 07003096 Accessed on May 9, 2016.

Tung, W. C., Ding, K. and Farmer, S. 2008. Knowledge, attitudes, and behaviors related to HIV and AIDS among college students in Taiwan. *Journal of the Association of Nurses in AIDS Care*, *19*(5), 397-408. Available at http://www.sciencedirect.com/science/article/pii/S10553280 08001416 Accessed on May 9, 2016.

Vyth, E. L., Steenhuis, I. H., Mallant, S. F., Mol, Z. L., Brug, J., Temminghoff, M., & Seidell, J. C. 2009. A front-of-pack nutrition logo: a quantitative and qualitative process evaluation in the Netherlands. *Journal of health communication*, *14*(7), 631-645. Available at http://www.tandfonline.com/doi/abs/10.1080/10810730903 204247 Accessed on May 9, 2016.

****