Prevalence of Abortion and Neonatal Death and Its Relation to Congenital TORCH Infections in the Departments of Gynaecology and Obstetrics and Neonates of Benghazi Medical Centre from 2014 to 2018

Samir Abd-elgawad[1] and Huda Mohamed[1*]
Please check corresponding author
[1]Department of Environmental Health, Faculty of Public Health, University of Benghazi, Libya.

Original Research Article

ABSTRACT

Background: TORCH infection is responsible for the major of maternal and fetal morbidity and mortality in the pregnancy because of their ability to generate congenital defects. It transmits to foetus from the mother during gestation or delivery time and leads to serious complication to the foetus. It can lead to abortion, congenital anomalies and intrauterine fetal death. In fact, the most effective way to prevent the infection is a regular hand washing, particularly when caring for infected women and babies. The aim of this study is to assess the relationship between the rate of abortion and foetus death and TORCH infection as a major cause.
Methods: The data was collected from neonatal death records from the department of gynaecology, obstetrics and neonates at Benghazi Medical Centre, which includes age groups, and causes of death, the data included all records from October 2014 to December 2018.
Results: The current study reveals that there is a significant elevation in the fetal and infant mortality rates from 2014 to 2018, and these numbers were increasing throughout the years without any medical reasons. High foetus death was observed at gestational period 33 -40 weeks, while the neonate death was higher at age 1 to 30 days. Furthermore, this study reported that head and brain congenital anomalies was the most common between foetus and neonates and these findings were assumed that the death of the foetus and neonate could be caused by any of TORCH infections when compared to previous studies.
Conclusion: Elevation rates of neonates and foetus is an obvious issue that must be of major concern, so that, the findings of this study emphasizing on the demand for doing TORCH test for all pregnant women at the first of pregnancy to early recognizing the infection. In addition, it is ensuring the demands of doing the TORCH test with the required HIV and hepatitis C tests before delivery to guide the staff take further attention. in addition, it emphasizes the need to focus on the effectiveness of hand hygiene, cleaning and disinfection in the department to reduce the rate of infection.

**Corresponding author: Email: huda.mohamed@uob.edu.ly and huda.mohamhed@uob.edu.ly;*

Keywords: Abortion prevalence; neonatal death; TORCH infections; pregnancy.

1. INTRODUCTION

Abortion and stillbirth are attributed to several causes such as TORCH infections, endocrine problems, chromosomal abnormalities, environmental hazard, genetic and maternal diseases (Kock, 2004).

TORCH stands for Toxoplasma gondii, rubella, cytomegalovirus and herpes (Deka, 2011). They are the most common cause of foetus mortality and morbidity in developing country(Das et al., 2007), which the primary TORCH infection has reported high mortality rates than recurrent infection (Maruyama et al., 2007).

It can be transmitted during gestation or delivery time through placenta (Deka, 2011), their symptoms are generally asymptomatic and chronic in mothers (Tiwari et al., 2016), however, it can cause serious impacts in foetus (Kaur et al., 1999) such as abortion, congenital anomalies, foetus death, malformation or leads to living baby with diseases(Maruyama et al., 2007). These happen as results of disability of foetus to resist the caused organisms (Mladina et al., 2002) and that leads to negative social and economic impact (Sebastian et al., 2008).

Toxoplasmosis gondii is caused by protozoan, it is the most prevalent one of TORCH infections (Sadik et al., 2012). It can be transmitted through contaminated soil, food and water with oocytes from infected cat faecal and contaminated raw meat with tissue cysts, and tachyzoites can transmit through transplacental during gestation period from mother to foetus (Deka, 2011). Infected mothers are usually asymptomatic, however, it has a negative impact on the foetus development depending on the stage of pregnancy (The Center for Food Security and Public Health, 2017), it leads to abortion, stillbirth or live baby with congenital toxoplasmosis such as small or very large head (CDC, 2018). The incidence of Foetus infection is more common during the third trimester, which is about 60- 70%, while the first trimester is more severe and less common, which about 10-15% (Deka, 2011). Its effects during the first trimester include fetal abnormalities range from chorioretinitis, hydrocephalus, convulsions and intracerebral calcifications to only mild effects, such as slightly diminished vision. Strabismus, nystagmus and microphthalmia. Furthermore, Foetus infected in the third trimester are often asymptomatic at birth and if they do not treat, these neonates may have severe complications such as chorioretinitis, pneumonia, splenomegaly, hepatomegaly, maculopapular rash (The Center for Food Security and Public Health, 2017).

Rubella is an RNA virus from paramyxovirus (Sadik et al., 2012); it transmits through the airborne droplet of the infected person (WHO, 2019). About 60 % of foetus become infected during the first three months of the gestation period, this type of infection leads to an elevated frequency of miscarriage, stillbirths as well as congenital malformations called Congenital Rubella Syndrome CRS. (Hamdan et al., 2011) and its symptoms include UTI, fever, conjunctivitis, malaise and lymphadenopathy. In addition, it leads to loss of hearing, blindness, mental retardation (Kesson, 2001) and a congenital heart defect. The defects in cardiac and eyes are developed when the infection is getting during the first 8 weeks while hearing defects and retinopathy are happening when infection getting during 16 weeks (Deka, 2011). Also, it causes Low birth weight and Skin rash at birth (CDC, 2017).

Herpes Simplex Virus (HSV) infection is transmitted to the foetus through the birth canal of infected mothers during birth so that this infection usually acquired at birth (Sadik et al., 2012). Moreover postnatal infection occurs through kissing or touching neonate by infected person and mother can get infection from direct contact with infected lesion, its complication on infant include lesion of skin such as ulcer and erythematous; neurological lesion such as encephalomalacia, haemorrhage, ventriculomegaly and calcification; and lesion of eyes such as chorioretinitis, cataracts and detachment of retinal (Wilson, 2013).

Cytomegalovirus (CMV) is herpesvirus; it occurs more common during perinatal periods (Padmavathy et al., 2013). It can be transmitted at any stage during pregnancy, its rout of transmission to the foetus include transplacental transmission, infected breast milk and other body fluids like saliva and urine

(Pizzo, 2011). The most common infection transmission happens in the first trimester; about 90% of primary CMV infection is asymptomatic (Deka, 2011). Its sign on infected neonate include baby with congenital CMV seems healthy at birth but the develop significantly over the time with signs such as hearing loss, developmental delay, low birth weight, yellow skin and eyes, enlarged a poor liver and spleen function, purple skin splotches or rashes or both, abnormally small head (microcephaly), enlarged spleen, retinitis. (CDC, 2018)

The aim of this study was to assess the relationship between abortion and neonate death and the TORCH infection in the department of gynaecology and obstetrics of Benghazi Medical Centre.

2. METHODS AND MATERIALS

A retrospective observational study of neonatal death records and abortion records from the department of gynaecology and obstetrics at Benghazi Medical Centre, these records include the age of foetus and infant at death and causes of death. The sample size was 2169 death certificates that recorded from October 2014 to December 2018 and these data were analysed by using the Statistical package for social sciences (SPSS) version 22 software.

This study was conducted after approval had been obtained from Benghazi Medical Centre, following the sending of a preliminary request letter to the manager of the BMC to obtain permission to carry out this study and collect all records of neonate death and abortion certificate, He provided a preliminary agreement by signing the letter of request. (Appendix 1)

Limitations: Most certificates did not include reliable and accurate data about the foetus and preterm ages, also, in some reports, the main causes of neonatal death and abortion were not mentioned, which the mentioned cause was normal intrauterine foetal death. Honestly, it is not scientific or logic to say that there are no reasons for intrauterine foetus death, so that, the author excluded these types of reports to reduce the bias in this study.

3. RESULTS

The present study reported that the rates of fetal and neonate death have been increased gradually in the period of study, which increased from 357 to 586 death cases. (Table 3.1).

Additionally, Table 3.2 indicates that the mortality rate of the foetus is higher among the age group of 17 to 24 weeks than other groups in 2014 and 2015, while it is higher at age 33-40 weeks in 2016, 2017 and 2018.

Table 3.1. Number of foetus and neonate death cases from 2014-2018

Years	Number of death cases (age in weeks)	Number of death cases (age in days)	Total number of death cases
2014	34	65	145
2015	169	188	357
2016	353	202	555
2017	285	244	529
2018	306	277	583

Table 3.2. Number of foetus death cases according to age from 2014-2018

Age (in weeks) before born	Number of death cases 2014	Number of death cases 2015	Number of death cases 2016	Number of death cases 2017	Number of death cases 2018
1-8	0	1	4	1	1
9- 16	3	11	4	3	2
17-24	14	60	90	54	53
25 -32	9	47	114	106	116

33-40	7	50	139	117	129
44-41	1	0	2	4	5
Total	34	169	353	285	306

On the other hand, the mortality rate of the neonate is higher among age group 1 day to one month from 2015 to 2018. (See Table 3.3)

Regarding the causes of death, Table 3.4 demonstrates that congenital malformation anomalies are the main cause of death in 2017, while Intrauterine fetal death is the main mentioned cause in death records in 2014, 2015, 2016 and 2018.

In more detail, Fig. 3.1 represents that most common type of congenital anomalies is Congenital deformities in the lungs in 2016, 2017 and 2018, while the Multiple congenital malformations is the commonly reported cause in death certificates of cases in 2014 and 2015, also, it comes the second one after lungs deformities in 2016 till 2018.

4. DISCUSSION

The findings of the current study reveal that there is an obvious issue that must be of major concern because it found a significant elevation in the fetal and infant mortality rates from 2014 to 2018. In addition, it found that the highest rate of the intrauterine death was reported at the age groups 33-40 weeks, followed by age groups 25-32, 17-24, then 1-16 weeks.

Table 3.3. Number of neonate death cases according to age from 2014-2018

Age (in days) after born	Number of death cases 2014	Number of death cases 2015	Number of death cases 2016	Number of death cases 2017	Number of death cases 2018
1-23 hour	40	14	40	49	52
1-30 days	38	37	100	156	165
31-60 days	1	0	3	2	1
90-120 days	1	0	0	1	0
Unknown Age	6	137	59	36	59
Total	65	188	202	244	277

Table 3.4. Number of fetal and neonate death cases according to causes of death from 2014-2018

Causes of death	Number of death cases in 2014	Number of death cases in 2015	Number of death cases in 2016	Number of death cases in 2017	Number of death cases in 2018
Abortion	7	67	24	16	34
Intrauterine fetal death	59	136	212	171	202
preterm births	20	55	15	19	34
congenital malformation anomalies	38	87	151	197	188
Sepsis	4	12	35	26	35
Cardiopulmonary arrest	13	11	45	39	22
Prune Belly syndrome	0	0	0	1	0
Edward syndrome	0	1	5	5	8
Down's syndrome	0	0	0	2	3
Patau Syndrome	0	0	0	0	1
Potters syndrome	0	0	0	0	1
Causes related to maternal health status	2	14	40	53	44

Unknown reason	2	23	28	3	5

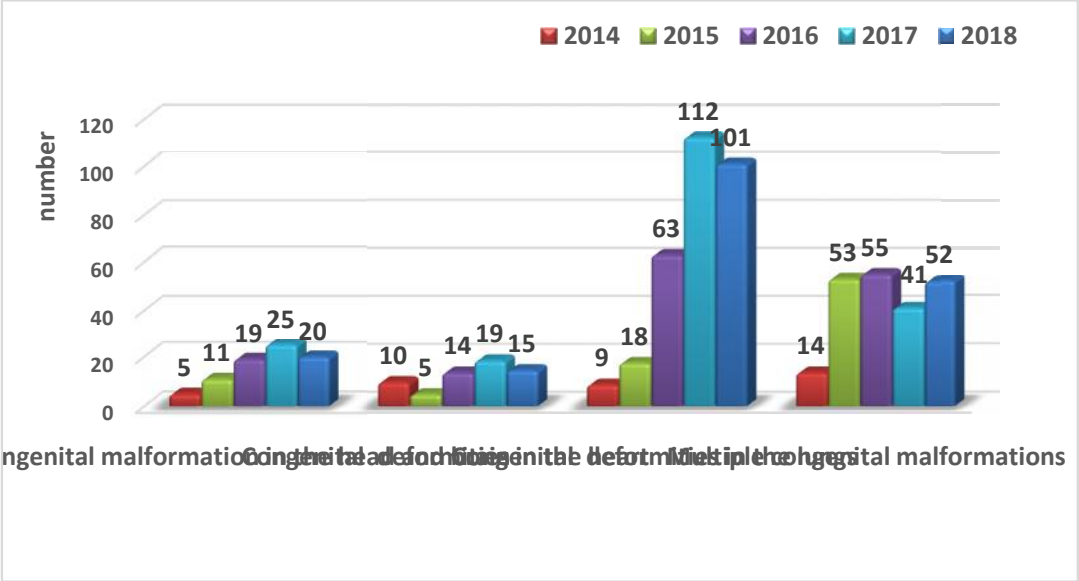

Fig. 3.1. Types of congenital anomalies

In contrast, Song et al. found that the highest rates of foetus death were observed at 20-23 weeks in Japan, Korea and the United States from 2009 to 2014. It could say the highest number of foetus death during 33- 40 weeks of gestation period in this study may belong to Toxoplasmosis, syphilis and cytomegalovirus infection. Which the highest rate of toxoplasmosis infection transmission can be seen in the third trimester and it is accounted for 60- 70% (Deka, 2011).

Furthermore, transmission of congenital syphilis and cytomegalovirus can occur at any stage of the pregnancy (WHO, 2017), additionally, Zeb et al. (2018) indicated that high foetus rate was reported at 21-25 weeks and 31- 35 weeks, and 6.9% of these cases were related to TORCH infection with high rate reported to Toxoplasmosis infection (Zeb, 2018).
On the other hand, Sebastian et al. found that high foetus death rate was at first trimester in 2008 in Kerala and they found that 50.7% of these cases had toxoplasma, 11.9% rubella, 28.2% CMV and 59.2% for HSV. The results from other studies presented that fetal loss during the first few weeks of pregnancy has been estimated to be 31% after implantations, the earliest recognizable effects of infection are usually clear after six to eight weeks of pregnancy (WHO, 2012).

Whereas the neonatal death rate was recorded after delivery 1-30 days, and that could probably be caused by HSV, this is due to the fact that says, the highest risk of passing herpes to new-born occurs during the third trimester at the time of delivery.

Additionally, intrauterine foetus death was reported as the main cause of death in 2014, 2015, 2016 and 2018 in this study which could be caused by CMV, Rubella and Toxoplasmosis infection, this was agreed with Prasoona et al. 2015 which found that 96 % of intrauterine death was caused by CMV infection. Also, the study found that Intrauterine death cause was followed by congenital malformation, abortion, cardiopulmonary arrest and sepsis, and all these causes was significantly associated with TORCH infection, which Prasoona et al. carried out study that in reality emphasize the connection between intrauterine, neonatal death and etiological agents (TORCH) that causing abortion, intrauterine death and congenital anomalies. This study included 1158 high-risk pregnant attending to Modern Government Maternity Hospital from 2010 to 2013 in India. They found that 97% of pregnant had IgM and IgG seropositivity for CMV, 84% for Rubella, and 65% and 36% for HSV and toxoplasmosis respectively. In more details, they found that 55% of infected women with toxoplasma had preterm labour, 45% intrauterine death, 32% repeated abortion, also, Rubella seropositivity showed congenital anomalies, preterm labor, neonate death, repeated miscarriage an death, 95%

preterm labor, 94% early infant death and 92% congenital anomalies. Lastly d intrauterine death. Furthermore, pregnant infected with CMV showed 96% intrauterine, Seropositivity pregnant for HSV indicated 77% congenital malformation, 72% preterm labour, 70% repeated miscarriage.

Furthermore, the findings of the current study showed the congenital malformations recorded as the most common cause of death in 2017. This also was demonstrated in the WHO report in 2016 that suggested the main cause of neonatal and fetal death is congenital anomalies and it considered the maternal infection with TORCH as one of the main risk factors of fetal and neonatal deaths that result of maternal infection with syphilis and rubella. Since syphilis, it was estimated to be about 1.5 million cases that occur during pregnancy each year (Newman et al., 2013). Moreover, about 60 % of the foetus becomes infected with rubella during the first three months of the gestation period and causes serious consequences on the foetus. It can affect the development of the foetus organs, which result in miscarriage, fetal death, and congenital anomalies (Hamdan et al., 2011). Furthermore, Cardiopulmonary failure could happen as a result of para virus B 19 infection which para virus induce arrest of production of red blood cells primarily in the second trimester period (Miller et al., 1998). In addition, this virus could lead to an increase in the risk of abortion and stillbirth (Xiong et al., 2019).

Moreover, the present study indicated that 80 cases out of 661 had congenital head and brain, and that could be a result of TORCH infection which Xinet al., 1997 studied the relationship between TORCH infection and the neurological change in neonate and infant by using CT scan. They found TORCH is associated positively with head and brain malformation, which leads to microcephalic focal, hydrocephalus and calcification. In addition, they found the earlier infection of pregnancy was relate to brain developmental anomalies. Furthermore, Malinger et al. 2003found that microcephaly and abnormal brain CT scan were reported in all infected foetus with CMV of mean age 27.5 weeks. Additionally, Sunitha et al. 2016 reported that central nervous system such as microcephaly and intracardiac focus was the major congenital anomalies, followed by renal anomalies, this study included 3301pregnant and diagnosis was done by TORCH test and 3D and 4D ultrasound, also, they reported that toxoplasmosis has a significant association within pregnant with congenital anomalies in South India.

5. CONCLUSION

The findings of this study proved that the TORCH infections can be considered as of elevated the rates of abortion and neonate death rates, which can cause mild maternal morbidity but have serious fetal consequences.

To conclude, It is important to take in account that the increasing knowledge of doctors to these infections will help them in counselling mothers on the appropriate preventive measures to avoid TORCH infection, also will help the parents on detection of the potential of adverse fetal effects when these infections are present.

So, this study emphasizes the demand for doing a TORCH test for all pregnant women at the first of pregnancy to early recognizing of the infection. In addition, it is ensuring the demands of doing the TORCH test with the required HIV and hepatitis C tests before delivery to guide the staff take further attention. Secondly, Screening for TORCH infections in all women (married and pregnant) especially those with a history of frequent abortion, neonatal and foetal death. Lastly, the need to focus on the effectiveness of hand hygiene, cleaning and disinfection in the department to reduce the rate of infection must be in much concern.

CONSENT

It is not applicable

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

CDC, 2017. Rubella transmission. Available online at https://www.cdc.gov/rubella/about/transmission.html

CDC, 2018. Parasites - Toxoplasmosis (Toxoplasma infection). Available online at https://www.cdc.gov/parasites/toxoplasmosis/disease.html

CDC, 2018. Babies Born with CMV (Congenital CMV Infection). Available online athttps://www.cdc.gov/cmv/congenital-infection.html

Das, S., Ramachandran, V.G. and Arora, R., 2007. Cytomegalovirus and rubella infection in children and pregnant mothers--a hospital based study. The Journal of communicable diseases, 39(2), pp.113-117.

Deka, D., 2011. Congenital intrauterine TORCH infections. *New Delhi Jaypee*Brothers; 224, 8.

Fleming, D.T., McQuillan, G.M., Johnson, R.E., Nahmias, A.J., Aral, S.O., Lee, F.K. and St. Louis, M.E., 1997. Herpes simplex virus type 2 in the United States, 1976 to 1994. *New England Journal of Medicine*, *337*(16), pp.1105-1111.

Hamdan, H.Z., Abdelbagi, I.E., Nasser, N.M. and Adam, I., 2011. Seroprevalence of cytomegalovirus and rubella among pregnant women in western Sudan. *Virology journal*, *8*(1), p.217.

De Kock, J. and Van der Walt, C. eds., 2004. *Maternal and newborn care: A complete guide for midwives and other health professionals*. Juta and Company Ltd.

Kaur, R., Gupta, N., Nair, D., Kakkar, M. and Mathur, M.D., 1999. Screening for TORCH infections in pregnant women: a report from Delhi. *Southeast Asian journal of tropical medicine and public health*, *30*(2), pp.284-286.

Kesson, A.M., 2001. Management of neonatal herpes simplex virus infection. *Paediatric drugs*, *3*(2), pp.81-90.

Li, X., Li, M. and Yang, Z., 1997. Congenital TORCH infections of the brain--CT manifestation (with analysis of 7 cases). *Chinese Journal of Radiology*, *31*(3), pp.160-163.

Malinger, G., Lev, D., Zahalka, N.,Aroia, Z.B., Watemberg, N., Kidron, D., Sira, L.B. and Lerman-Sagie, T., 2003. Fetal cytomegalovirus infection of the brain: the spectrum of sonographic findings. *American Journal of Neuroradiology*, *24*(1), pp.28-32.

Maruyama, K., Asai, J., Ii, M., Thorne, T., Losordo, D.W. and D'Amore, P.A., 2007. Decreased macrophage number and activation lead to reduced lymphatic vessel formation and contribute to impaired diabetic wound healing. *The American journal of pathology*, *170*(4), pp.1178-1191.

Miller E, Fairley CK, Cohen BJ, et al. Immediate and long term outcome of human parvovirus (B19) infection in pregnancy. Br J ObstetGynaecol
1998;105:174-178

Mladina, N., Mehikić, G. and Pasić, A., 2000. Torch infections in mothers as a cause of neonatal morbidity. *Medicinskiarhiv*, *54*(5-6), pp.273-276.

Padmavathy, M., Gowri, M., Malini, J., Umapathy, B.L., Navaneeth, B.V., Bhatia, M. and Harle, S., 2013. Seroprevalence of TORCH infections and adverse reproductive outcome in current pregnancy with bad obstetric history. *J Clin Biomed Sci*, *3*(2), pp.62-71.

Prasoona, K.R., Srinadh, B., Sunitha, T., Sujatha, M., Deepika, M.L.N., Lakshmi, B.V., Ramaiah, A. and Jyothy, A., 2015. Seroprevalence and influence of torch infections in high risk pregnant women: a large study from South India. *The journal of Obstetrics and Gynecology of India*, *65*(5), pp.301-309.

Pizzo JD.2011. Focus on Diagnosis: Congenital Infection, Ped. in Review; 32: 537-542.

Sadik, M.S., Fatima, H., Jamil, K. and Patil, C., 2012. Study of TORCH profile in patients with bad obstetric history. *Biology and Medicine*, *4*(2), p.95.

Sebastian, D., Zuhara, K.F. and Sekaran, K., 2008. Influence of TORCH infections in first trimester miscarriage in the Malabar region of Kerala. *African Journal of Microbiology Research*, *2*(3), pp.56-59.

Song, Y.H., Lee, G.M., Yoon, J.M., Cheon, E.J., Lee, S.K., Chung, S.H. and Lim, J.W., 2017. Trends in fetal and perinatal mortality in Korea (2009–2014): comparison with Japan and the United States. *Journal of Korean medical science*, *32*(8), pp.1319-1326.

Sunitha, T., Prasoona, K.R., Kumari, T.M., Srinadh, B., Deepika, M.L.N., Aruna, R. and Jyothy, A., 2017. Risk factors for congenital anomalies in high risk pregnant women: A large study from South India. Egyptian Journal of Medical Human Genetics, 18(1), pp.79-85.

Tiwari, S., Arora, B.S. and Diwan, R., 2016. TORCH IgMseroprevalence in women with abortions as adverse reproductive outcome in current pregnancy. *Int J Res Med Sci*, *4*(3), pp.784-788.

The Center for Food Security and Public Health , 2017. Toxoplasmosis. Available online at http://www.cfsph.iastate.edu/Factsheets/pdfs/toxoplasmosis.pdf

WHO, 2012. Investment case for eliminating mother-to-child transmission of syphilis. Availble online at https://apps.who.int/iris/bitstream/handle/10665/75480/9789241504348_eng.pdf;jsessionid=448EA2C75012740F9EA9E9C2B7EAFAFB?sequence=1

WHO, 2016. Congenital anomalies. Available online at https://www.who.int/news-room/fact-sheets/detail/congenital-anomalies

WHO, 2016.The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM. Available on line at https://www.who.int/reproductivehealth/publications/monitoring/icd-10-perinatal-deaths/en/

WHO, 2019. Rubella. Available online at https://www.who.int/ith/diseases/rubella/en/

Wilson-Davies, E.S.W. and Aitken, C., 2013. When should the 'TORCH'study be requested?. *Paediatrics and Child Health*, *23*(5), pp.226-228.

Xiong, Y.Q., Tan, J., Liu, Y.M., He, Q., Li, L., Zou, K. and Sun, X., 2019. The risk of maternal parvovirus B19 infection during pregnancy on fetal loss and fetalhydrops: a systematic review and meta-analysis. *Journal of Clinical Virology*.

Zeb, M.A., Jamal, S.F., Mir, A. and Khan, A.A., Frequency of Torch Infections during Pregnancy in Peshawar, Pakistan Muhammad Asif Zeb1, Shah Faisal Jamal1, Awal Mir2, Aamir Ali Khan3 and Aman Ullah1.

APPENDIX 1

جامعة بنغازي
كلية الصحة العامة
بنغازي - ليبيا

UNIVERSITY OF BENGHAZI
FACULTY OF PUBLIC HEALTH
Benghazi - Libya

الرقم: ٩٨/٢٠١٩-٧٤٢-٢
التاريخ: ٢٠١٩-٥-٩م

السيد/د.مدير مركز بنغازي الطبي

تحية طيبة...

في إطار التعاون المتبادل بين كليتنا والمؤسسات الصحية خدمة للصالح العام
نأمل منكم مشكورين السماح للسيدة/ا.هدى عبدالله الفارسي

والسيدة/ا.سامية ابراهيم العبيدي

أعضاء هيأة تدريس بقسم الصحة البيئية بالحصول على البيانات المتعلقة بعدوى TORCH لدى حديثي الولادة.

شاكرين حسن تعاونكم.

وكيل الكلية

د.م

ا.د.مفتاح عبدالعاطي الفيتوري
وكيل كلية الصحة العامة

رئيس قسم الصحة البيئية
المعاهد
الدوري العام

بنغازي / هاتف
TEL : 22195 / 22191