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

International Journal of Current Research
Vol. 8, Issue, 05, pp.30525-30528, May, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

CHLAMYDIA TRACHOMATIS RELATED NEONATAL SEPSIS

[1,*]Mate Siakwa, [2]Dzigbodi Kpikpitse, [3]Wisdom Azanu, [4]Robert Bella Kuganab-lem and [5]Emmanuel Hanson-Owoo

[1]School of Nursing, University of Cape Coast, Ghana
[2]School of Nursing, Garden City University College Kumasi, Ghana
[3]Department of Obstetrics and Gynaecology, Komfo Anokye Teaching Hospital, Kumasi, Ghana
[4]School of Allied Health, University for Development Studies Tamale, Ghana
[5]Cape Coast Teaching Hospital Cape Coast Ghana

ARTICLE INFO

Article History:
Received 26th February, 2016
Received in revised form
17th March, 2016
Accepted 25th April, 2016
Published online 10th May, 2016

Key words:
Chlamydia Trachomatis,
Neonates,
Sepsis,
Vertical Transmission,
Cohort Study.

ABSTRACT

The main objective of this study is to determine neonatal sepsis among neonates born to Chlamydia trachomatis (CT) infected mothers. One hundred and one neonatesborn to CT infected mothers were screened for CT infection by polymerase chain reaction (PCR).Maternal and neonatal risk factors for sepsis were also assessed using a checklist. Thirty-four of the neonates had sepsis of these, twenty-two(22) were early onset and 12 late onset. Neonatal infections included respiratory tract infections (RTI) 16; blood stream infection (BSI) 7; gastrointestinal tract (GIT) infections 5; urinary tract infection (UTI) 3; conjunctivitis (CONJ) 2; otitis media (OM) 1. Premature rapture of membrane (PROM) $p<0.001$); foul smelling liquor (FSL, $p<0.001$) intra partum fever (IPF) $p<0.001$) and meconium stained amniotic fluid (MSAF) $p<0.001$) were maternal factors found to have significantly increased the risk for CT infection in the neonate.Preterm birth ($p<0.00O1$) low birth weight and APGAR score less than 7 were neonatal characteristics found to have increased the risk for CT associated sepsis in the neonate.Caesarian section significantly reduced the risk for vertical transmission of CT ($p<0.05$).Routine screening and treatment of pregnant women for CT infection is recommended to reduce neonatal morbidity and mortality.

Citation: Mate Siakwa, Dzigbodi Kpikpitse, Wisdom Azanu, Robert Bella Kuganab-lem and Emmanuel Hanson-Owoo, 2016. "Chlamydia Trachomatis related neonatal sepsis", *International Journal of Current Research*, 8, (05), 30525-30528.

INTRODUCTION

Neonatal sepsis still remains a major challenge to the survival of neonates the world over. In Ghana, neonatal sepsis accounts for between 10 to 15% of neonatal mortality (Siakwa *et al*., 2014; Baiden *et al*., 2011). Both maternal and neonatal factors have been identified to increase the risk for neonatal sepsis. Maternal factors that have been identified to be significantly associated with neonatal sepsis are foul smelling liquor, meconium stained amniotic fluid, parity, history of STI/UTI and maternal age. Whereas, the male sex, prematurity, low birth weight, APGAR score less than 7 and resuscitation at birth were notable neonatal factors (Siakwa *et al*., 2014). Prevalence of Maternal CT infections are most often underestimated since the infection is asymptomatic and usually undetected.

Corresponding author: Mate Siakwa,
School of Nursing, University of Cape Coast, Ghana.

Maternal CT infections however, have been identified to increase the risk for neonatal sepsis (Centre for Disease control and Prevention, 2010; Chen *et al*., 2005). An increased incidence of chlamydia in the community has been documented along with an increase in neonatal chlamydia (Centre for Disease control and Prevention, 2010; Chen *et al*., 2005; Currie and Bowden, 2007). Prenatal implications of chlamydia infection for the mother and newborn include association with ectopic pregnancy, spontaneous abortion, preterm labouramnionitis, premature rapture of membranes, low birth weight, prematurity, still birth and neonatal death (Macllraith, 2003). Chlamydia infection during pregnancy could lead to intra partum fever and late onset post partum endometritis after vaginal delivery (Lawton *et al*., 2004). Vertical transmission of CT to the neonate occurs in approximately 50% of cases (Macllraith, 2003). The transfer of the CT from an infected mother could be as high as 23-70% (Macllraith, 2003). Infections in the newborn also include conjunctivitis, pneumonia, otitis media, bronchitis, pharyngitis, rhinitis and gastroenteritis (Davies, 1994) Clinical screening has been

recommended since 80-90% of the infected individuals are asymptomatic (Centre for Disease control and Prevention, 2010). This recommendation is difficult to implement due to lack of technical expertise and equipment for screening in low resource countries. The main aim of this study was to determine sepsis among neonates of CT infected mothers.

MATERIALS AND METHODS

Design: Prospective cohort study conducted during the period of July 2006 and December 2012.

Sampling: A total of 2014 pregnant women attending antenatal clinics at Cape Coast Teaching Hospital, Ghana during the study period were screened for CT. One hundred and twelve infected individuals were purposively selected and enrolled in the study after informed consent had been obtained. One hundred and one (live birth) neonates of participants were monitored and screened for CT infection when suspected of neonatal sepsis.

Maternal data: Pre-tested questionnaires with a Cronbach's alpha coefficient of 0.97 were used to obtain information on relevant medical, obstetrical and socio-demographic characteristics that were known to be risk factors for neonatal sepsis Siakwa *et al*. (2014)

Case definition: Neonates were classified as neonatal sepsis based on criteria reported earlier Siakwa *et al*. (2014).

Detection of CT by PCR: Ear, eye nasal, and pharyngeal swabs collected from all neonates with suspected sepsis under sterile conditions as well as blood, stool and urine samples were processed by PCR as described by Schmidt *et al*. (2015).

Ethics consideration: The Institutional Review Board of the University of Cape Coast approved the study and ethical clearance was obtained from the hospital. Participants' also signed informed consent and participation was voluntary.

Data analysis: Data was analyzed with SPSS 21. For the univariate analysis of categorical variables, Pearson's Chi square or Fisher's exact test was used. For continuous variables, we used the Independent sample t-test after checking normality and equality of the variance on the basis of Levine's test at 5% significance.

RESULTS

One hundred and one neonates of CT infected mothers were monitored during the neonatal period. Thirty-four had sepsis out of which 22 were of early onset whereas 12 were late onset. Respiratory tract infection (16/34), blood stream infection (7/34), Gastroenteritis (5/34), Urinary tract infection (3/34) conjunctivitis (2/34) and otitis media (1/34) were observed among the neonates (Fig 1). Fig. 2 showed maternal and neonatal risk factors for CT related neonatal sepsis. PROM ($p<0.001$) FSL ($p<0.001$) IPF ($p<0.001$) and MSAF ($p<0.001$) were maternal factors found to have significantly increased the risk for CT infection in the neonate. Preterm birth ($p<0.001$) low birth weight and APGAR score less than 7 were neonatal characteristics found to increase the risk for CT associated sepsis in the neonate. Caesarian section significantly reduced the risk of vertical transmission of CT ($p<0.05$).

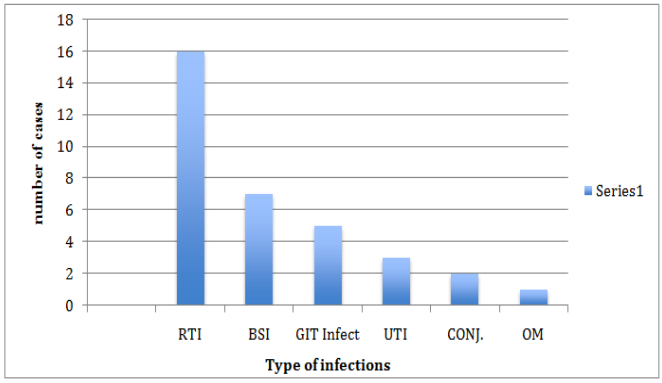

Fig. 1. Type of Infections among the Neonates

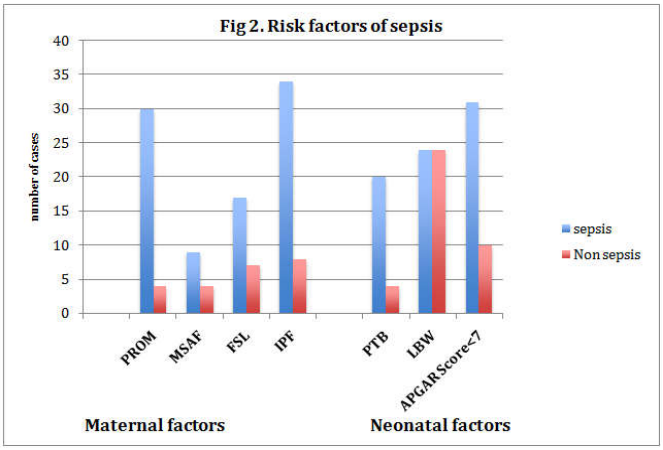

Fig 2. Maternal and Neonatal Risk Factors of Sepsis

DISCUSSION

The study determined sepsis among neonates born to CT infected mothers at the Cape Coast Teaching Hospital during the study period. The prevalence of CT related sepsis among the neonates born to the infected mothers was 33.7%.This finding is similar to the findings of Yu *et al*. (2009) who observed a24.3% vertical transmission of Macllraith (2003) indicated a vertical transmission of CT could be as high as 50% and transfer of CT from the mother to the neonate could range from 23 to70% (Macllraith, 2003; Lawton *et al*., 2004). Hahn *et al*. (2014) however found no such vertical transmission. The lack of vertical transmission could be due to effective management of STI among the study population and interventions put in place to manage risk factors. Vertical transmission of CT in the present study setting could have been higher if the study design considered screening for CT in stillbirth. Several other studies reported vertical transmission could result in spontaneous abortions and stillbirth (Sozio, 1998; Baud *et al*., 2011; Baud *et al*., 2008). The study design considered only those with sepsis however, earlier findings indicated CT infections are usually asymptomatic (4,8,9). There is also the possibility of asymptomatic neonatal infections that could go unnoticed. The majority of cases were of early onset. Earlier studies have reported that pathogens responsible for early onset sepsis generally reflect the predominant vaginal flora of the pregnant woman (Davies, 1994; Schmidt *et al*., 2015; Hahn *et al*., 2014; Baud *et al*., 2008). It was also posited that the physiology of normal pregnancy promotes the shedding

of CT into the vaginal tract, eventually facilitating vertical transmission. This could account for the higher risk of transmission in spontaneous vaginal delivery as opposed to caesarian section. The finding in the present study is consistent with earlier studies that caesarian section lowers significantly vertical transmission of CT. Maternal history of STI/UTI has been previously associated with increased risk for neonatal sepsis (Siakwa, 2014; Emamghorashi *et al*., 2012).

Neonatal infections noted in the present study included respiratory tract infections, blood stream infections, gastroenteritis, urinary tract infection, conjunctivitis and otitis media. Transmission of CT to the infant during birth has been reported to be a risk factor for the development of sepsis (Sozio and Ness, 1998). Previous studies have observed that premature and asphyxiated babies are likely to receive intubation and catheterization which predispose them to respiratory tract infections. Intravenous catheter inserted for drug administration and nutrition are also risk factors for blood stream infection if aseptic procedures are compromised. It was also posited that neonates ingest maternal fluids during labour and delivery predisposing them to gastroenteritis (Siakwa *et al*., 2014; Centre for Disease control and Prevention, 2009). Chlamydia conjunctivitis and otitis media have been well documented. (Sozio and Ness, 1998)

The present study identified PROM, FSL MSAF and IPF as maternal factors that significantly increased the risk of vertical transmission of CT while Preterm birth, birth weight below 2500g and Apgar score less than 7 are the neonatal risk factors. Earlier studies have identified PROM (Siakwa *et al*., 2014; Al- Dasoky *et al*., 2005; Shah *et al*., 2006; Giogiana *et al*., 2010), maternal UTI/STI (Siakwa *et al*., 2014; Al- Dasoky *et al*., 2005; Chacko and Sohi, 2005) and foul smelling liquor (Siakwa *et al*., 2014; Shah *et al*., 2006; Chacko and Sohi, 2005) as significant risk factors for neonatal sepsis. PROM occurs where fetal membranes rapture without the onset of spontaneous uterine activity resulting in cervical dilation (Fraser *et al*., 2003). Risk factors for PROM include cervical incompetence, cord prolapse and malpresentation associated with prematurity. After membrane rupture, microorganisms from the vagina could ascend into the amniotic sac, leading to the development ofchorioamnionitis or placentitis (Wilson and Lowdermilk, 2006) microorganisms on the other hand could ascend and cause PROM predisposing the baby to infection in utero (24). Meconium presence in amniotic fluid is a significant predictor of neonatal infection (Siakwa *et al*., 2014; Wilson and Lowdermilk, 2006). Normally, amniotic fluids remain clear, however, fetal hypoxia would result in stained MSAF. Recent evidence supports an association between lower Agar score and MSAF, which unfortunately has earlier been associated with neonatal sepsis (Siakwa *et al*., 2014; Al- Dasoky *et al*., 2005; Shah *et al*., 2006). The present study also revealed an association between low Apgar score and neonatal sepsis.

The study also revealed low birth weight of the neonate ($p<0.001$) and preterm delivery ($p<0.001$) as significant risk factors for neonatal sepsis and in fact these factors have been well documented in previous studies (Siakwa *et al*., 2014; Shah *et al*., 2006; Utomo, 2010; Haque, 2010). Explained that neonates with low birth weight and preterm babies tend to have poor host defenses and are therefore more likely to suffer sepsis. Moreover, neonates with low birth weight and preterm babies are also more likely to receive parenteral nutrition via IV cannula or some form of medication via IV access. This may predispose them to higher risk for infections compared to babies of normal weight who otherwise do not receive such therapies.

Conclusion

Vertical transmission of CT and its consequential neonatal sepsis was high among the study population. RTI, BSI and GIT infection, UTI, conjunctivitis, and otitis media were the infections identified with the majority being early onset sepsis. Maternal and neonatal risk factors for neonatal sepsis associated with maternal CT infection were PROM, FSL, MSAF, preterm labour, low birth weight and Apgar score less than 7. Screening of pregnant women on first antenatal visit is recommended for early diagnosis and treatment of CT infection to prevent the aforementioned adverse outcomes that increase neonatal morbidity and mortality.

REFERENCES

Al- Dasoky, A.H., Faten, Al- Awasheh, N.F., Kaplan, M.N., Hanadi, A., Al- Rimawi, A.H., Aga, M.R., Abu-Setteh H.M. 2005. Risk Factors for Neonatal Sepsis in Tertiary Hospital in Jordan. *J. Royal Med. Serv.,* Vol. 16, No. 3 December.

Baiden, F., Hodgson, A., Adjuik, M., Adongo, P., Ayaga, B. and Binka, F. 2011. Trend and causes of neonatal mortality in the Kassena-Nankana district of northern Ghana.1995 - 2002. *Trop. Med Int. Health*, 11:532-539

Baud, D., Goy, G., Jaton, K., Osterheld, M.C., Blumer, S. and Bore, N. *et al*. 2011. Role of Chlamydia trachomatis in miscarriage. *Emerg Infect Dis.,* 17 (9)1630-1635

Baud, D., Regan, L. and Greub, G. 2008. Emmerging role of Chlamydia and Chlamydia-like organism in adverse pregnancy outcomes. *CurrOpin infect Dis.,* 21:70-76

Centre for Disease control and Prevention. *Sexually transmitted disease surveillance 2*009; 2010. Alanta US Department of Health and Human service

Chacko, B., Sohi, I. 2005. Early Onset Neonatal Sepsis. *Indian Journal of Pediatrics.*72: 45-50.

Chen, M.Y., Fairley, C.K. and Donovan, B. 2005. Nowhere near the point of diminishing returns: correlations between Chlamydia testing and notification rate in New South Wales. *Aust. NZ J Public Health*, 29:249-253

Currie, M.J. and Bowden, F.J. 2007. The importance of Chlamydia in Obstetrics and Gyaenacology: An update. Aust. NZ Obstet. *Gynecol*., 47:2-8

Davies, H.D. Screening for Chlamydia infection Canadian task force for periodic Health Examination. *Canadian Guide to Clinical Preventive Health Care Ottawa. Health Canada*, 1994. Pp 732-42

Emamghorashi, F., Mahmoodi, N., Tagarod, Z. and Heydari, S.T. 2012. Maternal Urinary Tract Infection as a Risk Factor For Neonatal Urinary Tract Infection. *Iran. J. Kid. Dis.*, 6:3.

Fraser DM, Cooper AM, Nolte AGW. Myles Textbook for Midwives African Edition. 2003 *Elsevier Publishers*, UK.

Giogiana, F.B., Ioan, S., Ioan, M., Marioara, B., Elena, P., Calin, P. and Nilima, K. Sepsis In Newborns. TMI, 2010;Vol. 60, No.4 Received: Dec. 20, 2009, Accepted: Nov.2010.

Hahn H S, Lee K H, Koo YJ, Kim S-G, Rhee JE, Kim MY, *et al*. Distribution and perinatal transmission of Vaginal infections in pregnant women without vaginal symptoms. *Scan J infect Dis*., 2014; 46:348-353.

Haque, K N. 2010. Definition of blood stream infection in the new born. *Chil Care Med.,* 6:45-49.

Lawton, B., Rose, S., Brombead, C., Brown, S., MacDonald, J. and Shepard, J. Rates of Chlamydia trachomatis testing and chlamydia infection in pregnant women. *The New Zealand Med. J.,* 2004; 117(1194) 1-7

Macllraith, J. 2003. Chlamydia the young adults' epidemic. NZ Fam. *Physician,* 30:416-419.

Popovich, D.M. and McALhany, M. 2004. The practitioner's care and guidelines for infants born to Chlamydia positive mothers. *NBIN*, 4(1): 51-55.

Ramesh, B.Y. and Kumar, N. 2009. Outcome of sepsis evaluation in very low bith weight premature neonates. *J Clin. Diag. Res*., 3:1847-1852.

Rekart, M.L. and Brunham, R.C. 2008. Epidemiology of *Chlamydial* control; are we loosing ground? *Sex Transm Infect*, 84: 87-91.

Schmidt, R., Muniz, R.R., Cola, E., Stauffert, D., Silveria, M.F. and Miranda, E.A. 2015. Maternal Chlamydia trachomatis infections and preterm births in a University Hospital in Victoria, Brazil.; PLOS|one DO|:10:1371 /Journal pone 0141367.

Shah, G.S., Budhathoki, S., Das, B.K., Mandal, R.N. 2006. Risk factors in early neonatal sepsis. Kath. *Univ. Med. J.,* 4 (14): 187-191.

Siakwa M, Kpikpitse D, Mupelpi S, Mohammed S. Neonatal sepsis in rural Ghana: A case control study of risk factors in a birth cohort. *Int. J Res. Med. Health Sci*., 2014; 4(5): 77-88

Siakwa, M., Kpikpitse, D., Laryea, T., Ankobil, A., Dare, S. and Ebu, N. A five-year neonatal mortality trend in a Ghanaian Teaching Hospital after the implementation of strategies to achieve the Millenium Development Goal (MDG) 4. *Int. J Paed. Child Health*, 2014, 2(5) 43-49

Sozio, J. and Ness, R.B. 1998. Chlamydia lower genital infection and spontaneous abortion. *Infect Dis Obstet Gynecol.,* 6: 8-12

Sutton, M.Y., Sternberg, M., Zaidi, A., Loius, M.E. and Markowitz, I.E. 2005. Trends in Pelvic inflammatory Disease among hospital discharges and ambulatory visits United States 1985-2001. *Sex Transm infect*, 32:778-84

Utomo, T.M. 2010. Risk factors of neonatal sepsis. A preliminary study in DrSoetomo Hospital. *Ind J Trop infect Dis*., 1:1

Wilson, W., Lowdermilk, D. L. 2006. Maternal Child Nursing Elservier Publisher UK.

Yu, J., Wu, S., Li, F. and Hu, L. 2009. Vertical transmission of Chlamydia trachomatis in Chongqing China. *Curr Micrbiol*., 58:315-20

****