THE PREVALENCE OF NEONATAL SEPSIS AND ASSOCIATED FACTORS AMONG NEONATES ADMITTED TO THE NEONATAL INTENSIVE CARE UNIT OF JINJA REGIONAL REFERRAL HOSPITAL.

BY

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SUPERVISED BY;

Dr. MBEKEEKA PROSSY

A DISSERTATION SUBMITTED TO THE DEPARTMENT OF CLINICAL MEDICINE AND DENTISTRY OF KAMPALA INTERNATIONAL UNIVERSITY WESTERN CAMPUS AS A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELORS OF MEDICINE AND BACHELORS OF SURGERY
DECLARATION

I hereby declare to the best of my knowledge that, this dissertation is my original work and has never been submitted to any institution of higher learning for any undergraduate or postgraduate academic award and where the work of other people has been included, acknowledgement to this has been made in accordance to the text and references.

Name:........................................

Signature:...................................

Date:.........................................
APPROVAL

This is to certify that this dissertation titled “The prevalence of neonatal sepsis and associated factors among neonates admitted to the neonatal intensive care unit of Jinja Regional Referral Hospital”, submitted to the department of Clinical Medicine and Dentistry of Kampala International University Western Campus, is the original work done by Mubiru Abdul under my close supervision.

Sign………………………………      Date………………………

Dr. MBEKEEKA PROSSY

(MBChB, M.Med PAEDIATRICS)
DEDICATION
This dissertation is dedicated to my parents, entire family and friends. Thanks for the support and encouragement during development of this proposal.
AKNOWLEDGEMENT
I would like to thank the Almighty God for enabling me put together this piece of work. Then my supervisor Dr. Mbekeeka Prossy for her commitment and guidance throughout the entire process. Special thanks to Dr. Kyalubimba Lubega David of Naguru hospital for the inspiration and Mrs. Mirembe Josephine of the records department of Jinja Regional Referral Hospital for her willingness and effort during the data collection process.

Lastly I would like to thank my family and my special friends who have been there every step of way.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APGAR</td>
<td>Activity, pulse, Grimace, appearance, respiration</td>
</tr>
<tr>
<td>CONS</td>
<td>Coagulase-Negative Staphylococcus Group</td>
</tr>
<tr>
<td>EONS</td>
<td>Early onset neonatal sepsis</td>
</tr>
<tr>
<td>LONS</td>
<td>Late onset neonatal sepsis</td>
</tr>
<tr>
<td>NICU</td>
<td>Neonatal intensive care unit</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Emergency Fund</td>
</tr>
<tr>
<td>EDHS</td>
<td>Ethiopia Demographic and Health Survey</td>
</tr>
</tbody>
</table>
**OPERATIONAL DEFINITIONS**

Neonatal sepsis : Clinical syndrome resulting from a suspected or proven infection occurring in baby from birth to 28 days of life.

Early onset neonatal sepsis : Neonate with sepsis within 0-7 days

Late onset neonatal sepsis : Neonate with sepsis within 8-28 days

Low Birth Weight : Birth weight of the child <2.5kg

Preterm Birth : Live birth before 37 weeks of gestation

Neonate : Baby from birth until 28 day of life

Neonatal period : The time from 0-28 days of life

Prolonged rupture of membrane : Rupture of amniotic membrane >=18 h
ABSTRACT

Introduction

Globally neonatal sepsis is one of the most significant causes of morbidity and mortality among neonates. In Africa, and other developing countries, a small number of data were available on risk factors associated with neonatal sepsis. The objectives this study were to determine the prevalence of neonatal sepsis, associated obstetric and neonatal risk factors among neonates admitted to the neonatal ICU of Jinja Regional Referral Hospital.

Methodology

A retrospective descriptive study was used to obtain data which was tallied then put in frequencies and percentages. Using Microsoft excel 2007 data was presented using tables and graphs.

Results

The study found out that of the 763 neonates who were admitted to neonatal Intensive care of Jinja Regional referral Hospital 298 had neonatal sepsis which is 39.1% prevalence. Of the 262 neonates in this study 58.8 % (154) were males and 41.2% (108) were females, 78.6% (206) had EONS and (21.4%) 56 had LONS. The largest obstetric factor contributing to neonatal sepsis was PROM with 222(84.7%) while the 94.2 % (147 out of 156) of the neonates whose mothers had a history of UTI developed EONS. 90.9% of the neonates whose mothers didn’t attend ANC developed LONS. The largest neonatal factor contributing to neonatal sepsis was prematurity 181(69.1%) which was also the largest risk factor in those who developed EONS. 59.2% of term babies developed LONS.

Conclusions

Majority of the neonates who suffered from EONS were of mothers who had suffered from Urinary tract infections and also had foul smelling liquor. Most of the neonates that suffered from LONS were those of mothers that didn’t attend antenatal care.

Majority of the neonates with gestational age less than 37 weeks and APGAR score less than 7 suffered from EONS while those with birth weight above 2.5 suffered from LONS.

Recommendations

Early diagnosis and prompt treatment of urinary tract infections.
Encourage Antenatal care and hospital delivery.

Preventive measures should put in place to prevent premature delivery like cervical cerclage for mothers with incompetent cervix, prompt treatment of maternal genital infections, tocolysis where it’s indicated, giving fansidar and insecticide treated mosquito nets to pregnant women, regular blood pressure assessments in women with pre-eclampsia.
CHAPTER ONE

1.0 Introduction

1.1 Background
According to the pediatric sepsis consensus conference of 2005, neonatal sepsis is defined as a systemic inflammatory response syndrome in presence of suspected or proven infection in a neonate. It could be bacterial, viral, fungal or rickettsial (Goldstein B et al). It encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia, arthritis, osteomyelitis etc. (Stefanovic 2011)

It is characterized by systemic manifestations which result from bacterial invasion and multiplication in the blood stream (Amare et al 2012). Neonatal sepsis (NS) is a serious blood bacterial infection in neonate at the age equal to or less than 28 days of life which is manifested by systemic signs and symptom of infection (El Sadig et al 2015). Globally neonatal sepsis is one of the most significant causes of morbidity and mortality among neonates. The main causes of neonatal deaths were preterm birth complications (35 %), intrapartum related complications (24 %), and sepsis (15 %) globally (IGME 2015).

The prevalence of neonatal sepsis was more common in developing countries than that of developed countries. A study conducted in Japan indicated that the incidence of neonatal sepsis was 0.74% and out of these 0.13% was EONS (Ichiro Morioka et al. 2014).

Similarly, in Ethiopia a study conducted in Gondar university hospital in intensive care unit indicated that out of 181 neonates 67.4% were EONS and 32.6% LONS based on clinical parameters (Amare et. al. 2012). A study in Sudan showed a 37.8% culture positive neonatal septicemia out of 119 neonates in the study and all were cases of early onset neonatal sepsis. (Wafa Babiker et al 2018)

Another study in Egypt showed that the incidence of suspected neonatal sepsis among the admitted neonates at the neonatal intensive care units of the three included hospitals during the study period was 45.9% (357/778). Among the studied neonates, sepsis was recognized as EONS in 152 (44.2%) cases and as LOS in 192 (55.8%) cases according to infant age at the onset of symptoms. 33.9% (65/192) of LOS were due to nosocomial infection (Eman M et al. 2015).
Neonatal sepsis can be differentiated into early and late-onset neonatal sepsis according to peripartum pathogenesis, because both have different source of infection, onset of disease occurrence, mode of transmission, management and risk factors (Nelson 2011 7-8), which includes: socio-demographic, maternal, neonatal and medical factors were associated with the development of neonatal sepsis (Mate et al 2014). In Africa, and other developing countries, a small number of data were available on risk factors associated with neonatal sepsis. 

Blood culture is a definitive diagnostic tool for neonatal sepsis. However, this ‘gold standard’ testing method is time-consuming and may result false positive results as well as false negative results, which can be attributed to the difficulties in discriminating a true CONS infection from sample contamination (Meem et al 2011). In addition to this neonatal sepsis is diagnosed based on a combination of clinical appearance and the use of positive septic screening parameters such as: TLC < 5000/mm, band to total polymorph nuclear cells ratio of >0.2, C-reactive protein (CRP) >1mg/dl and micro ESR > 10 mm-first hour (Shuveksha Rawat KN et al 2013). Neonatal sepsis is associated with increased medical costs, prolonged hospital stay and potentially poor long term neurodevelopmental outcomes. Surviving infants approximately have a quarter of the neonates, have significant neurological sequale as a consequence of central nervous system involvement, septic shock or hypoxemia secondary to severe parenchyma lung disease despite prompt instigation of antibiotic therapy. (UNICEF, WHO 2014)
1.2. Problem Statement
Globally neonatal sepsis is one of the most significant causes of morbidity and mortality among neonates. Out of 5.9 million child deaths in 2015, almost 1 million occur in the first day of life and close to 2 million occurs in the first week of life. The main causes of neonatal deaths were preterm birth complications (35 %), intrapartum related complications (24 %), and sepsis (15 %) globally (IGME 2015).
The incidence of neonatal bacterial sepsis varies from 1 to 4 cases per 1,000 live births in developed countries, with great difference over time and geographic location (Nelson 2011).
The risk of neonatal death become 6 times higher in developing countries compared to that of developed countries (Edmond KZA 2010). According to 2011 UNICEF report, neonatal deaths accounted for 52% of all under five child mortality in South Asia, 53% in Latin America and Caribbean and 34% in sub-Saharan Africa (UNICEF 2012). In Africa, and other developing countries, a small number of data were available on risk factors associated with neonatal sepsis. Few evidences showed that both obstetric and neonatal factors play important roles in early onset sepsis, as they do in resource-rich countries (Baros et al 2010, Kanyange et al 2010).
Neonatal conditions which were causing under-five mortality in 2004 have recently increased to 43%. Out of these conditions which cause under five mortality, neonatal sepsis accounts 9% (HTSP Feb. 2015).
However the prevalence of neonatal sepsis and its associated factors at Jinja Regional Referral Hospital NICU is not known.

1.3 Study objective
1.3.1 General objective
To assess the prevalence and associated factors of neonatal sepsis among neonates admitted to neonatal ICU of Jinja Regional Referral Hospital.

1.3.2 Specific objectives
To determine the prevalence of neonatal sepsis among neonates admitted to the NICU of Jinja regional referral hospital.
To identify the obstetric factors associated with neonatal sepsis among neonates admitted to NICU of Jinja regional referral Hospital.
To identify the neonatal factors associated with neonatal sepsis among neonates admitted to NICU of Jinja regional referral Hospital.

1.4 Research Questions
What is the prevalence of neonatal sepsis in Jinja Regional Referral Hospital?
What are the obstetric factors associated with neonatal sepsis among neonates admitted to NICU of Jinja regional referral Hospital?
What are neonatal factors associated with neonatal sepsis among neonates admitted to NICU of Jinja regional referral Hospital?

1.5 Justification
Globally neonatal sepsis is one of the most significant causes of morbidity and mortality among neonates. Out of 5.9 million child deaths in 2015, almost 1 million occur in the first day of life and close to 2 million occurs in the first week of life. The main causes of neonatal deaths were preterm birth complications (35 %), intrapartum related complications (24 %), and sepsis (15 %) globally (IGME 2015).
According to existing literature evidences showed that both maternal and neonatal factors play important roles in early onset sepsis, as they do in resource-rich countries (Baros et al 2010, Kayange et al 2010).
Therefore the results of this study may help the policy makers and other responsible body to plan necessary training program for health professionals to improve their knowledge.
It will help to create awareness to the community through health education.
It is hoped that the results will provide insight to health care provider in identification of risk factors associated with neonatal sepsis.

1.6 Study scope
1.6.1 Subject scope
The study will focus on social demographic, obstetric and neonatal factors associated with the prevalence of neonatal sepsis.
1.6.2 Geographical scope.
The study will be carried out at Jinja regional referral hospital in Jinja NICU, located in Jinja Eastern Uganda. The hospital serves as a regional referral for districts such as Bugiri, Iganga, Jinja, Kaliro, Kamuli, Mayuge, Kayunga and some parts of Mukono.

1.6.3 Time scope
The study period was from June 2018 to October 2018. The proposal was developed between June and August, data was collected in September 2018, and the dissertation was written between October to November 2018.
1.7 Conceptual framework
The conceptual framework was developed by the principal investigator basing on the available literature about the causes of neonatal sepsis.

A number of neonatal risk factors were identified that play an important role in the occurrence of neonatal sepsis such as: male sex, preterm delivery, gestational age, low birth weight <2.5kg, APGAR score less than seven in the first one minute, mechanical ventilation, and prolonged rupture of membranes have significant roles in early and late onset neonatal sepsis. Obstetric factors such as PROM, foul smelling liquor, urinary tract infections, maternal age and parity. (Yelda et al 2012).
CHAPTER TWO: LITERATURE REVIEW

2.1 The prevalence of sepsis
The prevalence of neonatal sepsis is more common in developing countries than that in developed countries. A study conducted in Japan indicated that the incidence of neonatal sepsis was 0.74% and out of these 0.13% was EONS (Ichiro Morioka et al. 2014).

Similarly, in Ethiopia a study conducted in Gondar university hospital in intensive care unit indicated that out of 181 neonates 67.4% were EONS and 32.6% LONS based on clinical parameters (Amare et al. 2012). A study in Sudan showed a 37.8% culture positive neonatal septicemia out of 119 neonates in the study and all were cases of early onset neonatal sepsis. (Wafa Babiker et al. 2014)

Another study in Egypt showed that the incidence of suspected neonatal sepsis among the admitted neonates at the neonatal intensive care units of the three included hospitals during the study period was 45.9% (357/778). Among the studied neonates, sepsis was recognized as EONS in 152 (44.2%) cases and as LOS in 192 (55.8%) cases according to infant age at the onset of symptoms. 33.9% (65/192) of LOS were due to nosocomial infection. (Eman M et al. 2015).

According to different studies conducted in different areas reveal that the prevalence of early onset sepsis was more frequent than that late onset neonatal sepsis which is supported by a study conducted in Debrezeit hospital which showed that among 306 neonates included in the study 81.0% had EONS and 19% had LONS. (Woldu A et al. 2014)

A study in Southern Mexico showed that out of 11,790 neonates, 514 (43%) had neonatal sepsis. 75.3% had early onset while 24.7% of them had late onset neonatal sepsis. (Yelda et al 2012). A study in Mwanza Tanzania showed that 300 out of 770 (38.9%) had neonatal sepsis diagnosed by WHO criteria. Of 121 (40%) had EONS and 179 (60%) had LONS. (Kayange N et al 2010)

A study in Buyende district Eastern Uganda showed the prevalence of neonatal sepsis was 21.8% that is 34 out of 174 neonates in the study. (Bua John et al 2013)
2.2 Obstetric risk factors

According to results of several studies conducted in different countries, the main obstetric risk factors for the occurrence of neonatal sepsis were: foul smelling liquor, meconium stained amniotic fluid, parity, history of urinary tract infection (UTI/STI), maternal age, Chorioaminitis, Genital tract colonization with group B Streptococcus (GBS) and prolonged rupture of membrane (PROM) (Yelda et al 2012, Stephanie J et al 2012).

A study in Sri Lanka showed that neonatal sepsis is more likely to occur in neonates whose mothers had three or more vaginal exams, PROM greater than 18 hours and duration of labor greater than 9 hours. (K Y S Perera et al 2018)

A study done in public hospitals in Mekelle city showed a significant association between prolonged rupture of membranes (PROM) and intrapartum fever with neonatal sepsis. It showed that neonates of mothers who gave birth after 18 hours of rupture of membranes were 7.4 times higher than those who gave birth before 18 hours. It was also noted in the same study that neonates born to mothers who had fever during labor had 6 times higher odds of developing sepsis compared to those without intrapartum fever. In the same study UTI/STI in the index pregnancy showed an increased risk of developing neonatal sepsis. The study showed that, neonates born to mothers who had UTI/STI during the index pregnancy had five times higher odds of developing sepsis compared to those born to mothers who did not have a UTI/STI during the index pregnancy.(Destaleem et al 2015)

A study in Gondar, north west Ethiopia showed that cesarean delivery has increased risk of neonates with sepsis as compared to normal vaginal delivery or even instrumental delivery.(Tsehaynesh Gleyesus et al). In Longyan first hospital vaginal delivery is associated with increased risk of sepsis in addition to prime parity and gestational age of the neonate. (Ting Xiao et al)

A study in Mulago National referral hospital showed that there was a relationship between lack of antenatal care attendance by the mother and neonatal sepsis where neonates of mothers who didn’t attend antenatal care were at increased risk of developing neonatal sepsis. (Mugalu et al 2006).

A study done in Buyende district showed that lack of attendance of antenatal care or access to it in a health care facility is likely to result in more sick newborns with sepsis. (Bua John et al 2013)
2.3 Neonatal risk factors
A number of neonatal risk factors were identified that play an important role in the occurrence of neonatal sepsis such as: male sex, preterm delivery, gestational age, low birth weight <2.5kg, APGAR score less than seven in the first one minute, mechanical ventilation, and prolonged rupture of membranes have significant roles in early and late onset neonatal sepsis, as they do in resource-rich countries (Yelda et al 2012, Stephanie J et al, Chiabi et al 2015).
APGAR score at 5th minute and immediate cry after birth showed significant association with neonatal sepsis risk. Neonates with an APGAR score less than 7 at 5th minute had higher odds of developing sepsis compared to neonates who had an APGAR score greater or equal to 7. Similarly, neonates who cried immediately at birth were 99% less likely to develop sepsis as compared to neonates who did not cry immediately. (Destaleem et al 2015)
Birth weight and gestational age were associated with neonatal sepsis. 43% of neonates with birth weight 401-750g had at least one episode of culture proven late onset sepsis. There was a decrease in the rate to 28% for those with birth weight 751-1000g, 15% for those with weight 1001-1250g and 7% for those with 1251-1500g. Similarly the rate of infection was inversely proportional to gestational age. 46% of neonates born at less than 25 weeks developed late onset sepsis. The rate reduced to 29% at 25-28 weeks, 10% at 29 to 32 weeks and only 2% for infants born after 32 weeks of gestation.
A study in Mexico showed that factors such as birth weight, prematurity and emergence of any respiratory complications after birth were associated with the neonatal sepsis. (Leal et. al 2012). A study done in Indonesia showed that a neonate of a mother with a risk factor an APGAR score of less than 7, weeks of gestation less than 37 and birth weight less than 1500g developed neonatal sepsis. (Muhammad Hayun et al 2015). Even in Gondar, Ethiopia an APGAR score less than 7 together with low birth weight contribute to neonatal sepsis. (Tsehaynesh Gleyesus et. al) A study in the NICU of Longyan first hospital, Fujian shows that factors associated with neonatal sepsis are low birth weight, age in days, and prematurity since most premature also have a low birth weight. (Ting Xiao et al)
CHAPTER THREE: METHODOLOGY

3.1 Site
The study was carried out at Jinja regional referral hospital in Jinja NICU, located in Jinja Eastern Uganda. The hospital serves as a regional referral for districts such as Bugiri, Iganga, Jinja, Kaliro, Kamuli, Mayuge, Kayunga and some parts of Mukono.

3.2 Research Design
An institution based retrospective descriptive study was carried out to determine the factors associated with the prevalence of neonatal sepsis at Jinja Regional Referral Hospital NICU between January 1st and December 31st 2017.

3.3 Study population
The source population for the study was all neonates admitted to the Neonatal ICU of Jinja regional Referral Hospital between 1st January 2017 and 31st December 2017.

3.4 Sampling technique
A consecutive sampling technique was used to select the files. Files were checked for consistency and only those with complete information were considered.

3.5 Sample size
The sample size was be determined by Keish and Leslie (1965) formula as below

\[ N = \frac{Z^2PQ}{D^2} \]

Where \( N \) = sample size required

\[ Z = \] Standard normal deviate(1.96 for 95% confidence interval)
\[ P = \] Proportion of neonates with sepsis 21.8%
\[ Q = 1-P \]
\[ D = \] the level of precision desired (0.05)

Estimated prevalence of neonates with sepsis in eastern Uganda is 21.8% according to a study by Bua John et al therefore estimated sample is 262.
3.6 Data collection process
3.6.1 Data collection procedure

Using a checklist, records department was approached and the files for neonates treated for neonatal sepsis were be requested, sorted, organized and only those that met the criteria were used to obtain data.

3.6.2 Data management

Data collected using a checklist, tallied then using Microsoft Excel 2007 the data was presented using tables and graphs.

3.7 Inclusion and Exclusion Criteria
3.7.1. Inclusion Criteria
All neonates diagnosed with sepsis who were admitted to the NICU of Jinja regional referral hospital between January 1st and December 1st 2017.

3.7.2. Exclusion criteria
Neonates files with incomplete patient chart information.

Neonates with a diagnosis other than sepsis.

3.8 Study variables
3.8.1 Dependent variables
Neonatal sepsis

3.8.2 Independent Variables
Obstetric Risk Factors

Neonatal risk factors
3.9 Research instrument
Data was collected using a checklist that was structured to obtain the data able to fulfill the study objectives. A sample of the checklist is included in the appendix of the dissertation.

3.10 Ethical consideration
Approval was sought from Institutional Review Board and Ethics Committee of KIU. Permission to carry out research was obtained from the hospital Executive Director before data was collected. Initials were used to provide privacy and confidentiality of the patient’s data. Before data collection, the objectives of the study were fully explained to the records manager in order to obtain her permission which was granted.

3.11 Dissemination of results
Copies of final results will be shared among different health and administrative bodies of the hospital.

KIUTH library for future reference

Jinja Regional referral Hospital.

3.12 Limitations and Delimitations
3.12.1 Limitations
Incomplete patient information

Finances

Limited time

Standard ministry of health chart doesn’t have some parameters that would otherwise be assessed.
3.12.2 Delimitations
The charts with incomplete information were left out and only those with sufficient information were used.

Budget was cut down to remove the avoidable expenditures without compromising the study Data collection was started earlier than expected and results were presented and analyzed simultaneously.
Parameters not on the ministry of health chart were left out since there were not so relevant to the study.
CHAPTER FOUR: RESULTS PRESENTATION AND ANALYSIS

The study found out that of the 763 neonates who were admitted to neonatal Intensive care of Jinja Regional referral Hospital, 298 had neonatal sepsis which is 39.1% prevalence.

4.1 SOCIO DEMOGRAPHIC CHARACTERISTICS

<table>
<thead>
<tr>
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<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex Of Neonate</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Age Of Neonate</td>
<td>0-7 Days</td>
</tr>
<tr>
<td></td>
<td>8-28 Days</td>
</tr>
<tr>
<td>Maternal Age</td>
<td>&lt;20</td>
</tr>
<tr>
<td></td>
<td>20-35</td>
</tr>
<tr>
<td></td>
<td>&gt;35</td>
</tr>
</tbody>
</table>

Table 1: socio demographic characteristics of mothers and neonates

Of the 262 neonates in this study 58.8 %( 154) were males and 41.2 %( 108) were females, 78.6 %( 206) had EONS and 21.4 %( 56) had LONS. Majority of the mothers were below 20 years 43.5 %( 114), 87 (33.2%) were between 20 and 35 years and 61 (23.3%) were above 35 years of age.
## 4.2 OBSTETRIC RISK FACTORS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SEPSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td>Maternal History</td>
<td></td>
</tr>
<tr>
<td>Of UTI Yes</td>
<td>156(59.5%)</td>
</tr>
<tr>
<td>No</td>
<td>106(40.5%)</td>
</tr>
<tr>
<td>Attendance Of ANC</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>251(95.8%)</td>
</tr>
<tr>
<td>No</td>
<td>11(4.2%)</td>
</tr>
<tr>
<td>Foul Smelling Liquor</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>200(76.3%)</td>
</tr>
<tr>
<td>No</td>
<td>62(23.6%)</td>
</tr>
<tr>
<td>History Of Prom</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222(84.7%)</td>
</tr>
<tr>
<td>No</td>
<td>40(15.3%)</td>
</tr>
<tr>
<td>Place Of Delivery</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>214(81.8%)</td>
</tr>
<tr>
<td>Home</td>
<td>48(18.2%)</td>
</tr>
<tr>
<td>Mode Of Delivery</td>
<td></td>
</tr>
<tr>
<td>Vaginally</td>
<td>187(71.4%)</td>
</tr>
<tr>
<td>C/S</td>
<td>75(28.6%)</td>
</tr>
</tbody>
</table>

Table 2: obstetric risk factors
Figure 1 Obstetric Risk Factors (Totals)

The above is a graphical representation of the different factors expected to contribute to the prevalence of sepsis according to the existing literature. 84.7% of neonates their mothers had a history of PROM, while 76.3% of neonates their mothers who had foul smelling liquor, 59.5% of neonates whose mothers had a history of UTI had sepsis, 18.2% of the neonates who had sepsis were delivered from home, 71.4% of the neonates who had sepsis were delivered vaginally and only 4.2% of the neonates with sepsis were of mothers who had not attended ANC.
Figure 2: Obstetric factors (EONS and LONS)

Majority of the neonates 94.2%, whose mothers had a history of UTI had EONS and only 5.8% of mothers who had UTI had LONS. Most of the neonates, 90.9% whose mothers didn’t attend ANC had LONS while only 9.1% of the neonates whose mothers didn’t attend ANC had EONS. Of the neonates delivered by vaginal birth 80.4% developed EONS while 19.3% had LONS. Of neonates delivered at home, 70.8% had EONS while 29.2% developed LONS. Most of neonates 80.2 %, whose mothers had a history of PROM had EONS while 19.8% had LONS. Majority of the neonates 83.5%, whose mothers had foul smelling liquor had EONS well as only 16.5% had LONS.
4.3 NEONATAL RISK FACTORS

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SEPSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
</tr>
<tr>
<td>BIRTH WEIGHT</td>
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</tr>
<tr>
<td>&lt;2.5 kgs.</td>
<td>172(65.5%)</td>
</tr>
<tr>
<td>&gt;2.5 kgs.</td>
<td>90(34.4%)</td>
</tr>
<tr>
<td>GESTATIONAL AGE</td>
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</tr>
<tr>
<td>&lt;37 weeks(Preterm)</td>
<td>181(69.1%)</td>
</tr>
<tr>
<td>&gt;37 weeks(Term)</td>
<td>81(30.9%)</td>
</tr>
<tr>
<td>AP GAR score &lt;7</td>
<td>143(54.6%)</td>
</tr>
<tr>
<td>&gt;7</td>
<td>119(45.4%)</td>
</tr>
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</table>

Table 3: Neonatal factors

Figure 3: Neonatal Risk Factors (Totals)
According to existing literature the above factors are associated with neonatal sepsis and the figure compares the different factors with preterm (prematurity) being the highest with 69.1% (181 out of 262) of the premature babies in this study getting sepsis and then low birth weight 65.5% 172 of the 262 neonates in the study developed sepsis then lastly an APGAR score less than 7 where 54.6% of the neonates with APGAR score <7 developed sepsis.

Figure 4: Neonatal Risk Factors (EONS and LONS)
Over 81.4% of EONS had a birth weight <2.5 kgs while 26.7% of the neonates with birth weight >2.5 kgs had LONS. 95.6% of the preterm neonates had EONS while 59.2% of the term neonates had LONS. 89.5% of the neonates with APGAR < 7 had EONS while 34.5% of those with APGAR >7 had LONS.
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

DISCUSSION

5.1 Prevalence
The prevalence of sepsis at Jinja regional referral hospital in 2017 was 39.1% which is higher than what Bua et al found in Buyende 2013. This could be due to the fact that Jinja is a regional referral that serves a large catchment population as compared to Buyende District. This is also almost similar to a 37.8% got by Wafa Babiker et. al. in Sudan 2018. A similar study in southern Mexico by Yelda et. al. in 2012 showed the prevalence of sepsis in that area as 43%.

In this study 78.6% had early onset neonatal sepsis and 21.4% had late onset neonatal sepsis and similar results were obtained in southern mexico 2012 by Yelda et. al. where EONS prevalence was 75.3%and LONS 24.7%. Woldu et. al. in Debrezeit hospital of Ethiopia 2014 found a prevalence of EONS at 81.0% and LONS at 19% which is almost similar to what was found in this study.

5.2 Obstetric factors
In this study neonatal sepsis was not found more in neonates whose mothers didn’t attend ANC and this was different to the findings that were found out by Mugalu et al in 2009. This is because antenatal care attendance alone cannot be protective however if screening for infections and prompt treatment is done during ANC then that can be preventive for neonatal sepsis.

This study showed that vaginal delivery was more associated with sepsis than cesarean delivery which was also observed by Ting Xiao et al at Longyan hospital in 2017. However according to Tsehaynesh et al in 2017 who showed that cesarean delivery was more likely to cause neonatal sepsis. Cesarean section is more likely to cause neonatal sepsis in places where aseptic precautions are not taken into consideration during the procedure.

This study found that neonates of mothers who had foul smelling liquor and PROM developed neonatal sepsis and the results are similar to studies conducted by Stephanie J et. al. 2012 and Yelda et al 2012 in Mexico.
5.3 Neonatal factors
This study found that prematurity and low birth weight neonates were at a higher risk of getting neonatal sepsis. Most of the preterm neonates also had a low birth weight which was also found by Xing Tiao et al 2017. It was also found that most term infants were more likely to suffer from LONS than EONS.

In this study, neonates with APGAR score <7 didn’t have a higher percentage of sepsis as it was seen in study done in Indonesia by Muhammad Hayun et. al. in 2015. Similarly studies by Yelda et. al. 2012, Xing Tiao et al 2017 and Tsehaynesh et al 2017, in this study neonates with APGAR score less than 7 who developed sepsis were almost equal to those who had an APGAR score more than 7 who developed sepsis

5.4 Conclusion
Majority of the neonates who suffered from EONS were of mothers who had suffered from Urinary tract infections and also had foul smelling liquor. Most of the neonates that suffered from LONS were those of mothers who didn’t attend antenatal care.

Majority of the neonates with gestational age less than 37 weeks and APGAR score less than 7 suffered from EONS while those with birth weight above 2.5 suffered from LONS.

5.5 Recommendation
Early diagnosis and prompt treatment of urinary tract infections.
Encourage Antenatal care and hospital delivery.
Preventive measures should put in place to prevent premature delivery like cervical cerclage for mothers with incompetent cervix, prompt treatment of maternal genital infections, tocolysis where it’s indicated, giving fansidar and insecticide treated mosquito nets to pregnant women, regular blood pressure assessments in women with pre-eclampsia.
REFERENCES
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Stephanie J. Schrag D, Clare L. Cutland, MD, Elizabeth R. Zell, MStat, Locadiah Kuwanda, MSc,, Eckhart J. Buchmann M, Sithembiso C. Velaphi, MD, Michelle J. Groome, MD,, Shabir A. Madhi M, PhD,and the PoPS Trial Team. Risk Factors for Neonatal Sepsis and Perinatal Death Among Infants Enrolled in the Prevention of Perinatal Sepsis Trial, Soweto, South Africa. The Pediatric Infectious Disease Journal 2012;31(8).


Ting Xiao, Li Ping Chen, Hui Liu, SiSi Xia, Yan Luo, Ding Chang Wu. The analysis of etiology and risk factors for 192 cases of neonatal sepsis. Longyan First Hospital, Furjan.

Tsehaynesh Gleyesus, Feleke Moges, Setegn Eshetie, Biruk Yeshitela, and Ebba Abate. Bacterial Etiologic Agents causing neonatal sepsis and associated risks factors in Gondar, Northwest Ethiopia.


Wafa Babiker, Amany Ahmed, Taiser Babiker, Elamin Mohamed and Babiker Saad Almugadan. Prevalence and causes of neonatal sepsis Soba University Hospital, Sudan


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APPENDIX I: CHECKLIST
THE PREVALENCE OF NEONATAL SEPSIS AND ASSOCIATED FACTORS AMONG NEONATES TO THE NEONATAL INTENSIVE CARE UNIT OF JINJA REGIONAL REFERRAL HOSPITAL.
MARTERNAL SOCIO DEMOGRAPHIC FACTORS

Age

OBSTETRIC FACTORS

PROM

Evidence of UTI/ Intrapartum fever

Attendance of ANC

Foul smelling liquor

Meconium stained liquor

Mode of delivery

NEONATAL FACTORS

Age at diagnosis

Weeks of delivery

Birth weight

APGAR
## APPENDIX II: BUDGET

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<td>6</td>
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<td></td>
<td>TOTAL</td>
<td></td>
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### APPENDIX III: WORK PLAN

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<tr>
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<td>Data Analysis and dissertation writing</td>
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APPENDIX IV: INTRODUCTORY LETTER

OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY

05/09/2018

TO WHOM IT MAY CONCERN

RE: MUBIRU ABDUL (BMS/0028/133/DU)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Programme.

He wishes to conduct his student Research in your community.

**Topic:** Prevalence and factors associated with neonatal sepsis among neonates admitted to neonatal intensive care unit of Jinja Regional Referral Hospital

**Supervisor:** Dr. Mbekeka Prossy

Any assistance given will be appreciated.

Dr. Akib Surat O
Deputy Executive Director/Assoc Dean (FCM & D)

"Exploring the Heights"
Assoc. Prof Ssebuufu Robinson, Dean (FCM & D) 0772 507248 email: ssebuufu@gmail.com
Dr. Akib Surat Associte Dean FCM & D) email: drakib@yahoo.com
JINJA REGIONAL
REFERRAL HOSPITAL
P.O. BOX 43
JINJA

SEP 6, 2018

All Head of Department
Paediatrics
Jinja Regional Referral Hospital

Re: MUBIRU ABDUL

This is to introduce to you the above named student from Kampala International University. He has come to Jinja Regional Referral Hospital to do a research on “The prevalence of Neonatal sepsis and associated factors among neonates admitted to the Neonatal Intensive Care Unit of Jinja Regional Referral Hospital”.

Kindly assist him.

Dr. Senyonjo Godfrey
FOR: CHAIRMAN RESEARCH COMMITTEE