ST PAUL'S HOSPITAL MILLENIUM MEDICAL COLLEGE

FACTORS ASSOCIATED WITH INDICATED PRETERM BIRTH AND OUTCOME OF PRETERM BIRTH IN SPHMMC FROM SEPTEMBER 1, 2015 TO SEPTEMBER1, 2016.

A STUDENT RESEARCH REPORT TO BE SUBMITTED TO THE DEPARTMENT OF PUBLIC HEALTH, SPHMMC, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE

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FACTORS ASSOCIATED WITH INDICATED PRETERM BIRTH AND OUTCOME OF PRETERM BIRTH IN SPHMMC FROM SEPTEMBER 1, 2015 TO SEPTEMBER1, 2016.

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Acronyms and abbreviations

APGAR	Appearance, Pulse, Grimace, Activity and Respiration
DM	Diabetes Mellitus
EDHS	Ethiopian Demographic and Health Survey
GA	Gestational Age
HIV/AIDS	Human Immuno-deficiency Virus/ Acquired immune deficiency Syndrome
IPV	Intimate Partner Violence
NICU	Neonatal Intensive Care Unit
NMR	Neonatal Mortality Rate
OPD	Outpatient Department
PICU	Pediatric Intensive Care Unit
PPROM	Preterm Premature Rupture Of Membrane
PROM	Premature Rupture Of Membrane
PTB	Preterm Birth
SGA	Small for Gestational Age
SPHMMC	Saint Paul Hospital Millennium Medical College
UK	United Kingdom
UN	United Nation
USD	United States Dollar
VLBW	Very Low Birth Weight
RDS	Respiratory Distress Syndrome
PNA	Perinatal Asphyxia
MAS	Meconium Aspiration Syndrome
EONS	Early Onset Neonatal Sepsis
HDN	Hemolytic Disease Of The Newborn

Abstract

The birth of a preterm infant results in significant health consequences to the infant and emotional and economic costs for families and communities. Approximately 70 to 80 percent of preterm births occur spontaneously and the remaining 20 to 30 percent of preterm births are medically indicated because of maternal or fetal issues. About 75% of perinatal deaths and 50% of neurological abnormalities are directly attributed to preterm. The aim of this study is to identify the common risk factors associated with indicated preterm birth and its immediate outcome which indicates ways to decrease its occurrence and associated death which contributes to significant neonatal mortality rate.

Methodology: An institutional based analytic and descriptive retrospective study was conducted. Total sample size of 208 medical charts was used and systematic sampling technique was used to select study units. The study was done in SPHMMC NICU. The data was entered and analyzed with SPSS version 22. Both univariate analysis and binary logistic regression was done.

Result: Among the preterm birth 68.8% were spontaneous preterm birth and 31.3% were indicated preterm birth. Indicated preterm births had an odds of being born to HIV mothers that are 7.250 times the odds of those Spontaneous preterm birth (P=0.037, AOR=7.250, 95% 1.122,46.850). Those mothers having preeclampsia with severity feature more likely (P=0.031,AOR=39.27, 95% CI: 14.21,108.50) give indicated preterm birth and less likely (P=0.000, AOR=0.026, 95% CI: 0.010,0.072) to give spontaneous preterm birth. Those mothers with Chorioamnionitis were more likely (P=0.017, AOR=5.444, 95% CI: 1.364,21.894) to give indicated preterm birth and less likely (P=0.023, AOR=0.205, 95% CI: 0.052,0.808) to give spontaneous preterm birth. Preterm neonates who were discharged dead had odds of having RDS that are 22 times odds of those discharged alive (p=0.004, AOR= 22.08, 95%CI: 2.708,180.072).

Conclusion: Maternal HIV infection, preeclampsia with severity feature, Chorioamnionitis, partial HELLP was found to have significant association indicated preterm birth. RDS showed significant association with death outcome of the neonate.

1. Introduction

1.1 Background

Preterm birth refers to a delivery that occurs before 37 0/7ths weeks of gestation. It may or may not be preceded by preterm labor. Preterm birth are classified by gestational age as Moderate preterm (32 to <37 weeks), Late preterm(34 0/7ths to 36 6/7ths weeks), Very preterm(28 to <32 weeks), Extremely preterm (<28 weeks). Preterm birth can also classified by birth weight as Low birth weight (<2500 grams, Very low birth weight (<1500 grams), Extremely low birth weight (<1000 grams). It is also classified as spontaneous or provider initiated (indicated) preterm birth. Approximately 70 to 80 percent of preterm births occur spontaneously and the remaining 20 to 30 percent of preterm births are medically indicated because of maternal or fetal issues (eg, preeclampsia, placenta previa, abruptio placenta, fetal growth restriction, multiple gestation). Complications of pregnancy can lead to both spontaneous and provider-initiated preterm births. [1,2]

Worldwide, the preterm birth rate is estimated to be about 11 percent (range 5 percent [parts of Europe] to 18 percent [parts of Africa]), and about 15 million children are born preterm each year (range 12 to 18 million). Of these preterm births, 84 percent occurred at 32 to 36 weeks, 10 percent occurred at 28 to <32 weeks, and 5 percent occurred at <28 weeks. Very-low birth weight (VLBW) infants weigh <1,500 g and are predominantly premature. In the United States in 2011, the VLBW rates were approximately 1.44% overall, 2.99% among blacks, and 1.14% among whites. The VLBW rate is an accurate predictor of the infant mortality rate. VLBW infants account for more than 50% of neonatal deaths and 50% of handicapped infants; their survival is directly related to birth weight, with approximately 20% of those between 500 and 600 g and >90% of those between 1,250 and 1,500 g surviving. [1,2]

Preterm birth is a major cause of death and a significant cause of long-term loss of human potential amongst survivors all around the world. Complications of preterm birth are the single largest direct cause of neonatal deaths, responsible for 35% of the world's 3.1 million deaths a year, and the second most common cause of under-5 deaths after pneumonia. In almost all high- and middle-income countries of the world, preterm birth is the leading cause of child death . Being born preterm also increases a baby's risk of dying due to other causes, especially from

neonatal infections with preterm birth estimated to be a risk factor in at least 50% of all neonatal deaths.[1,2]

1.2. Statement of the problem

Preterm birth is the most common of cause neonatal morbidity and mortality as well as the second leading cause of under-five mortality after pneumonia. It has significant health, social, psychological and economic effects. The rate of preterm birth is rising throughout the world. Globally, around 10–11% of all births, or 15 million births per year are estimated to be preterm.[3] Preterm birth rates have been reported to range from 5% to 7% of live births in some developed countries, but are estimated to be substantially higher in developing countries[4]. The vast majority (85%) of global preterm births occurs in Asia and Africa where health systems are weak and access to and utilization of health services are limited [5]. In Ethiopia, 320,000 babies are born too soon each year and 24,400 children under five die due to direct preterm complications [6]. According to Ethiopian Demographic and Health Survey in 2016, In Ethiopia, high rate of neonatal mortality (29 deaths per 1,000 live births)is reported and preterm birth is believe to be a major and direct cause of neonatal mortality.[3,4,5,6]

In Brazil 2012, the rate of preterm birth was 11.5% out of which 60.7 % spontaneous with spontaneous onset of labor or premature preterm rupture of membranes - and 39.3 % provider-initiated, with more than 90 % of the last group being pre-labor cesarean deliveries. In 2013 India, the incidence of preterm birth is found to be 10.23% and spontaneous preterm labor, PPROM and iatrogenic preterm birth were the causes in 56.05%, 21.82% and 22.1% of preterm births respectively. [7,8]

Preterm births usually have different medical disorders including congenital anomalies. Out of total 18 million low-birth weight infants in north Africa and Southeast Asia, 41% were preterm (16% preterm-SGA, 25% preterm and appropriate size for gestational age). In East Africa, 99% percent of low birth weight babies were either small for gestational age or preterm. Whereas, around 69% of preterm babies in Southeast Nigeria had either low birth weight, very low birth weight, or extreme low birth weight. [11,12]

Ethiopian neonatal, early neonatal and late neonatal mortality rates trend over 2006-2011 were 36.7, 29.2 and 7.5 per 1000 live births respectively. Regardless of significant success in infant

and under-5 mortality in Ethiopia, the reduction in neonatal mortality is relatively low. From report of EDHS 2016, the Neonatal Mortality Rate (NMR) was29/1000 live births. According to the recent UN estimate, the neonatal mortality reduced by 48% from the 1990 estimate to 28 per 1000 live births in 2013 while the reduction rat e of under-five mortality rate was by about 67%. Prematurity (37%), infection (28%), and asphyxia (24%) are the most common causes of death in neonates. Neonatal mortality rate of Jimma zone, Southwest Ethiopia in 2013 was 35.5 per 1000 live-births. 69.1% of them died within the first week of life making weighted early neonatal mortality rate to be 23.7 and risk of neonatal death was found to be increased in Prematurity as compared to term births. [14,15]

Generally preterm has many complications and is one of the leading cause neonatal mortality. And 20 to 30 of these preterm birth are medically indicated (indicated preterm births). However, there are no ample previous studies done on factors affecting indicated preterm birth and its outcome at SPHMMC and Ethiopia at large. Therefore, the aim of this study is to identify the common risk factors associated with indicated preterm birth and its outcome which indicates ways to decrease its occurrence and associated death which contributes to significant neonatal mortality rate.

1.3. Significance the study

Different reasons contribute for the deaths of preterm neonate. Varieties of medical disorders which are diagnosed earlier and missed to be diagnosed are the major causes for this death. So, identifying common factors associated with indicated preterm births and their outcome, support for the readiness of SPHMMC and other health facilities so as to make appropriate diagnoses and thorough evaluation of pregnant mothers for the risk factors of indicated preterm births so as to decrease prevalence of preterm birth and its associated complications and mortality. Thus, this study will try to make these possible.

In addition, little is known about risk factors and outcome of indicated preterm in SPHMMC and our country at large. Therefore, this study serves as base line information about factors associated with indicated preterm birth and its outcome in the context of this country. This study will also help researchers as input for other studies which will be conducted on the related subject matter in the future time.

2. Literature Review

Globally 15 million babies are born annually, more than one in 10 babies are born preterm. Preterm birth rates are increasing in almost all countries. And 20-30% of these preterm births are indicated for fetal or maternal indications. Preterm birth rates were 11.8% in low-income countries, 11.3% in middle-income countries, 9.4% upper middle and 9.3% in high-income countries. [1, 2, 30]

2.1. Factors associated with indicated preterm births

2.1.1. Maternal Socio-demographic factors

There are no much studies specifically showing the association between indicated preterm birth and maternal socio-demographic factors but there are studies showing associations between maternal socio demographic factors and preterm birth in general. Socioeconomic factor is one of the predictor of preterm birth. Women who were poor, young, black, less educated, and unmarried, were more likely to give preterm births. Similarly, in western China 46.0% of women who had a preterm birth have average family income≤ 320 USD/month compared with 36.7% in the control group, the difference had statistical significance. 43.3% were unemployed or housewife, 30.8% were peasant , 11.4% were commercial service staffs, professional staffs occupied 5.2%, and government staffs were 1.0%. Unlike the occupation, educational status showed significant statistical relation. [18,32]

According to study in a tertiary referral hospital of UK, The mean maternal age for those preterm births was 29.4 within range of 16-46, whereas the majorities (87.3%) were in the age group of 19-39. In Taiwan Greater risk for preterm birth was found in Pregnant women aged <25 years or >28 years compared to those aged 27 years. The risk of preterm births declined to ages of 25≈28years, but it was highest at ages of<14 years, and then steadily increased to ages of ≥44y ears. In rural South Africa and Malawi, significantly greater proportion of women with preterm births was less than 20 years old. [18,19]

2.1.2. Obstetric and gynecologic related factors

As evidenced by different studies causes of preterm vary in different countries. Preterm birth may result from preterm labor with intact fetal membranes, preterm rupture of the fetal membranes, or from iatrogenic preterm delivery for maternal or fetal indications. Globally, 25-40% are for premature ruptures of the fetal membranes, and 30-35% are indicated deliveries.

The common obstetric risk factors for indicated preterm births are preeclampsia with severity features, Eeclampsia, chorioamnionitis, Abruptio placenta, placenta previa and multiple gestation. It also indirectly associated with parity, previous cesarean section, previous low birth weight and perinatal death.[27, 28] In tertiary referral hospital of UK,72.8% and 56.1% of the mothers who gave preterm birth were gravida >0 and para >0m respectively. Stated gestational ages were under 34 Weeks for 14.8% of preterm cases and the smallest case was 22+5 weeks in Study of Western China. [1, 2, 20, 21]

2.1.3. Medical disorders in mother

Approximately 30% of all preterm births are indicated for either maternal or fetal complications, such as maternal illness or fetal growth restriction. 11-15% has medically induced causes. Clinical risk factors such as hypertension were differently associated with spontaneous and iatrogenic preterm but factors such as diabetes mellitus were not.[22.31]

In rural South Africa, although it was not statistically significant ; the proportion of preterm deliveries was slightly higher in HIV-positive than in HIV-negative women. Also among HIV-infected Tanzanian Women who gave birth, 24% were premature and 9% were very premature. Low weight gains during pregnancy, malaria, Entamoeba infection, HIV disease stage ≥2 and pre-hypertension or hypertension were significantly and independently associated with increased risk of preterm delivery. But no statistical differences were noted for the prevalence of syphilis ($p = 0.12$) or HIV positive status ($p= 0.30$) between those who delivered preterm versus term in Malawi.[23, 31]

2.1.4. Maternal Physical factors

The risk of indicated preterm birth was increased among overweight and obese women. When the woman is heavier, the risk of induced preterm birth before 37 weeks is higher; with heavier weight, obese and very obese women having a higher relative risk. The risk of spontaneous preterm birth did not vary. Overweight and obese women had an increased risk of preterm birth before 33 weeks. The heavier the woman, the higher the risk of early preterm birth. Overweight, obese, and very obese women had a higher relative risk. [1, 24, 31]

2.1.5. Outcome of Preterm births

The increased risk of adverse out comes associated with short birth interval than long birth interval. Birth interval of less than 18 months was significantly associated with almost all

adverse neonatal outcomes. Birth interval <18 months did not increase the risk of neonatal mortality to a level of statistical significance; however there was increase odds of infant mortality in 83%. Similar report was evidenced in Ghana that neonatal deaths were observed to occur most often in newborns having birth spacing less than 18 months Nulliparous/age 18-<35 had a 28% and parity ≥3/age≥35 had a 66% increase in odds of neonatal mortality whereas parity≥3/age 18-<35 had a 30% increase in odds for infant mortality. Also in western China, risk of neonatal death was significantly higher at the extremes of maternal age; <14 years, which declined to an age of 28 years, and then increased again to ages of ≥44 y ears.[18,32]

Death outcome of preterm births also varies depending on their gestational age. In East Africa, newborn deaths were among newborns born either small for gestational age or preterm. 28% of neonatal mortality was associated with being born preterm and 39% of neonatal mortality was associated with being born either preterm or small for gestational age. From very preterm infants (<34 wk), less than 1% were live births and 20% were deaths. But among those born moderately preterm (34–36 wk) and small for gestational age, just 1% of live births, but 8% of deaths were recorded. In addition extremely preterm died in early neonatal period than other preterm. Common causes of death in preterm neonates are RDS and neonatal sepsis [1, 2, 18, 31]

3. Objective

3.1. General objective

To asses factors associated with indicated preterm birth and its outcome in SPHMMC from September 1, 2015 to September1, and 2016.

3.2. Specific objectives

To identify factors associated with indicated preterm birth in SPHMMC from September 1, 2015 to September1, 2016.

To determine factors associated with outcome of preterm birth in SPHMMC from September 1, 2015 to September1, 2016.

4. Methodology

4.1. Study Area

St. Paul's hospital millennium medical college is located in Gulele sub city Addis Ababa. The hospital has been providing medical service for more than fifty years. It becomes teaching hospital in 2000 E.C (millennium). In 2000 E.C it begins only with 50 and inadequate medical staffs. Currently there are more than 700 students and good number medical staffs including specialists and sub specialists. It has twelve departments which are: Pediatrics, Internal Medicine, Gynecology & Obstetrics, Surgery, Ophthalmology, Dermatology, ENT, Psychiatry, Dentistry, forensic medicine, Radiology and Emergency Medicine. The pediatrics department has Pediatric Intensive Care Unit (PICU), Ward, Neonatal Intensive Care Unit (NICU), Emergency, OPD and Echocardiography units. There were total of 9465 births registered in both labor ward and EOPD in 2008 E.C; among this 9048 were live births and 417 were still births. And there were total of 3579 preterm admissions at both labor ward and EOPD in 2008. The NICU had total of 2154 admissions out which 852 were preterm in 2008 E.C.

4.2. Study design

Descriptive, Analytic and quantitative Retrospective institution based study design was conducted.

4.3. Study period

The study was conducted from January 6 to march 15.

4.4. Target population

All live births in SPHMMC and its catchment Areas

4.5. Source population

All preterm births' medical records (charts) from September 1 2015 – September 1 2016 in SPHMMC NICU.

4.6. Sample population

All selected Preterm birth s' medical records (charts) from September 1 2015 – September 1 2016 in SPHMMC NICU.

4.7. Study unit

Each selected preterm birth medical records (charts) from the hospital's NICU registry logbook.

4.8. Inclusion criteria and Exclusion Criteria

4.8.1. Inclusion criteria

All preterm births who were admitted to NICU in SPMMC whose medical record is legibly written.

4.8.2. Exclusion criteria

Preterm births whose history and diagnosis on the chart is not clearly recorded

4.9. Sample size determination

The prevalence of preterm birth in study in 2016 in three hospitals involving Black lion, zewditu memorial and Ghandi specialized memorial hospitals is 16.15%. Considering 95% Confidence interval with 5% marginal of error, and employing single population proportion formula the sample size (n_0) is calculated as follows.

n_0= initial sample size

Z= standard normal value at 95% C.I is 1.96

P= prevalence of factor associated with preterm birth and its immediate outcome is 0.1615

D= possible margin of error tolerated 5%

$n_0 = (Z_{\alpha/2})^2 * p\ (1-p)/d^2$

$n_0 = (1.96)^2 * 0.1615(1-0.1615)/(0.05)^2$

$n_0 = 208.088332$

4.10. Sampling method

To select the study units systematic sampling technique was used. Therefore, the interval (K) is calculated by dividing the total number preterms (N) admission in that year for the number of the sampled preterms.

K= N/n

K=852/208

K=4.09615

Therefore study units was selected by systematic sampling every 4 preterm after selecting the first preterm by simple random sampling from NICU preterm registry logbook.

4.11. Data Collection method

Data was collected by using structured, pretested questionnaire from the selected patient's medical records. The questionnaire is adopted different related studies. The questionnaire contains socio-demographic characteristics of the preterm neonate and the mother, maternal medical disorders, gynecologic and obstetric factors, common medical disorders in neonate, and immediate outcome of the preterm birth.

4.12. Operational definitions

The following operational definitions were adopted from the research done on factors affecting preterm birth and its outcome in Addis Ababa University. [29]

Outcome: Outcome of preterm birth being alive or dead as it has been recorded on discharge summary or death summary of the neonate.

Low APGAR score: Registered APGAR Score of the neonate between 0-6.

Medical disorders in mother: Any history of medical diagnosis in the mother as it has been registered on the neonate's medical record.

Medical disorders in the neonate: Any recorded medical diagnosis for the preterm neonates on their medical records.

Multigravidas: Recorded gravid of >=2

Multiparty: Recorded parity of >=2

Normal APGAR score: Registered APGAR score from 7 to 10.

Spontaneous Preterm: for those which labor was started spontaneously prior to 37 weeks of GA.

Indicated Preterm: for those pregnancy was terminated by cesarean section or labor induction either for maternal or fetal cases prior to 37 weeks of GA.

4.13. Study variables

4.13.1. Independent Variables

Identification of the preterm birth

Gestational age, sex, weight, height

Maternal sociodemographic characteristics

Age, occupation, educational status

Gynecologic-obstetric related factors

Gravidity, Parity, Birth interval, mode of previous delivery, multiple pregnancies, premature ruptures of membrane

Medical disorders in mother

Hypertension, DM, HIV/AIDS, Malaria, Syphilis, Depression or other psychiatric diseases

4.13.2. Dependent Variable

Indicated preterm birth

Outcome of preterm birth

4.14. Data Quality control

The adopted and developed tool was evaluated with experienced researchers. Pretest was employed on 5% (19 preterm baby's card) of the sample size with structured questionnaire in SPHMMC on admitted preterm neonate in 2016 two weeks prior to the actual study to check usually recorded variables on the patient's medical record. Daily evaluation of the data for completeness and encountered difficulties on the time of data collection was seen.

4.15. Data processing and analysis

Completeness of the questionnaire will be rechecked preceding data entry. Following this, data coding and entry was accomplished SPSS version 22. Data, recoding and analysis were performed with this SPSS. Bivariate logistic regression analysis was done after dichotomizing the dependent variables with coding '1' for success and '0' for failure. After checking

associations of the variables, those with $p<0.2$ will be processed to multivariate logistic regression analysis to control confounding factors in the association. P-value of < 0.05 was used to express statistical significance of the variables. Sentence, table of frequency and graphs was used to present result of this study.

4.16. Ethical considerations

Letter of corporation was written from SPHMMC public health department to Neonatal Intensive Care Unit (NICU) and to SPHMMC administration beurue. The searching and obtaining of the selected samples' medical record (charts) was done. Finally, strict care for the patient's medical record and confidentiality not to take patient identifications except the identified for the neonate was involved throughout the time of data collection up to return of medical records on the end of tasks.

4.17. Dissemination and utilization of results

The results of this study will be disseminated or communicated to SPHMMC public health department, department of pediatrics, Federal Ministry of Health, Regional health bureau, local institutions and other concerned bodies through reports and publication on an appropriate journal.

5. Result

From total of 2154 NICU admissions; preterm birth accounts for 852. A total of 208 preterm neonates' medical records having both maternal and the neonate's histories were involved in this study.

Univariate Analysis of maternal factors`

Majority of the mothers which was 32.2% were in age range of 25-29 and 27.9% were in age range of 20-24 years. More than half of the mothers 57.2 % are from oromia region, 41.8% were Addis Ababa residents and the rest 1% were from other regions.

For the current mode of delivery spontaneous vaginal accounts 103 (49.5%), emergency cesarean section accounts for 59 (28.4%), elective C/S 34 (16.3%) and assisted breech delivery 2.4%. Besides, 5.3% of mothers were diagnosed with medical illness; and among these HIV/AIDS accounts for 4.3%, HBV infection and valvular heart disease accounts for 1.9%and 0.5% respectively. Among the obstetric illnesses previous C/S scar, partial HELLP syndrome, preeclampsia with severity feature account for 4.3%, 2.5% and 22.6% respectively.

Table 1: Obstetrics related illness of preterm baby mother: SPHMMC, Addis Ababa, Ethiopia, September 1, 2015 to September1, 2016..

Obstetric illness	Frequency	percent	Cumulative percent
Multiple Gestation	53	25.5	25.5
Previous c/s scar	9	4.3	4.3
Partial HELLP syndrome	6	2.9	2.9
Preeclamsia with severity feature	47	22.6	22.6
Eeclamsia	10	4.8	4.8
PROM	28	13.5	13.5
Chorioamnionitis	17	8.2	8.2
Placenta previa	9	4.3	4.3
Abruptio placenta	4	1.9	1.9

Univariate Analysis of neonatal factors

Forty nine percent of 102 (49%) the preterm births were male and 106 (51.0%) were female neonates. 143 (68.8%) were spontaneous preterm birth and 65 (31.3%) were indicated preterm birth. The most common preterm birth GA is 32-34 weeks which was 58.2% and the least one is 28-31 weeks which was 12.5%.

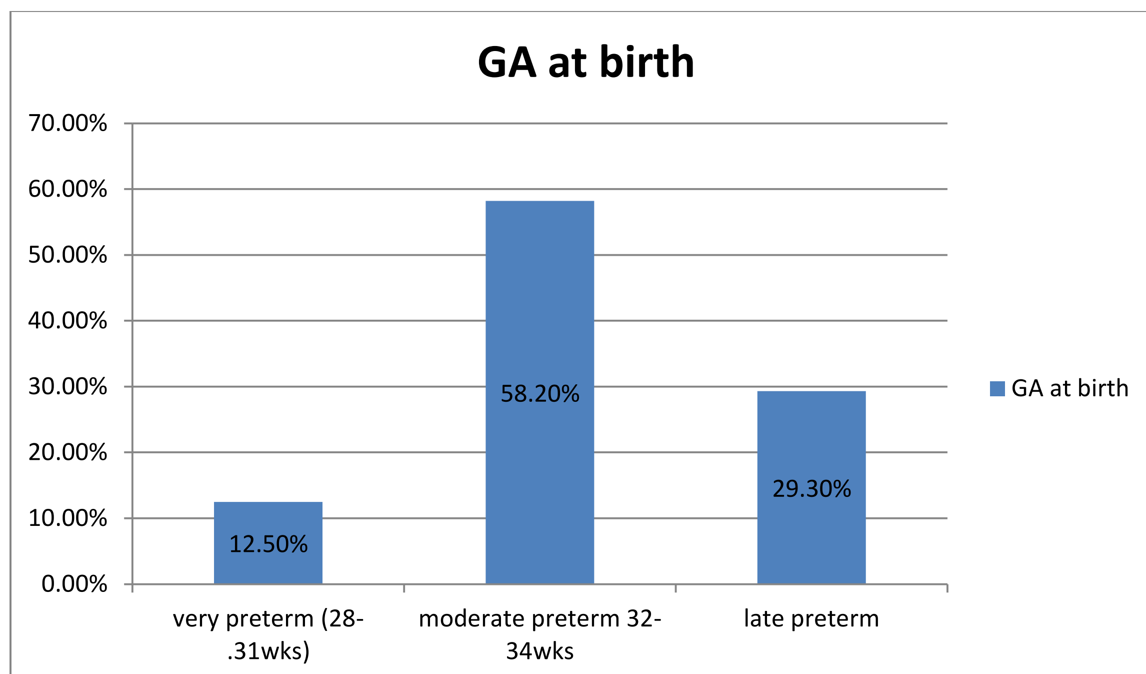

Figure 1: show preterm births Classification according to the gestational age of preterm birth, SPHMMC, Addis Ababa, Ethiopia, September 1, 2015 to September1, 2016..

The first minute APGAR score of the preterm neonates was found to range 1 to 9 with mean of 6.49 and standard deviation of 1.196 where 32 (15.4%) and 176 (84.6%) were under category of low (0-6) and normal (7-10) APGAR Score respectively. According to finding of this study, 189 (90.9%) of weights were appropriate for their gestational age (AGA), 16(7.7%) were small for their gestational age (SGA) and few 3(1.4%) were under category of large for gestational age (LGA).

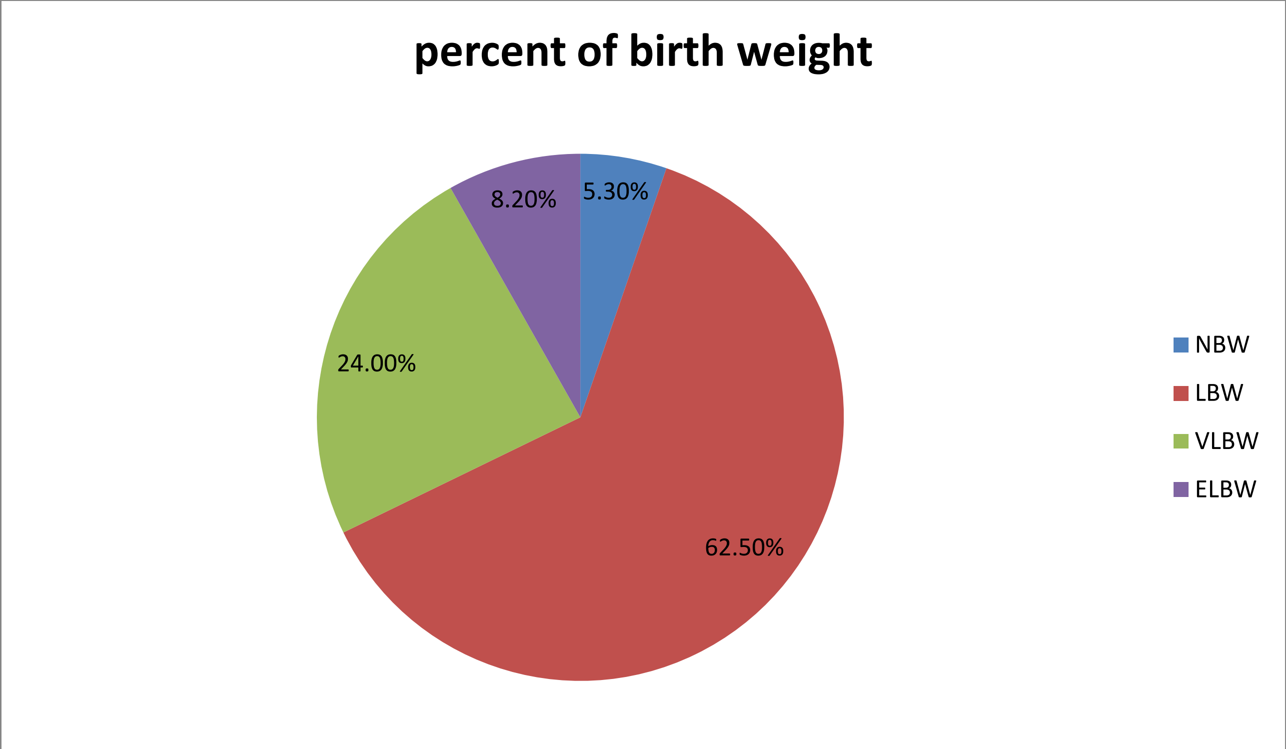

Figure 2: Weight Classification of preterm births, SPHMMC, Addis Ababa, Ethiopia, and September 1, 2015 to September1, 2016..

Among the preterm neonates admitted to NICU majority of them103 (49.5%) had Respiratory distress syndrome and of them 55(26.4%) had Early onset neonatal sepsis.

Neonatal illness	Frequency	percent	Cumulative percent
RDS	103	49.5	49.5
EONS	55	26.4	26.4
Hypothermia	145	69.7	69.7
Hypoglycemia	8	3.8	3.8
MAS	8	3.8	3.5

Table 2 : Common medical problems of preterm births, SPHMMC, Addis Ababa, Ethiopia, September 1, 2015 to September1, 2016.

From those preterm neonates admitted to NICU 34 (16.3%%) were died and 174 (89.7%) discharged alive.

Factors associated with Indicated Preterm birth

Collected data were classified by considering preterm birth whose labor was started spontaneously and whose labor was induced either for maternal or fetal indication. Crosstab with chi-square and P<0.05 was used to check statistical significance and binary logistic regression were also undertaken. Indicated preterm births had an odds of being born to HIV mothers that are 7.250 times the odds of those Spontaneous preterm birth (P=0.037, AOR=7.250, 95% 1.122,46.850). but HIV mothers less likely experience Spontaneous preterm birth (P=0.02, AOR=0.138, 95%CI: 0.022,0.887). preeclampsia with severity feature and partial HELLP had also shown significant association indicated preterm birth. Those mothers having preeclampsia with severity feature more likely (P=0.031,AOR=39.27, 95% CI: 14.21,108.50) give indicated preterm birth and less likely (P=0.000, AOR=0.026, 95% CI: 0.010,0.072) to give spontaneous preterm birth. And mother with partial HELLP give indicated preterm birth 31.14 times p= 0.006,AOR=31.141, 95%CI:3.627,367.2)the odds of spontaneous preterm birth. Those mothers with Chorioamnionitis were more likely (P=0.017, AOR=5.444, 95% CI: 1.364,21.894) to give indicated preterm birth and less likely (P=0.023, AOR=0.205, 95% CI: 0.052,0.808) to give spontaneous preterm birth. Generally mother with chorioamnionitis, HIV positive, preeclampsia with severity feature and partial HELLP syndrome more likely to give indicated preterm than spontaneous preterm. Factor like multiple gestation, parity, maternal age and PROM have not significant association to both indicated and spontaneous preterm birth.

Table 4 : factors associated with Indicated Preterm birth,SPHMMC, September 1, 2015 to September1, 2016.

Characteristics	Indicated preterm		S.E.	P-value	AOR(95% C.I)
	yes	no			
Multiple pregnancy					
Yes	11	42	1.7	0.366	0.612(0.210,1.778)
No	54	101			
Maternal HIV infection					
Yes	6	3	1.3	**0.037****	7.250(1.122,46.850)
No	57	140			
Previous C/S scar					
Yes	6	3	1.3	0.202	3.496(0.510,23.951)
No	57	140			

Partial HELLP syndrome					
Yes	5	1	1.56	**0.006****	31.141(3.627,367.2)
No	60	142			
Preeclampsia with severity features					
Yes	38	9	1.6	**0.000****	39.27(14.21,108.50)
No	27	134			
Eeclampsia					
Yes	5	5		**0.032****	6.22(1.166,33.208)
No	60	138			
PROM					
Yes	12	16	2.4	0.076	3.141(0.886,11.136)
No	53	127			
Chorioamnionitis					
Yes	9	8	1.18	**0.017****	5.444(1.364,21.894)
No	56	135			
Polyhidroamnios					
Yes	2	1		0.144	8.831(0.476,163.895)
No	63	142			
NRFHRP					
Yes	7	6		0.852	1.156(0.257,5.307_
No	58	137			

Factors associated with Outcome of preterm birth

From those preterm neonates admitted to NICU 16.3%% were died and 89.7% discharged alive. In this study maternal factors like age, parity, Preeclampsia with severity feature, GDM and Maternal HIV infection had no significant association in Bivariate analysis while some variables shown significant association with immediate death outcome of the preterm birth. Preterm neonate with PNA more likely die before discharge than those who had no PNA (P=0.001, OR=12.214, 95% CI : 2.88,51.67) . Likewise those preterm neonates who were discharged dead had odds of having RDS that are 22 times odds of those discharged alive (p=0.004, AOR= 22.08, 95%CI: 2.708,180.072). Compared to late preterm birth, very preterm(P=0.000, OR=16.571, 95%CI : 4.11,66.75) and moderate preterm (P=0.046, OR=3.601, 95%CI : 1.022,12.691) neonates more likely discharged dead. Preterm

with low APGAR score (P=0.001, OR=4.2, 95%CI: 1.8, 9.76) die 4.2 folds of those with normal APGAR score before discharge.

In general respiratory distress syndrome had significant association with preterm death in multivariate analysis(p=0.004, AOR= 22.08, 95%CI: 2.708,180.072).However, Hypothermia, HDN and MAS didn't show any significant association in bivariate analysis. Also weight category (being SGA, AGA, and LGA) had no significant association with immediate death outcome of the preterm neonate in multivariate.

Table 5: factors associated with immediate death outcome of Preterm birth, SPHMMC, Addis Ababa, Ethiopia, September 1, 2015 to September1, 2016.

Characteristics	Death before discharge		S.E	P-value	AOR(95% C.I)
	Yes	No			
Maternal HIV infection					
Yes	3	6		0.505	4.905(0.046,525.375)
No	31	168			
Preeclampsia with severity feature					
Yes	3	44		0.450	0.493(0.0.78,3.094)
No	31	130			
PROM					
Yes	7	21		0.113	3.393(0.748,15.395)
No	27	153			
Gestational Age at birth					
Very preterm(28-31)	12	14		0.654	1.94(0.106,35.55)
Moderate preterm(32-34)	19	102		0.806	1.352(0.121,15.079)
Late preterm(35-36)	3	58			
Birth Weight					
NBW(2500-3800g)	0	11			
LBW(1500-2500g)	12	118		0.998	0.000
VLBW(1000-1500g)	11	39		**0.000****	0.037(0.011,0.130)
ELBW(<1000g)	11	6		**0.003****	0.153(0.043,0.535)

APGAR score					
Low	12	20		0.375	2.088(0.411,10.607)
Normal	22	154			
RDS					
Yes	29	74		**0.004****	22.08(2.708,180.072)
No	5	100			
Hypothermia					
Yes	19	126		0.301	0.514(0.146, 1.815)
No	15	48			

6. Discussion

This study identified magnitude of indicated preterm in NICU as well as factors associated with indicated preterm birth and outcome of preterm birth. In this study the percentage of indicated parentage of indicated preterm birth was 31.3%. This finding is lower than the study in brazil which is 35% and also the study done in Addis Ababa University which is 33.9%. This could be deu to methodological difference since the difference is not large. Most of the preterms had GA at birth in the range of (32-34 weeks) is almost similar with the recorded in Addis Ababa university hospital, but lower than that of gestational age in preterm birth in North Eastern Indira Gandhi Regional Institute of Health & Medical Sciences, India. Methodological and socio-economic difference might play a role for this variation. Percent of preterm-AGA (90.9%) was greater than the percent of SGA. This is similar with that of finding in Addis Ababa University. (28)

In line with evidence from study of Southeast Nigeria, almost all preterm births in this study were low birth weight, very low birth weight and extremely low birth weight Majority of the mothers which was 31% were in age range of 25-29. But in rural South Africa and Malawi the greater proportion of the mothers were less than 20 years old. Methodological and socio -economic variation can be the reason for this difference. Socioeconomic difference with methodology of the study can be reason into account for this variation.

Preeclampsia with severity feature and partial HELLP had also shown significant association both for spontaneous and indicated preterm birth. Those mothers having preeclampsia with severity feature more likely (P=0.031,AOR=39.27, 95% CI: 14.21,108.50) give indicated preterm birth and less likely (P=0.000, AOR=0.026, 95% CI: 0.010,0.072) to give spontaneous preterm birth. And mother with partial HELLP give indicated preterm birth 31.14 times p= 0.006,AOR=31.141, 95%CI:3.627,367.2)the odds of spontaneous preterm birth. This is in line with studies done in with studies done in North east Tanzania, India and Indonesia in 2015 and 2016; which have shown significant association between pregnancy induced hypertension and preterm birth. The same result had also been found in the study done in Addis Ababa University. This could be because of termination of pregnancies through induction or C/s at gestational age of 34 weeks or when the newborn reaches 2kg to 2.2kg in preeclampsia with severity feature; and immediate termination in case the mother develops DIC, HELLP syndrome, APH and etc. Percentage of death preterm neonate admitted to NICU in this study was 16.3% . This is almost similar to study done in Nigeria in 2015. RDS is significantly associated with Death outcome of preterm neonate (p=0.004, AOR= 22.08, 95%CI: 2.708, 180.072). This result was found in the study done in Addis Ababa University 2015. And this because of deficiency of surfactant in preterm newborns.(29,30)

7. Strength and Limitations of the study

Strengths

In this study both bivariate and multivariate analysis was used in which chi-square, Odds ratio and adjusted odds ratio was used to see degree of Association between dependent and independent variables.

Limitations

Since data collected from secondary source, lack of and incomplete information was the major problem to assess different socio-economic characteristics and other important variables that would have associations with preterm birth and its immediate outcome.

8. Conclusion and Recommendations

Conclusion

Preterm birth was a problem in SPHMMC and this study revealed different factors associated with indicated preterm birth preterm birth and outcome of preterm birth. Maternal HIV infection, preeclampsia with severity feature, Chorioamnionitis, partial HELLP syndrome and Eeclampsia were found to have significant association indicated preterm birth. Some maternal and neonatal factors were significantly associated with immediate death outcome of preterm birth. Very preterm, PNA, low APGAR score has shown significant Association with death of preterm neonate. However only RDS has shown significant association to preterm death in multivariate analysis.

Recommendations

For SPHMMC OBGYN Department

- It is better to regularly screen out pregnant mothers for HIV, hypertension and thoroughly ask for history of premature rupture of membrane.
- Low dose Aspirin can be used in prevention of preeclampsia, As recent studies has shown benefit in this regard.[31]
- Decreasing repeated vaginal examination and providing appropriate Antibiotics and steroids reduces rate choriaanionitis in mothers with PROM and ultimately reducing indicated preterm and GA at birth
- Early detection of fetuses with Non reassuring biophysical profile providing appropriate medical intervention which at same time prolong GA delivery and reduce the rate perinatal Asphyxia(PNA) ultimately reducing preterm death.

For SPHMMC Pediatrics (NICU) Department

- Increasing the number of standard CPAP as well as mechanical ventilator in NICU will improve prognosis preterm with RDS ultimately degreasing preterm mortality.
- Use of surfactant through Endotracheal tube also improve survival of preterm with RDS since those preterms has surfactant deficiency to begin with.

For Policy makers

Identified Preventable causes of both spontaneous and indicated preterm birth as well as immediate death outcome of preterm birth need to be taken in to consideration in health transformation plan to be worked on so that survival chance of preterm birth will be increased. Again it is important if standard format of sufficient history taking is distributed uniformly for health facilities which can be great privilege for collection of sufficient data in research.

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Annex

Questionnaire

Information sheet for permission request from the hospital

Researcher: Dr. Mubarek Jemal Osman (Undergraduate student on degree of Doctor of Medicine at Saint Paul Hospital Millennium Medical College, phone 0943137745, email: mubkayo7745@gmail.com)

Dear/sir:

It is obvious that a medical student should conduct a relevant research for fulfillment of his Degree of Doctor of Medicine. Therefore I am interested in conducting research **on Factors associated with preterm birth and its immediate outcome in SPHMMC from September 1, 2015 to September1, 2016**. The aim of this study is identify common risk factors for preterm births and their immediate outcome which can show the way for decreasing both preterm birth occurrence and risk of its death that contributes for neonatal mortality significantly.

Saint Paul Hospital Millennium Medical College was selected to conduct this research. Sample will be selected from preterm neonates admitted to NICU from September 1, 2015 to September1, 2016. Each study unit will be selected using systematic sampling from the medical record numbers sorted from admission Log book of NICU. After the selected study units are identified, card of the patient will be taken from the record office of the hospital. Data collection will be undertaken using structured questionnaire between January 6 to march 15, 2017.

Confidentiality issue is maintained, no identification of the patients both the mother and neonate will be recorded. The information will not be applied for other purpose except this study. All obtained patient s' card will be returned to the record office.

Finally, after analyzing and compiling the findings of this study a copy of this thesis will be provided for your institution. Having understood the given information about this study, you can put your signature of confirmation below.

Signature: __________________ Thank you!

Questions

Questions related to sociodemographic, factors associated with preterm birth and its immediate outcome

Instruction: Select correct answer for each question accordingly.

No.	Questions	Possible answers	Skip to
I. Questions for the mother			
a. Socio-demographic characteristics			
101	Age		
102	Place of residence	1. A.A_____ 2. Other region______	
b. Obstetric related factors			
201	Number of Gravidity		
202	Number of Parity		If 1, to 206
203	What type immediate Previous pregnancy outcome she faced?	1. Preterm birth 2. Still birth 3. Neonatal death 4. Abortion 5. Normal	
204	When did she give birth previously?	1. 12 months ago 2. 18 months ago 3. 24 months ago 4. 36 months ago 5. Others(specify)	
205	What was her immediate Previous mode of delivery?	1. Spontaneous Vaginal 2. Cesarean Section 3. Instrumental	
206	What was her Current mode of delivery?	1. Spontaneous Vaginal 2. Cesarean Section 3. Instrumental	

207	What type of preterm was it?	1. Spontaneous 2. Indicated	
208	Was the current pregnancy multiple (twin)?	1. Yes 2. No	
209	Has she been diagnosed with any medical problems?	1. Yes 2. No	If no, Q.301
210	If yes to question 209, what was that medical diagnosis?	1. Anemia 2. Malaria 3. HIV 4. Syphilis 5. Hypertension in pregnancy 6. Diabetes 7. PROM 8. Others(specify)	
II. Questions for the preterm neonate			
a. Identifications			
301	Gestational age at birth in weeks		
302	Sex	1. Male 2. Female	
303	Weight in grams		
304	Length in centimeters		
305	APGAR score of 1st minute		
b. Diagnosed comorbidities (medical problems)			
401	What was the category of gestational age for weight?	1. AGA 2. SGA 3. LGA	
402	Had the neonate been diagnosed with any medical disorders?	3. Yes 4. No	If no, Q 404
403	If yes, what type of medical disorders it had?	1. Respiratory distress 2. Bronchopulmonary dysplasia	

		3. Pneumonia 4. Hypothermia 5. Sepsis 6. Others__________________	
404	Outcome on discharge	1. Alive 2. Dead	