Maternal and fetal factors contributing to neonatal outcome in Al-Tibri Medical College and Hospital

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ABSTRACT

Background: The study was done to identify the maternal and fetal factors contributing to neonatal outcome and to evaluate the correlation between risk factors and adverse neonatal outcome.
Subjects and methods: This prospective observational study was conducted on 126 mothers and their neonates fulfilling the selection criteria at Al-Tibri Medical College and Hospital. A self-designed Performa was used to enter data of subjects. Sick neonates were referred to neonatal intensive care unit for admission and management. The results were analyzed by using SPSS version 23. A p-values ≤ 0.05 was considered as significant.
Results: Out of 126 enrolled subjects, 81% mothers were multigravidas, 31% were unbooked, 13.5% had gestational comorbidities, 15% were drug addict, 2% were Hepatitis B positive. 22.2% underwent emergency LSCS while 31.7% delivered babies by elective LSCS. Regarding fetal factors contributing to sick babies, IUGR (20%), twin fetuses (15.4%), prematurity (47.7%) were significant. 65 were sick babies. Adverse neonatal outcomes observed were prematurity in 25.4%, IUGR in 11.1%, NICU admission in 33.3%, and neonatal death in 2%. Risk factors associated with adverse neonatal outcomes were positive maternal drug addiction (p-value = 0.028), preterm delivery (p-value<0.001), NICU admission (p-value<0.001) and low birth weight (p-value <0.001).
Conclusion: Compromised maternal antenatal care has profound deleterious effect on fetus and neonate. Obstetricians, perinatologists and neonatologists need to work in concord to improve maternal antenatal care hence improving neonatal outcome. In our study adverse neonatal outcome was associated with unbooked cases, delivery by EmLSCS, addicted mother, preterm delivery, LBW and neonates requiring NICU admission.
Keywords:
Maternal factors, Fetal factors, Neonatal outcome

INTRODUCTION

Neonatal period is the most sensitive and vulnerable period in a baby's life and is much influenced by the maternal and intrauterine conditions.[1] Prompt identification of these factors in turn contribute to favorable neonatal outcomes.[2] According to 2018 UNICEF data for Pakistan, neonatal mortality rate is 44 per 1000 live births.[3] According to 2019 data infant mortality rate in Pakistan is 60.219 deaths/1000 live births.[4]

Around the globe, 86% of women can access optimal antenatal services once during their whole pregnancy while only 62% of pregnant ladies access four antenatal visits.[5] Even much lesser number of antenatal visits observed in women belonging to South Asia (52%) and Sub-Saharan Africa (46%) contributing to high maternal mortality in this part of the world. According to United Nations interagency estimations, a decline in global maternal mortality rate of 44% percent

observed from 1990 to 2015 (from 385 deaths to 216 deaths/1000live births).[4] As per 2015 estimates, maternal mortality rate in Pakistan is considerably high i.e., 178 deaths per thousand live births.[6]

Lack of availability of resources is an important contributing factor to neonatal mortality and is directly proportional to adverse neonatal survival rates. Increased attention to provision of adequate basic perinatal care can result in improved survival rates of newborns.[7,8]

Maternal care during the pregnancy and after delivery has profound effect on improving neonatal outcome.[9,10] Intrapartum asphyxia, birth trauma, fetal distress, maternal hypertension, diabetes, addiction are some of the avoidable factors contributing to adverse neonatal outcome.[11] One study indicated that most neonatal deaths are caused by health worker related factors. There is a strong body of evidence that, in the births attended by well-trained health provider, the neonate has a high chance of survival.[12,13]

Maternal and neonatal morbidity and mortality is still a challenging problem in developing and resource limited countries. Purpose of conducting this study is to identify contributing factors that have profound effect on neonatal outcome. Furthermore this study will help

to devise guidelines for safe motherhood, hence improved neonatal outcome in population visiting public sector and welfare hospitals especially the underprivileged.

SUBJECTS AND METHODS

This prospective observational study was conducted in Obstetric Department of Al-Tibri Medical College and Hospital from February 2019 to July 2019. A pretested structured Performa was filled by the author and co-authors. Information of maternal factors was gathered from the pregnant ladies in labour room, Operation theatre, and postnatal ward. Data of fetal factors obtained from serial antenatal ultrasounds while neonatal outcome assessed clinically in labor room, theatre and in postnatal ward. Total 126 mothers were enrolled for the study. Neonates requiring resuscitation at birth were referred for neonatal intensive care admission. Neonates with maternal comorbids like pregnancy induced hypertension, bad obstetrical history and gestational diabetes were followed closely till discharge and appropriate interventions done when needed. Preterm, LBW, IUGR, and requiring NICU admission were considered sick babies. Intrauterine death, still birth, neonatal death, floppy baby, preterm baby, respiratory distress and convulsions at birth were considered adverse neonatal outcomes.

Data were stored and analyzed using IBM-SPSS version 23.0. Pearson chi square test of independence was used to see the association of parameters with neonatal outcome, binary logistic regression analysis was done to estimate the odds ratio and 95% confidence interval of these parameters for adverse neonatal outcome. A p-values less than 0.05 were considered significant.

The current study was approved by the ethical committee of Al-Tibri Medical College and Hospital, Karachi. After taking informed consent from parents of admitted neonates, data was collected in a self-administered questionnaire.

RESULTS

Table 1 shows the demographic profile of the study participants. Out of 126 enrolled mothers, 102 were multigravida (81%) while 24 were primigravida (19%), 39 (31%) were unbooked cases, 58 delivered vaginally while 40 underwent elective cesarean section and 28 delivered by emergency cesarean section. 15 mothers have history of positive drug addiction accounting for 11.9% of cases. 10 mothers had premature rupture of membranes (7.9 %) with meconium stained liquor in 2.4 % of cases. 2 mothers were HBsAg reactive (1.6%).

Regarding fetal demographics, 32 were preterm (25.4%), 94 were term gestation (74.6%) while 14 were IUGR (11.1%). 10 were multiple gestation (7.9%) and 116 were singleton (92.1%). The neonatal outcomes that is depicted in the table is that 124 babies born alive (98.4%), 2 (1.6%) born dead including 1 still birth, 52 were male (41.3%) while 74 were female (58.7%). 61 were well baby (48.4%) while 65 were sick babies (51.6%). Babies requiring nursery admission 42 (33.3%).

Table 1 shows association of maternal and fetal factors with neonatal outcome. Sick babies had mothers with mean age 24.98 ± 4.72 years and duration of gestation 35.98 ± 2.56 weeks (p-value<0.001). Considering maternal co morbid conditions, PIH plus GDM, GDM, PIH contribute 4.6%, 7.7% and 12.3% respectively to adverse neonatal outcomes. 53 sick babies (81.5%) and 58 well babies (95.1%) were born to mothers with negative drug addiction while 3 well babies (4.9%) and 12 sick babies (18.5%) were born to mothers with positive drug addiction (p-value = 0.019). 49 well babies (80.3%) and 39 (58.5%) sick babies were born to booked cases mothers while 1 well babies (19.7%) and 27 (41.5%) sick babies were born to unbooked cases mothers (p-value = 0.008).

Total 55 sick babies (84.6%) and 61 well babies (100 %) were born to mothers with no premature rupture of membranes while no well-baby and 10 sick babies (15.4%) were born to mothers with premature rupture of membranes, (p-value = 0.091). 62 sick babies (95.4%) and 61 well babies (100%) were born to mothers with meconium-stained liquor while no well-baby and 3 sick babies (4.6%) were born to mothers with meconium-stained liquor, (p-value = 0.089). 62 sick babies (95.4%) and 61 well babies (100%) were born to mothers with negative Hepatitis B status while no well-baby and 2 sick babies (3.1%) were born to mothers with positive hepatitis B status (p-value = 0.167).

When fetal factors were taken into consideration, 60 (98.4%) well babies had no IUGR while 52 (80%) had no IUGR. 1(1.6%) well baby was IUGR, while 13 (20%) sick babies were IUGR (p-value = 0.091). Considering mode of delivery, 32 (34.2%) sick babies and 26 (42.6%) well babies were delivered vaginally while 20 (30.8%) sick babies and 8 (30.8%) well babies were delivered by emergency LSCS and 13 (20%) sick babies and 27 (44.3%) well babies (p-value = 0.005)

Table 1. Association of maternal, fetal and neonatal factors with study outcome

Characteristics	Total n (%)	Well baby (n = 61)	Sick baby (n = 65)	p-value
Maternal demographics				
Maternal Age (Years)*	25.37 ± 4.92	25.79 ± 5.14	24.98 ± 4.72	0.999
Parity				
Multi	102 (81%)	53 (86.9%)	49 (75.4%)	0.169
Primi	24 (19%)	8 (13.1%)	16 (24.6%)	
Antenatal booking				
Booked	87 (69%)	49 (80.3%)	38 (58.5%)	0.008
Un-booked	39 (31%)	12 (19.7%)	27 (41.5%)	
Comorbidities				
PIH, GDM	3 (2.4%)	0 (0.0%)	3 (4.6%)	0.064
GDM	6 (4.8%)	1 (1.6%)	5 (7.7%)	
PIH	8 (6.3%)	0 (0.0%)	8 (12.3%)	
Nil	109 (86.5%)	60 (98.4%)	49 (75.4%)	
Hepatitis B positive	2 (1.6%)	61 (100.0%)	63 (96.9%)	0.167
Previous LSCS	40 (31.7%)	20 (32.8%)	20 (30.8%)	0.808
Drug addiction	15 (11.9%)	3 (4.9%)	12 (18.5%)	0.019
Fetal demographics				
Multiple gestation	10 (7.9%)	0 (0.0%)	10 (15.4%)	0.061
Duration of gestation (Weeks)*	36.82 ± 2.27	37.80 ± 1.35	35.89 ± 2.56	< 0.001
IUGR	14 (11.1%)	1 (1.6%)	13 (20.0%)	0.091
Mode of delivery				
Vaginal	58 (46%)	26 (42.6%)	32 (49.2%)	0.005
Emergency LSCS	28 (22.2%)	8 (13.1%)	20 (30.8%)	
Elective LSCS	40 (31.7%)	27 (44.3%)	13 (20.0%)	
Premature rupture of membranes (PROM)	10 (7.9%)	0 (0.0%)	10 (15.4%)	0.091
Meconium-stained liquor	3 (2.4%)	0 (0.0%)	3 (4.6%)	0.089
Neonatal demographics				
Birth weight (Kg)*	2.83 ± 0.73	3.25 ± 0.43	2.45 ± 0.75	<0.001
Baby gender				
Male	52 (41.3%)	26 (42.6%)	26 (40.0%)	0.765
Female	74 (58.7%)	35 (57.4%)	39 (60.0%)	
Term				
Preterm	32 (25.4%)	1 (1.6%)	31 (47.7%)	<0.001
Term	94 (74.6%)	60 (98.4%)	34 (52.3%)	
Status				
Alive	124 (98.4%)	61 (100.0%)	63 (96.9%)	0.167
Dead	2 (1.6%)	0 (0.0%)	2 (3.1%)	
NICU Admission	42 (33.3%)	1 (1.6%)	41 (63.1%)	0.001

Categorical variables were presented as Frequencies and Percentages. A p-value was calculated by Chi-square /Fisher Exact's test. Continuous variables were presented as Mean ± Standard deviation and a p-value was calculated by Student t-test. A p-value ≤0.05 was considered as significant.

delivered by elective LSCS. 31 (47.7%) sick babies and 1 (1.6%) well baby were delivered prematurely while 34 (52.3%) sick babies and 60 (98.4%) well babies were delivered at term (p-value<0.001). Looking at the neonatal outcome, sick babies weighed 2.45 ± 0.75 kg while well babies weighed 3.25 ± 0.43 kg.

When we look at the risk factors affecting neonatal outcome in our study, positive maternal drug intake, preterm babies, NICU admission, low birth weight were associated with adverse neonatal outcomes (p–value=0.028, <0.001, 0.029, <0.001 respectively). On the other hand booked cases, elective LSCS carried favorable neonatal outcome (p-value 0.009, 0.029 respectively).

DISCUSSION
Neonatal morbidity and mortality is a major health concern in developing countries especially in a country like Pakistan. Maternal and fetal factors have a sound effect on neonatal outcome .Our study has shown that antenatal care, maternal drug intake, comorbid conditions, duration of gestation, mode of delivery, neonatal birth weight and maturity significantly effect neonatal outcome .

Maternal factors that were associated with adverse neonatal outcome were young maternal age, unbooked cases, multiparity, maternal drug abuse and positive hepatitis B serology. In the current study unbooked cases constituted 30.95% of the total deliveries which is similar to study conducted in Dhaka by Adhikary A and colleagues (39%) [14] but far more than a similar study conducted in South eastern Nigeria in which unbooked cases constitutes 17% of the total deliveries in a large study population.[15,16] This represents lack of awareness of mothers regarding antenatal visits in the population.

Table 2. Assessment of Risk factors affecting on Neonatal outcomes

Risk Factors	OR (95% CI)	p-value
Maternal drug addiction	4.377 (1.171 - 16.367)	0.028*
Antenatal booking	0.345 (0.155 - 0.768)	0.009*
Mode of delivery		
Emergency LSCS	2.031 (0.770 - 5.356)	0.152
Elective LSCS	0.391 (0.169 - 0.906)	0.029*
Term		
Preterm	0.018 (0.002 - 0.0141)	< 0.001*
NICU Admission	102.51 (13.336 - 787.831)	< 0.001*
Duration of gestation (weeks)	0.715 (0.522 - 0.979)	0.037*
Birth weight (Kg)	0.157 (0.065 - 0.382)	< 0.001*

OR: Odds ratio, Logistic regression was applied. A *p-value ≤ 0.05 was considered as significant.

Among the unbooked cases 69% delivered sick babies (mostly by emergency surgical intervention), which is an eye-opening figure for the health care providers. Maternal co-morbid conditions especially GDM and PIH significantly contributed to adverse neonatal outcome. Among the 17 mothers with comorbidities in our study population, 94% delivered sick babies. GDM is associated with neonatal morbidity and mortality. GDM affected relevant perinatal and neonatal outcomes based on its association with an increased risk of delivery by C-section, preterm birth, macrosomia at birth and neonatal hypoglycaemia.[17] The recently published report by International Diabetes Federation (IDF) states that one in seven births might be affected by GDM. Moreover, hypertensive disorders of pregnancy are also associated with guarded maternal and neonatal outcomes.[18,19]

When we look at the impact of mode of delivery on neonatal outcome, babies born by spontaneous vaginal delivery had higher birth weights and are mostly well babies, while most of the preterm and sick babies are delivered by EmLSCS (p-value = 0.029). This finding is consistent with the studies conducted by Ohad Gluck and Colleagues in January 2019 in Tel aviv, Israel and Prakash et al.[20,21]

Similarly low birth weight babies and babies requiring NICU admission also significantly relates to adverse neonatal outcome (p-value <0.001). These findings fairly resembles the study done by Atalay et al in 2013 in Turkey[22,23] observed better survival with increasing birth weight.

Factors positively affecting neonatal outcome in our study were booked cases (p-value = 0.009) and elective cesarean section (p-value = 0.029). A study done by Deeba Kalim in Peshawar showed adverse maternal and neonatal outcomes with unbooked cases.[24] Unbooked mothers suffered from PIH, PROM, anemia, emergency cesarean section (p-value <0.001) more and their neonates suffered from birth asphyxia, low birth weight, sepsis etc. Likewise babies born by

elective cesarean section carried good prognosis in our study. This factor is consistent with the study done by Benzouina and Colleagues in 2016 which showed that identifying mothers early who have to underwent cesarean section can decrease fetal complications hence improving neonatal outcome.[25]

CONCLUSION
Improving the availability and accessibility of quality antenatal care services in Pakistan will improve pregnancy outcome. Steps should be taken to ensure availability and accessibility of good antenatal care. Incorporation of free antenatal care can improve neonatal outcome.

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