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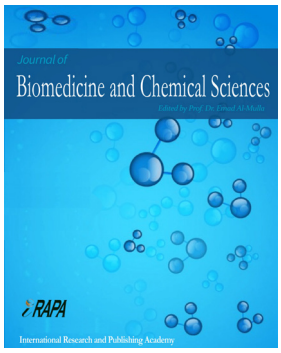

Magnitude of Perinatal Mortality and Associated Factors among Babies born in Hospital Vadodara, Gujarat

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ABSTRACT

Perinatal mortality is defined as both stillbirth and early neonatal deaths which occurs from 28 gestational age of pregnancy for seven completed days after birth or at least one kilogram. Perinatal mortality is a health indicator for prenatal, intra partum and newborn care. It is one of the major challenges for under-five mortality. Up to the knowledge of principal investigator while searching different literatures, there is a limited number of studies have related to perinatal deaths in our country. Most of the researchers have used secondary data. Therefore; this study may fill this gap by assessing the magnitude of perinatal mortality and associated factors among babies born based on the primary data. Institutional based cross sectional study design was conducted among 631study participants. Epi-data 4.2 and SPSS Version 21 was used for data entry and analysis respectively. The variable associated with the outcome variable in Bivariate p value <0.25 was considered for further multivariable analysis to control for potential confounding. Crude and Adjusted Odd Ratios was calculated to assess the association between dependent and independent variable with 95% CI. The variable which shows p ≤0.05 was considered as statistically significance. The magnitude of perinatal, mortality was found to be 9.0% (95%, CI: 7%-11%). Maternal age less than 18 years (AOR, 4.80CI; 1.33-17.33), history of perinatal loss (AOR 9.47, CI:3.32-26.98), gestational age less than 37weeks (AOR,4.01 CI:1.56-10.28), Apgar score (4-6) (AOR,5.24, CI:1.93-13.30) and low birth weight (AOR, 4.64CI:1.85-11.60) was significantly associated with perinatal mortality. Generally, this study has high perinatal death, which needs more attention. Maternal age less than 18 years, gestational age less than 37 wks, low birth weight, history of perinatal loss and (4-6) Apgar score at 5 minutes were significant predictors of perinatal death.

INTRODUCTION

Perinatal mortality is defined as both stillbirth and early neonatal deaths which occurs from 28 gestational age of pregnancy for seven completed days after birth or at least one kilogram. The perinatal period is the most vulnerable period in the life of an individual and the rate of death during this period is higher than at any other period of life (McPherson et al., 2017). Perinatal mortality is a health indicator for prenatal, intra partum and newborn care. It is affected by different number of factors and important determinants that need to be assessed before reaching conclusions about quality-of-care issues (Mohangoo et al., 2013). Greater than 3/4th of neonatal deaths, word-wide have been occurring in South Asia and sub-Saharan Africa annually. It is significantly caused by mode of delivery, low Apgar score, gestational age less than 37 weeks, birth asphyxia, traumatic delivery and inadequate care during pregnancy, labour and delivery (Allanson et al., 2015).

In developing countries, the common cause of still births is obstructed, prolonged labour, pre-eclampsia,

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and infection, whereas in developed countries congenital anomalies, placental problems and maternal medical disease (Onrust et al., 1999). In all countries by 2030 sustainable development program engagement, action and partner harmonization efforts to be implemented for Every Newborn Action Plan which targets the reduction of the neonatal mortality rate and stillbirths to 12 or fewer per 1,000 live births (Belachew et al., 2022). Other studies conducted in different parts of Ethiopia indicated that maternal illiteracy, being self-employed and multiple births have contributed to the perinatal mortality rate of 23.4 and 27.5 per1000 live births from stillbirth and early neonatal deaths respectively (Nguyen & Castro, 2019). Obstructed labour (27%), male presentation (11%) and hypertensive disorder of pregnancy and prematurity (7%) have contributed to neonatal mortality within first 28 days of life. It contributes nearly 28% of under5 deaths and 75% deaths within 1st weeks (Mpembeni et al., 2014).

Perinatal mortality is one of the major challenges for under-five mortality. By 2030 in all countries the sustainable development program engagement, action and partner proposed that reduction of neonatal mortality and still birth to 12 or fewer per 1000 live births. Up to the knowledge of principal investigator while searching different literatures, there are limited numbers of studies done related to perinatal deaths in our country (Bayou & Berhan, 2012).

METHODOLOGY

Study Area and Period

This study was conducted in the hospitals of Vadodara, Gujarat from January 20 to March 19, 2020. Institutional based cross sectional study design by using quantitative method was employed. Babies were born in the three Hospitals of Vadodara, Gujarat Regional State during data collection period.

Dependent Variable

- Perinatal mortality

Independent Variables

- Socio-Demographic Factors: Age, education, residence, religion, Ethnic group, referral
- Obstetric Factors and Complications: parity, obstructed labour, ANC history mode of delivery, Gestational age (GA) at onset of labour, history of previous delivery, Preeclampsia, eclampsia
- Antepartum haemorrhage, premature rupture of membrane, uterine rupture
- Medical factors: Anemia, chronic HTN, DM, Syphilis
- Fatal and neonatal conditions: Prematurity/ preterm, weight of newborn at birth, Mal-presentation, congenital malformation
- Health Care Factors: Partograph use, Apgar score

Data Quality Control

For data collectors and a supervisor two days training on the data collection tool was given. At the institutions data collectors had been closely supervised by the supervisors and principal investigator daily basis to check the completeness of each questionnaire. Prior to the actual data collection, the questionnaire was pre-tested on 5% of the sample size respondents out of a institution selected for the study. After the pre-testing, difficult and vague questions were revised. After modification of the questions, the actual data collection was conducted by using questionnaires which prepared in local language version for clear understanding and good communication. Double data entry was done.

METHODS

All filled questionnaires were checked for completeness and consistency; coded and data entry was used Epi-data version 4.2. Data were exported to SPSS version 21 for further analysis. Descriptive summary like frequency, cross tabs and graphical presentation were used. Bivariate analysis was carried out to identify factors that were significantly associated with perinatal mortality. All variables in bivariate analysis ($p<0.25$) were taken into the multivariate model to control possible confounders and the variables were selected by enter method technique. Multicollinearity was checked the linear correlation among the predictors by using, VIF, tolerance and standard error.

Hosemer-Lemeshow test found to be non-significant and omnibus test was significant which indicate the model was fitted adequately. The odd ratio was used as primary measure on the strength of predictors and outcome variable. Adjusted odd ratio with 95% confidence level was used to identify factors affecting perinatal mortality using multivariate analysis in the binary logistic regression. Finally, the level of statistical significance was declared at p-value ≤ 0.05.

Ethical consideration

Ethical clearance was obtained from Institutional Health Research Ethics Review Committee and official

letter was written for Parul University. Informed, voluntary, written and signed consent from the mothers who gave birth in each hospital was sought. Information given to participants includes the aims of study, duration and possible risks.

RESULTS & FINDINGS

Socio Demographic Characteristics

Table 1 presents A total of 631 mothers who gave birth in the hospitals of Vadodara during data collection period were included in the study, with response rate of 97.8%. The mean (±SD) age of the mothers was 26.68 (±5.96) years.

Table 1

Socio Demographic Characteristics of Mothers Gave Birth in Hospitals

Variables	Characteristics	Frequency	Percentage %
Maternal age	<=18	39	6.2
	19-34	492	78
	>=35	100	15.8
Marital status	Married	580	91.9
	Single	17	2.7
	Widowed	6	1.0
	Diverse	20	3.2
	Other	8	1.3
Occupational status	Housewife	404	64.0
	Private employee	70	11.1
	Government employee	76	12.0
	Laborer/merchant/student	81	12.8
Religion	Orthodox	541	85.7
	Protestant	29	4.6
	Muslim	61	9.7
Ethnicity	Oromo	541	85.7
	Amhara	82	13.0
	Other	8	1.3
Educational status	No formal education	231	36.6
	Primary	280	44.4
	Secondary and above	120	19.0
Residence	Rural	345	54.7
	Urban	286	45.3
Mode of admission	Referral	181	28.7
	not referral	450	71.53

Obstetric Characteristics

Among the total mothers who were screened for HIV, 614(97.3%) were non-reactive and 17(2.7%) were reactive. Out of 631 mothers who were screed for VDRL,587(93.0%) were syphilis - free, 18(2.9%) was positive for syphilis and 26(4.1%) were not recorded when the document was observed. All the positive for syphilis 18(2.9%) were treated before date of delivery. Haemoglobin determination was done for 516 (81.8%) of mothers during ANC follow up or before delivery. About 442 (85.7%) mothers had normal haemoglobin level while 74(14.3%) of them were had anaemia during their course of pregnancy.

Table 2

Obstetrics factors of mothers who gave birth in the hospitals, North Shoa, Oromia

Variables	Characteristics	Frequency/Percent	
		Death	Alive
Parity(N=631)	Primi para	19(7.0%)	254(93.0%)
	Multipara (2-4)	28(11.1%)	224(88.9%)
	Grand multipara (>=5)	10(9.4%)	96(90.6%)
Regular ANC (N=631)	Yes	29(6.6%)	411(93.4%)
	No	28(14.7%)	163(85.3%)
Mode of delivery	SVD	44(10.1%)	393(89.9.3%)
	C/S	7(7.8%)	83(92.2%)
	Instrumental delivery	6(5.8%)	98(94.2%)
History of perinatal death	Yes	18(43.9%)	23(56.1%)
	No	39(6.6%)	551(93.4%)
Obstetric complication	Yes	35(12.6%)	242(87.4%)
	No	31(8.8%)	323(91.2%)
APH	yes	10(10.0%)	45(90.0%)
	No	52(9.0%)	529(91.0%)
Pre/eclampsia	yes	10(18.2%)	45(81.2%)
	No	47(8.2%)	529(91.8%)
Obstructed labour	yes	5(5.1%)	94(94.9%)
	No	52(9.8%)	480(90.2%)
PROM	yes	10(14.7%)	58(85.3%)
	No	47(8.3%)	516(91.7%)

Medical and Newborn Characteristics

Out of 631 participants, majority of them 595(94.5%) had no chronic illness; only 36(5.7%) had chronic illness. About the mothers with chronic illness 23(63.9%) had chronic hypertension,10(27.8%) had diabetic mellitus and 5(13.9%) had anaemia. Among the babies who were born in the hospitals during data collection period, 53(8.4%) had congenital anomalies and 578(91.6%) were without any congenital anomaly. Male babies comprise more than half of the total number 364(57.7 %) and the female babies were 267(42.3%).

Out of the babies who were born in the hospitals 5(0.8%) were multi-fatal pregnancy and 99.8% of them were single fatal pregnancy. Majority 552(87.5%) of them were born after 37 weeks of gestational age and the rest 79(12.5%) were delivered before 37 weeks of gestational age. Out of 110 babies who were transferred in to NICU, 22(20.0%) babies were died. Prematurity was the main cause of death which was 17 (77.3%) babies; 5(22.7%) were unable to feed and 5 (22.7%) babies had early neonatal infection. Among death in NICU, 11 (50%) of them were died immediately within 24 hours of delivery. The probable causes of death were included birth asphyxia 9(81.8), prematurity 8(72.7%) and unknown cause 5(45.5%).

Health Care Characteristics

Among the total babies who were born in the hospitals during data collection period, the Apgar score of newborn babies at first minutes 212(33.6%), 386(61.2%) and 33(5.2%) were between 7-10, 4-6 and 0-3 respectively. At 5th minute of their birth time 548(86.9%), 57(9.0%) and 26(4.1%) were between 7-10, 4-6 and 0-3 respectively. Concerning the labour processes 585(92.5%) mothers were gave birth which labour was followed and 46 (7.5%) was not followed by partograph.

Magnitude of Perinatal Mortality

Among the total babies who were born in the hospitals of Vadodara, Gujarat during the data collection period 574(91.0%) were alive and 9.0% (95%, CI: 7%-11%) were dead. From 57(9.0%) death, 23(40.4%) of them were delivered with signs of life but died at various time during their 1st week of life after birth while 34(59.6%) of them were stillbirth.

Table 3

Binary and multivariate analysis of factors associated with perinatal mortality among babies born

Variables	characteristics	Perinatal outcome		COR (95%CI)	AOR (95%CI)
		dead	alive		
Education status	No formal education	13	218	0.34 (0.159-0.716) *	0.46 (0.16 -1.33)
	primary	26	254	0. 58(0.31-1.10)	0.40(0.15-1.04)
	Secondary and above	18	102	1	1
Maternal age	≤18	6	33	2.61(1.02-6.70) *	4.80(1.33-17.33) *
	19-34	32	460	1	1
	≥35	19	81	3.37(1.82-6.24) *	2.41(0.96-6.10)
Regular ANC	yes	29	411	1	1
	No	28	163	2.44(1.41-4.22) *	1.33(0.59-3.02)
Preeclampsia/eclampsia	yes	10	45	2.50(1.19-5.28) *	1.3(0.42-4.06)
	No	47	529	1	1
Gestational age	<37	33	46	15.78(8.60-28.93) **	4.01 (1.56-10.28) *
	≥37	24	528	1	1
Congenital malformation	yes	19	34	7.94(0.14-15.22)	7.63(0.78-20.97)
	No	38	540	1	1
Hx of perinatal death	yes	18	23	11.10(5.51-22.20) ***	9.47(3.32-26.98) ***
	No	39	551	1	1
Newborn weight	<2500	40	88	13.0(7.05-23.94) ***	4.64(1.85-11.60) **
	>=2500	17	486	1	1
APGAR score at 5minutes	0-3	12	14	16.54(10.24-55.86) *	10.15(0.66 -25.01)
	6-Apr	18	39	8.9(4.51-19.29) ***	5.24(1.93-13.30) ***
	10-Jul	27	521	1	1

Discussion

Magnitude of Perinatal Mortality

In this study perinatal mortality is 9.0 % (95%, CI: 7%-11%) which indicates that 9 babies are expected to die out of 100 babies born. This is significantly higher than in the study conducted in South Africa and East Iran based on cross sectional study which was 2.92% and 1.68% respectively. This may be due to poor transport access which leads to prolonged labour and perinatal asphyxia, absence of well-equipped neonatal ward. Perinatal death is 9.0% in this study which significantly lower than in a study conducted in Hawasa University Specialized and Referral Hospital and at Wolliata Sodo

Specialized University Hospital which (Seppa, 2013). This decreases probably due to awareness of women about antenatal care. it might be due to severely complicated cases are referred out of the zone.

Factor Associated with Perinatal Mortality

In this study mothers those give birth before 18 years old have five times more likely to have perinatal death which is in line with the study conducted in Nigeria (Baskett, 2000). This in facts that most of the mothers in this age group are primipara and they give birth infants who are low birth weight, small for gestational age and preterm which increase perinatal death. They may be immature to handle or care their babies or lack of awareness with course of pregnancy, labour, lack adequate advice on birth preparedness and complication readiness. However, this study contradicts the study were conducted in Murmansk in Russia (Andarge et al., 2017). This may be due to variation scope study, sample size or time taken for study.

In this study babies who born with low birth weight (<2.5kg) are five times a chance to die during perinatal period. It is agreed with the study were done in three Municipal Dar Es Salam, Tanzania and study in Wolliata Sodo university and referral hospital. This explanation that babies born with low birth weight are lack of fat deposition that make vulnerable to hypothermia that may leads to death. This also might be due to not practice kangaroo mother care in all hospitals in similarly way (Alves et al., 2020).

In this study Babies born which gestational age less than 37 weeks are four times have chance to die during perinatal period than those greater than or equal to 37 weeks. This is in line with the study conducted in Hawasa specialized university hospital (Ahmed et al., 2006). This in fact that preterm birth has premature organ that hinder easily adapted to extra uterine life. It might be due to lack of regular antenatal care, inadequacy of advices on danger sign or absence of long term trained neonatal nursing (Tamang et al., 2021). In this finding babies who were born with Apgar score (4-6) five times more a chance to die during perinatal period than those 7-10 were scored. This is in line with the study indicated in Wolliata Sodo teaching and referral hospital Apgar score (4-6) (Kahane et al., 2018).This in fact near-certain death at a very low Apgar score is due to the inability of the newborn to respond effectively to external aggression or the health care providers' may not effectively using resuscitation materials, lack of equipped neonatal intensive care unit in this study area which may enhances death (Wall et al., 2009).

CONCLUSION

Generally, perinatal death in Vadodara is medium, which needs more attention. Maternal age less than 18 years, gestational age less than 37 wks, low birth weight, history of perinatal loss and 4-6 Apgar score at 5 minutes were significant predictors of perinatal death. The future researchers need to include mothers who give birth at home and health institution to figure out better magnitude of perinatal death.

Authors' contribution

Sanjay Shinde wrote the proposal involved in data collection analysis and interpretation. Sanjay Shinde was involved in data collection, analysis and interpretation of statistical outputs and drafted the manuscript. Milka Madhale was involved in data collection, analysis and interpretation of statistical outputs. All authors read and approved the final manuscript.

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Competing Interest

The authors had no competing interests.

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