Audit of perinatal mortality at SSMCHRC-(Rural teaching hospital) a retrospective study

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Abstract: *Objective:* To estimate magnitude, determinants of perinatal mortality and suggest remedial measures for its reduction. *Background:* Perinatal mortality is mirror reflection of maternal and child health and socioeconomic environment of community. It is influenced by various medicosocial preventable causes. It can be reduced by improving maternal and child health services and by health education. *Methods:* A retrospective hospital based study of perinatal deaths among 2333 deliveries was conducted from June 2008 to June 2010 in our hospital. Fetomaternal factors like maternal age, religion, residence, parity, mode of delivery, booking status, antenatal complications, baby's sex, birth weight, congenital anomalies, neonatal complications influencing perinatal mortality rate were tabulated and analyzed. Cause of perinatal death was assessed. *Results:* perinatal mortality rate was 127.4/1000 total births. Maternal factors like age more than 35 years, muslim religion, inadequate antenatal care, primiparity, grand multiparity, induced deliveries and neonatal factors like low birth weight, prematurity were associated with increased perinatal mortality. The leading cause of stillbirth was antepartum hemorrhage and prematurity for neonatal mortality. *Conclusion:* Apart from clinical causes high perinatal mortality was due to poverty, illiteracy, lack of health awareness, inadequate antenatal care and delayed referral. Health education, identification of high risk mothers, timely referral, advanced life support of preterm neonates should significantly help to reduce perinatal deaths.

Keywords: perinatal mortality rate, referral hospital, risk factors, health education

Introduction

Perinatal mortality rate (PNMR) is mirror reflection of maternal health, socioeconomic environment and quality of obstetric and neonatal care in the community [1] and the country, thus it is used for assessing the quality of health care nationally and internationally. According to United Nation's (UN) millennium declaration goal -"Cutting under five mortality by two third by 2015", seems difficult to achieve without reducing perinatal deaths [2]. According to WHO's estimate annually around four million stillbirths and four million neonatal deaths occur in the world [3].

PNMR has greatly reduced in developed countries (PNMR<10) [1] by highest standard of maternal, child health (MCH) care and health awareness created by active involvement of UN and other organizations. But in developing countries (PNMR-40-120) [1] the picture is still very gloomy having 98% of global perinatal deaths. In India PNMR is 48.6/1000 total births [3] (NFHS-3, 2005-2006).This from population survey could be a gross underestimate of true PNMR due to underreporting of stillbirths. Causes of stillbirth (intrauterine death >28Weeks) and early neonatal death (< 7 days) are common. So they are studied together as perinatal death. Preventable causes of perinatal mortality contribute in majority of cases in our setup or country as a whole. The reason for studying dead is to save living [4]. Thus regular periodic audit of perinatal mortality in an institution, assesses its magnitude, causes and suggests steps to reduce it [3].

Material and Methods

Shree Siddhartha Medical College hospital and research centre (SSMCH RC) is a tertiary, referral and teaching hospital situated in rural area of Tumkur district about 6 km, North West from the town. This is a retrospective hospital based study of all deliveries, to review extent and determinants of perinatal

mortality from June 2008 – June 2010 in SSMCHRC. No such study has been done here in the past. Parturition registers in labor room, death registers in NICU, case files of early neonatal deaths and mothers files of stillbirths were critically analyzed.

WHO definitions were applied for stillbirths, early neonatal deaths (END), perinatal deaths (PND), perinatal mortality rate (per 1000 total births), early neonatal mortality rate (per 1000 live births), prematurity and low birth weight. Fetomatenal factors like age, religion, residence, parity, mode of delivery, booking status, gestational age, sex and birth weight of baby, congenital anomalies, antenatal / neonatal complications influencing perinatal mortality were tabulated and analyzed .Cause of perinatal death was assessed in each case. Statistical analysis was accomplished using chi-square test with one degree freedom for testing differences in proportion assuming significance at probability level <0.05. Koopman's likelihood based approximation recommended by Gart and Nam used to construct confidence interval (95%) for relative risk (RR). Ethical clearance was obtained from the institutional ethical committee.

Results

During the study period of 25 months there were 2333 deliveries, 41 sets of them were twins and two sets were triplets. Thus babies born were 2378.Out of these 235 were stillborn (fresh-205-87.2%, macerated-30-12.8%), 2143 were live born and 68 were early neonatal deaths. Seventy seven babies weighed less than 1000g. Thus perinatal mortality rate (PNMR) was 127.42/1000 total births and corrected PNMR was 99.52/1000 total births, almost two times higher than national average of 48.6/1000 total births 3 and 3.5 times that of Karnataka (PNM-37.1/1000 births-The Indian child profile -2002). Stillbirth rate was 98.2/1000 births and early neonatal mortality rate was 31.73 /1000 live births.

Pre-eclampsia (15.3%), eclampsia (12.3%), abruption (22.5%) were most common causes of stillbirths. 4.23% of stillbirths had gross congenital anomalies. Maternal (60.4%) and fetal factors (34.89%) were responsible in almost 95% of stillbirths and no cause could be found in 11 cases (4.68%) (table-1).

Table-1: Causes of Stillbirth		
	Number	**Percentage**
I. Maternal causes (60.4%)		
A. Obstetric		
Abruption	53	22.5
Pre-eclampsia	36	15.3
Eclampsia	29	12.3
Placenta praevia	7	2.97
Rupture Uterus	5	2.12
Obstructed labor	5	2.12
Oligohydramnios	3	1.27
B. Medical		
Gestational diabetes	2	0.85
Antiphospolipid antibody syndrome	1	0.43
Jaundice	1	0.43
II Fetal causes (34.89%)		
Birth asphyxia with breech presentation	29	12.34
Intrauterine growth restriction	11	4.68
Congenital Anomalies	10	4.23
Cord prolapsed	8	3.4
Twins	7	2.97
Transverse lie	6	2.55
Fetal distress	5	2.12
Tight Cord round neck	4	1.7
Non immune hydrops	1	0.42
Face presentation	1	0.42
III uknown	11	4.68
Total	**235**	**100**

Table-2: Causes of early neonatal death		
Cause	**No**	**%age**
Prematurity (RDS, HMD)	43	63.23
Birth asphyxia (DIC, IVH, HIE)	10	14.7
Septicemia	7	10.3
Meconium aspiration syndrome	6	8.83
Aspiration	1	1.47
Congenital anomaly	1	1.47
Total	68	100
RDS-respiratory distress syndrome, HMD-hyaline membrane disease, DIC-disseminated intravascular coagulation, IVH- intraventricular hemorrhage, HIE-hypoxic ischemic encephalopathy		

Prematurity contributed either directly or indirectly to nearly two third (63.23%) of END, followed by severe birth asphyxia (14.7%) (table-2). 42.64% of END occurred in 24 hours, 14.7% in 24-72 hours and 42.64% in more than 72 hours. Demographic factors (table no.3): There was four times increased risk of perinatal death with maternal age more than 35years (PMR 500, P<0.001), 1.42 times in Muslims (PMR 172.58) than Hindus (P-0.0055) and 1.35 times in unbooked women (PMR 163.9, P-0.0139). Obstetric factors (table no.3): PNMR was lowest in second para, high in primigravida (PMR 124.17, RR-1.24), significantly high in para three and four, and highest among grandmultipara (PMR 245.48). PNMR was 2.9 times more in induced deliveries and was low among caesarean section (RR-0.43, P<0.001) and instrumental deliveries.

Table-3: Maternal factors affecting perinatal mortality										
Factors		TB	%	SB	ND	PND	%	PNMR	RR	CI	P value
1. Age	<20y	515	22.07	46	23	69	22.77	133.98	1.08	0.81-1.38	0.5541[b]
	21-35y	1796	76.98	183	40	223	73.59	124.16	1	--	--
	>35y	22	0.94	6	5	11	3.63	500	4.03	2.44-5.74	<0.001[a]
2.Religion	Hindu	1939	83.11	192	43	235	77.55	121.19	1	--	--
	Muslim	394	16.88	43	25	68	22.44	172.58	1.42	1.11-1.82	0.0055[a]
3. Residence	Rural	2002	85.8	204	52	256	84.48	127.87	0.9	0.68-1.21	0.4620[b]
	Urban	331	14.18	31	16	47	15.51	141	1	--	--
4.Booking Status	Booked	1851	79.33	185	39	224	73.92	121.01	1	--	--
	Unboo-ked	482	20.66	50	29	79	26.07	163.90	1.35	1.07-1.71	0.0139[a]
5.Parity	1	1216	52.1	122	29	151	49.8	124.17	1.24	0.94-1.63	0.1302[b]
	2	649	27.8	49	16	65	21.4	100.15	1	--	--
	3	307	13.1	42	10	52	17.1	169.38	1.7	1.21-3.36	0.0032[a]
	4	108	4.6	15	7	22	7.3	203.7	2.03	1.3-3.1	0.0011[a]
	5	53	2.27	7	6	13	4.3	245.28	2.45	1.42-4	0.0015[a]
6. Mode of Delivery-	SV	902	38.6	132	30	163	53.46	179.8	1	--	--
	Induced	126	5.4	56	10	66	21.78	523.8	2.92	2.33-3.59	<0.001[a]
	Ventouse	49	2.1	2	0	2	0.66	40.8	0.23	0.06-0.77	0.0096[a]
	Forceps	70	3.04	6	0	6	1.98	85.7	0.48	0.22-0.99	0.0316[a]
	Caesarean	1177	50.45	29	28	57	18.81	48.42	0.43	0.34-0.54	<0.001[a]
	Others	9	0.38	9	-	9	2.97	-	--	--	-

Table-4: Fetal/neonatal factors affecting perinatal mortality											
Factors		TB	%	SB	ND	PND	%	PNMR	RR	CI	P value
1.Gestational Age (Weeks)	28-32	209	8.95	111	31	142	46.86	679.4	12.15	9.73-15.17	<0.001[a]
	33-36	257	11.01	42	12	54	17.81	210.11	3.76	2.75-5.11	<0.001[a]
	37-40	1	68.23	67	22	89	29.37	55.9	1	--	--
	--	592	--	--	--	--	--	--	--	--	--
	>40	275	11.78	15	3	18	5.94	65.45	0.85	0.53-1.39	0.5770[b]
2.Baby birth Weight-Kg	<1	77	3.23	62	12	74	25.4	961.03	28.14	19.8-42.32	<0.001[a]
	1.1-1.5	152	6.39	52	22	74	25.4	486.84	14.66	9.74-22.07	<0.001[a]
	1.6-2	256	10.76	58	16	74	25.4	289.06	8.71	5.72-13.27	<0.001[a]
	2.1-2.5	691	29.05	35	8	43	14.19	62.22	1.87	1.17-3	0.0086[a]
	2.6-3	783	32.92	18	8	26	8.58	33.2	1		
	3.1-3.5	364	15.3	8	1	9	2.97	24.72	0.74	0.36-1.54	0.3814[b]
	>3.5	55	2.3	2	1	3	0.99	54.54	1.65	0.54-4.81	0.4048[b]
3. Baby sex	Male	1257	52.85	131	40	171	56.43	136.03	1.16	0.93-1.43	0.1962[b]
	Female	1121	47.14	104	28	132	43.56	117.75	1	--	--
For table 3 &4 - TB-Total births, SB –still birth, ND-neonatal death, PND- perinatal death, PNMR- perinatal mortality rate /1000 total births, RR-relative risk, SV-spontaneous vaginal, others: laprotomy-5, craniotomy -3, evisceration-1. CI-confidence interval. a-statistically significant, b-statistically not significant,											

Fetal factors (table no.4): In this study there was no significant association between perinatal death and baby's sex (1.16 times in male, P-0.1962). PNMR was inversely proportional to increasing birth weight and maturity of baby. 64.67% perinatal deaths were among preterm. PNMR was highest in extremely premature (<32weeks, PNMR 679.4, RR 12.15), high (PNMR 210.11, RR-3.76) in premature (33-36weeks) and lowest among term babies (PNMR 55.9). Almost 87.4% perinatal deaths were among low birth weight (<2.5kg) neonates. It was also very high among extremely low birth weight babies (PNMR-961).

Discussion

Perinatal death audit helps to plan necessary action to prevent PND due to potentially preventable causes. In this study PNMR of 127.4/1000 total births is alarmingly high compared to other studies (Table 5). Achievement of national goal of PNMR- 30/1000 births [7] seems to be far

away but not impossible. The study of PNM among high risk referred cases in this rural tertiary care teaching hospital is expected to be higher than population based study.

Table-5: PNMR / 1000 total births	
Studies	PNMR /1000 total births
UK[5]	7.6
Japan, South Wales[5]	<10
Karnataka	37.1
Punjab[6]	37.5
India[3]	48.86
Global[7]	49.6
JIPMER ,Pondicherry[8]	55
Kenya[1]	65
SCB medical college, Cuttack[7]	70.2
Pakistan (Liaquat university)[5]	72.11
Nepal[9]	83.9
South east Asia[10]	87
Tanzania[1]	96
HQH, Bellary[11]	106.8
SSMCHRC (Present study)	127.42

Limitations of this Study

➢ This is a retrospective study, so some data are incomplete. Correlation of maternal anemia, malnutrition, socioeconomic status, literacy, gestational diabetes, APLA among mothers with perinatal mortality could not be done in all cases.

➢ High perinatal mortality in tertiary referral hospital based study does not reflect actual community situation.

➢ Mothers delivering vaginally healthy neonates were discharged after 48 hours. So figures of early neonatal deaths are only partly correct.

➢ Correlation of clinical findings with perinatal autopsy would have been valuable in cases where no cause could be found. But without autopsy actual cause remains unexplained in such cases.

Other than clinical causes high perinatal mortality was due to associated factors like poverty, illiteracy, superstition and lack of awareness of existing obstetric services in peripheral rural areas. Delayed referral to tertiary centre gets compounded by poor transport facilities; unethical practices by quacks and untrained dais; unnecessary referral to intermediary centre without proper facilities; social taboos; ignorance of warning signs by patients and family members; and reluctance to go to higher hospital. Many women arrived late with established preterm labor or intrapartum complications with moribund or dead fetus, where perinatal loss could not be prevented.

In this study PNMR is high in elderly mothers, grandmultipara (>5) and unbooked women as in the study by Kiran Wassan , Gaddi Seetharam and others [4,7,10,11] PNMR was not significantly high in teenage pregnancies in contrast to the study by Murali Paul Kannan [8]. This could be because of wrong reporting of higher age by teenage girls as legal age of marriage in the country is 18 years and above. PNMR is relatively high in urban women (P-0.4620) but not very indicative as the number of urban mothers was very low (n=331, 14%) and the referral hospital is in rural area, away from the town. Most of urban women were from areas of the town where poor population reside. This also can be explained by the fact that in Karnataka percentage of people below poverty line is more in urban than in rural area (Karnataka human development report -2005).

Perinatal deaths were common in low birth weight and premature babies, similar to study by Anjali et al and others [1,4,8,10,12]. Preterm babies have less survival chances due to increased risk of asphyxia, hyaline membrane disease, hypoglycemia, and septicemia. 63% of neonatal deaths were due to prematurity, higher than reported by Das Lucy et al [7] (42.5%) and by Gaddi Seetharam [11] (59%). Birth asphyxia was the cause in 14% of END less than the study by Das Lucy et al [7] (26.2%) and by Murali P K (54%) [8]. 22.44% of total perinatal deaths were early neonatal deaths, comparable to 29.63% by Das Lucy et al [7]. In this study Abruption, preeclampsia, eclampsia were major causes for stillbirths similar to that reported by NMCTH [10] study, Das Lucy et al [7] and others [2, 4]. 4.23% of stillborn babies had gross congenital anomaly comparable to 4.4% of NMCTH [10] study. Direct cause for stillbirth could not be found in 4.68% in this study, much less than study at NMCTH (40%) and Indonesia (32%) [10].

There was no significant relation of perinatal death with sex of baby in contrast to study by Murali MK where it was more in male babies. Due to high number of complicated referred cases 50.4% of total deliveries were by emergency caesarean. PNMR was high (523.8) with induced deliveries because women with intrauterine death due to abruption or preeclampsia were not in labor on admission and needed induction for delivery. By knowing various medico-social factors influencing PNMR, remedial measures could be found and taken. A good antenatal care with proper advices regarding health care is necessary. Avoiding infections and unnecessary polypharmacy in early pregnancy minimize congenital malformations. Educating pregnant women about common pregnancy complications, their risk factors and warning signs shall help them for early care seeking and to achieve better perinatal outcome. Training of birth attendants and other peripheral doctors is required for early diagnosis of high risk cases like preeclampsia, abruption, malpresentations and others and

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help to minimize mishandling. Recently training has been implemented by the state authority but timely referral to better equipped facilities is the need of hour. Prevention of preterm births, advanced intensive support like CPAP, availability of surfactant and ventilators for preterm babies go long way in preventing untimely deaths. Treatment of infections, nutritional problems minimizes low birth weight neonates.

Apart from health care country has to make rapid strides in social sector as well. Continued education by mass media is needed to improve literacy of women, to avoid late pregnancy, promote small family norm, create awareness about antenatal care and early care seeking by optimal utilization of minimal available rural health infrastructure. Women empowerment and balanced growth in economy also contribute in reducing PNMR. Under NRHM (National Rural Health Scheme) ASHA (Accredited Social Health Activists) workers are deployed by government of India in high burden states. These female community health workers create health awareness and facilitate women for accessing health services. "Janani suraksha yojana" is an additional scheme under which cash assistance will be given to pregnant women and health worker if delivery occurs in a health facility. Ambulance services like "108" introduced since a year are sure to improve accessibility of high risk cases to referral hospital. These general measures are expected to contribute in reduction of PNMR in this area/state in particular and nation in general in the coming future. Achievement of millennium goal of acceptable PNMR (30/1000 births) is daunting but not impossible.

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