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Perinatal Mortality – The Wider Perspective

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Summary

A retrospective study of perinatal mortality was undertaken in a tertiary health care referral institute attached to a teaching college, to classify and analyse the total number of perinatal deaths in comparison to live births in a span of one year. Various antenatal and intranatal risk factors directly or indirectly responsible for each perinatal mortality were studied. Epidemiological factors including medical, obstetric and socio-economic influences on each perinatal death were assessed. There were 482 perinatal deaths out of 6778 deliveries during 12 months. The perinatal mortality rate per 1000 live births was 56.55, the corrected perinatal mortality was 50.80, the extended perinatal mortality was 71.16 and the factual perinatal mortality rate was 32.96 per 1000 live births. Almost 84.6% of perinatal deaths in the present series had some identifiable preventable factor. Early antenatal registration, a minimum of 3 antenatal visits, appropriate and timely transfer from peripheral hospitals to tertiary institutes and performance of caesarean section before irreversible fetal morbidity would go a long way to reduce perinatal mortality. Regular clinical perinatal auditing involving a team approach of obstetricians, neonatologists and pathologists with a flexible protocol towards evolving a safe perinatal outcome would enable us to achieve our target figures for the next millennium.

Abbreviations
PNMR – Perinatal mortality rate
ENND – Early neonatal death
FSB = fresh still Birth
MSB = Macerated still Birth

Introduction

The health infrastructure in India has now geared to take a leap forward to reorient and improvise existing maternal and child health services. The sensitive index of the quality of our health care delivery system as a whole, or, in part is reflected by maternal and perinatal mortality rates. During the last four decades there has been a marked reduction in maternal and perinatal deaths in a developing country like ours. The perinatal mortality rate is the best index of existing obstetrical and neonatal services especially with the decline of infant mortality rates to low levels. The National goals for "Health for all" has suggested quantifiable targets for achievement by 2000 AD. The figure for perinatal mortality is little less than 30 per 1000, still three times higher than what has been achieved in developed countries. A composite perinatal audit is the most important solution to directly influence gradual development of existing health care services. The perinatal mortality has emerged as a reliable yardstick by removing from consideration the dividing line between a still birth and an early neonatal death. Stemberra in 1986 analysed 4 phases in the cause-effect relationship of perinatal mortality – firstly, in the period of classical obstetrics mechanical causes like malpresentations and cephalopelvic disproportion were important. Next, anemia, toxaemia and infections were

considered responsible. In the third phase attention shifted to the functional derangement of the materno-placental-fetal unit. The most recent epidemiological surveys lay stress on psycho-social risk factors.

$$\text{Perinatal mortality rate} = \frac{\text{Late fetal deaths (still births) 28 weeks or more + deaths under 1 week}}{\text{Total births in a year}} \times 1000$$

$$\text{Corrected perinatal mortality rate} = \frac{\text{(late fetal deaths + deaths under 1 week weighing > 1000 gms) – deaths due to major congenital malformations.}}{\text{(Total live births + still births) weighing over 1000 gms at birth}} \times 1000$$

The advent of neonatal intensive care units with ventilators have had a positive effect on mortality rates. Neonatologists now strive hard to give a good outcome to neonates less than 1000 gms. Hence the extended perinatal mortality is calculated as:

$$\text{Extended Perinatal Mortality Rate} = \frac{\text{(Late fetal deaths + Still births) weighing over 500 gms at birth}}{\text{(Total live births + still births) weighing over 500gms at birth}} \times 1000$$

The factual perinatal mortality includes only those patients who were registered antenatally at the same institution where they delivered and where this study was conducted

$$\text{Factual perinatal Mortality rate} = \frac{\text{Total no. of early neonatal deaths + still births (antenatally registered at The same institute)}}{\text{Total no. of births}} \times 1000$$

The concept of perinatal mortality would probably still undergo the process of evolution of definitions. This could weed out confounding factors and concentrate on those areas needing intervention.

Material and Methods

1. This retrospective study was undertaken in a 1400 beded multidisciplinary tertiary referral institute. Primarily, the total number of deliveries in obstetric units during one year from 1st April 1997 to 31st March 1998 were recorded. The total number of perinatal deaths during the same period was assessed in coordination with the department of neonatology. Every perinatal death was closely evaluated.
2. Vital antenatal data including age, socio-economic status, addictions, obstetric history, and time of antenatal registration were assessed. Records were also screened for baseline haematological and urine investigation, doses of tetanus toxoid were recorded. Salient ultrasound findings were noted when available.
3. Assessment was also made about the type of labour whether spontaneous, induced or augmented, type of presentation and mode of delivery. The fetal outcome in terms of sex, weight, maturity, any gross congenital malformations and apgar score at 1m, 5m and 10m were recorded. The cause of death was assessed in each case and correlated with findings of post-mortem when available.

Observations

Table I : Perinatal Mortality Rates

Total Births	6778
Live Births	6523
Still Births	250
Early neonatal deaths	232
Still Birth rate per 1000	38.32
Early neonatal death rate per 1000	35.25
Perinatal mortality rate per 1000	56.55
Corrected perinatal mortality rate per 1000	50.80
Extended perinatal mortality rate per 1000	71.16
Factual perinatal mortality rate per 1000	32.96

Table II : Maternal Age and Parity in relation to perinatal mortality

Age group	No.	ENND	FSB	MSB	PNMR
< 20 years	142	90	32	20	20.96
21-44 years	118	36	59	23	17.42
25-29 years	90	49	36	15	13.28
30-34 years	69	37	25	7	10.18
> 35 years	63	20	33	10	9.66

The perinatal mortality rate in the present series was relatively higher in pregnancies in the age group less than 20 years (20.96). Perinatal outcome was better between 20-29 years where the risk of malnutrition, anemia and intercurrent diseases like hypertension would be lower. A higher mortality rate (24.95) was observed in primi gravidas as compared to multigravidas (15.05 in 3rd gravidas and 10.9 in gravida 4 onwards).

Out of 250 still births, there were 175 fresh still births (70%) and 75 macerated still births (30%). Out of 175 fresh still births, 156 (89.14%) weighed more than

1kg. Thus almost 89.14% of fresh still births could probably have had some preventable factor.

The PNMR was 28.35 when spacing was less than 1 year; 23.03 with 1-2 year spacing and 6.64 with more than 3 years spacing.

Table III : Antenatal Registration and Perinatal mortality

Total deliveries	6778
Total perinatal deaths	482
Antenatal registration at institution	215 (44.6%)
Antenatal registration outside	91 (18.81%)
No antenatal registration in pregnancy	176 (36.51%)

The perinatal outcome was significantly affected with no antenatal care viz. 33.66. With 1-3 visits the PNMR was 17.56; 4-6 visits the rate dropped down to 11.39.

The highest PNMR viz 46.36 was noted where maternal education was nil. It reduced to 19.48 with at least primary education and 5.61 with secondary education or more. Maternal awareness indirectly affected antenatal care. There was lesser receptivity to family planning acceptance which had its impact on spacing between births and nutrition.

21.99% of patients in the present series of 482 perinatal deaths had mild anemia and 6.63% of patients had severe anemia during pregnancy.

PNMR was marginally higher (54.98%) in male fetuses as compared to female fetuses (45.02). It was higher below 34 weeks (22.8%) and was reduced to less than 8% beyond 35 weeks of pregnancy.

The PNMR was 17.84% in the birth weight category of 751-1000gms; 16.18% between 1001-1250gms. It varied between 8-10.9% between 1251 to 2500gms. It was 12.03% between 2501-3500 gms and 14.5% in >3500gms.

Out of 482 perinatal deaths there were 390 (80.97%) vaginal deliveries. 36 (7.46%) assisted breech deliveries, 16 (3.32%) outlet forceps extraction, 36 (7.46%) caesarean sections, 1 case of internal podalic version and 1 case of craniotomy in a dead fetus. The commonest indications for a caesarean section were prolonged labor, fetal distress, placenta previa, breech presentation, transverse lie, cephalopelvic disproportion, abruption placentae and eclampsia.

The perinatal mortality was higher in preterm deliveries and more when Apgar scores were between 1 3 at 1min. Even in full term neonates the mortality rate was higher with poor Apgar score at 1min, indicating hypoxic ischaemic encephalopathy as a major cause of mortality out of 482 perinatal deaths, 171 (35.48%) of premature neonates expired, within 24 hours of delivery. Nineteen out of 27 (3.9%) of full term early neonatal deaths occurred with 24 hours. Hence the first 24 hours were crucial for both pre-term and full term fetuses.

Table IV : Maternal Risk Factors Associated with PNMR

Risk Factors	ENND	Still Birth
I Medical		
Anemia	139	185
Essential Hypertension	0	1
Jaundice	0	1
Sepsis	0	1
Diabetes Mellitus	0	1
Malaria	2	3
Pulmonary kochs	2	1
VDRL positive	0	1
II Obstetric		
Pregnancy induced hypertension	8	7
Eclampsia	6	4
Polyhydramnios	4	3
Placenta Previa	5	2
Abruptio placentae	8	7
Twins	4	2
BOH	4	2
III Social		
Single parenthood	1	0
IV Intrapartum		
PROM	14	11
Preterm labour	207	186
Prolonged labour	41	22
Rupture uterus	0	2
Failed forceps	1	2
V Idiopathic Factors	34	40

Table V Fetal Risk Factors Related to PNMR

Risk Factors	ENND	Still Birth
1. Life threatening congenital anomaly	4	13
2. Asphyxia	38	26
3. Respiratory distress syndrome	57	0
4. Septicemia	60	0
5. Meningitis	4	0
6. Pneumonia	20	8
7. Jaundice	3	0

Table VI : Post mortem findings in perinatal mortality in this series

Autopsy finding	Preterm	Full term
Congenital Anomalies		
Hydrocephalus	0	1
Dandy Walkers syndrome	1	0
Pulmonary Hypoplasia	1	1
Patent Ductus Arteriosus	0	1
Meningitis	2	4
Bronchopneumonia	1	4
Meconium Aspiration pneumonia	0	14
Intacranial haemorrhage	9	5
Intraventricular haemorrhage	8	5
Subarachanoid haemorrhage	0	6

Table VII : Analysis of Primary, Secondary and Tertiary Preventable factors in this series

Prevention factors	ENND	Still Birth
I. Primary Prevention		
Early antenatal registration	92	84
Regular antenatal visits	172	175
Early Recognition of maternal or fetal risk factors	198	210
Early diagnosis of congenital Anomalies	3	12
II Secondary Prevention		
Delayed referral from Peripheral hospital	96	47
Mismanagement at peripheral centre	19	26
III Tertiary Prevention		
Earlier resort to caesarean section	6	5
Intensive intrapartum monitoring	156	110

Discussion

Perinatal mortality has been likened to an iceberg where handicap remains the submerged and unknown moiety. Though standards of maternity care have improved in the third world countries, India continues to face a mounting population explosion which has its toll in the perinatal profile, even though she has entered the declining phase of the population cycle. The present study was done in a tertiary Municipal hospital treating patients mainly from the largest slum area in Asia and a large number of referral patients. The PNMR in the present series was 56.55. In comparison Mehta and Jayant (1981) quoted PNMR of 70 (1980), ICMR study (1990) quoted 57.7 and Parmar et al (1994) 68.29. These figures reflect a high PNMR in contrast to Sweden where it was 8.7 (1980). Hence concentrated efforts should be directed to upgrade socio-economic conditions, literacy rates and primary health care services.

In the present series there were 51.86% still births and 48.13% early neonatal deaths. The higher still birth rate indirectly reflects the importance of antenatal care proving thereby that it is a largely preventable factor. Lister and Rossiter (1985) reported 63% still births and 37% early neonatal deaths. Higher perinatal mortality figures in the present series could be attributed to a large number of emergency referral admissions. Mehta and Jayant (1981) also showed higher perinatal mortality in teaching institutes but cautioned against doubting the quality of services provided. The factual PNMR of 32.96/1000 reflect a lower mortality in patients antenatally registered at the same institute.

Higher PNMR below 20 years maternal age could be attributed to higher incidence of anemia, malnutrition, cephalopelvic disproportion and prolonged labour in this age group. In the present series out of 250 still births, 156 (89.14%) weighed more than 1kg and could have been largely preventable by early antenatal registration, regular follow up, early identification of high risk factors and timely interference to improve perinatal outcome. Mehta and Jayant (1984) also states that the majority of still births in his series were preventable with appropriate care and precautions. Spacing between pregnancies more than 2 years reduced the PNMR by almost 50% in this study.

In the present series, a higher PNMR was noted when maternal Hb was < 9gm%. Lister and Rossiter et al 1985 also stated a 2-3 fold increase in PNMR when maternal Hb was below 6gm%. He also quoted a higher incidence of small for date babies, prematurity and IUGR due to a reduction in fetal stores of iron, folate and Vit B_{12}. Hence they advocated a specific lab method of Hb estimation to avoid fallacies of clinical estimation.

While co-relating gestational age, the PNMR in the present series was 28.05/1000 below 28 weeks and 23.76/1000 below 34 weeks. Survival improved beyond 35 weeks due to better lung maturation. PNMR was lower with birth weight exceeding 2kgs. Out of 482 perinatal deaths there were 390 vaginal deliveries (80.9%), 36 assisted breech deliveries (7.46%), 16 outlet forceps extractions (7.46%), 36 caesarean sections (7.46%), 1 case of internal podalic version and 1 of craniotomy in a dead fetus. Apgar score was the most reliable clinical predictor of fetal outcome; the prognosis was worst when Apgar scores were 1-3 at one minute with a high incidence of hypoxic ischaemic encephalopathy in these cases. Three hundred forty one perinatal deaths had some medical factor complicating pregnancy leading to an adverse outcome directly or indirectly.

Anemia was the commonest and most preventable medical disorder in this study. The next common antepartum disorders were hypertension

jaundice, diabetes, septicemia, malaria and pulmonary tuberculosis. Seventy three patients had an obstetric factor complicating pregnancy. Pregnancy induced hypertension, eclampsia and antepartum hemorrhage were seen in 9.7% of perinatal deaths.

In this study, autopsies were conducted in 63 cases out of 482 perinatal deaths, 33 cases had intracranial or intraventricular hemorrhage indicating severe birth asphyxia. Major cases of congenital anomalies underwent autopsy. Rajshekar (1996) has emphasized the importance and need of perinatal autopsy findings for accurate diagnosis and correlation of clinical findings. Unfortunately autopsy rates have been decreasing due to an unpleasant and tedious exercise, difficulty in obtaining consent and complex administrative procedures.

Conclusion

1. Almost 84.6% of perinatal deaths in the present series had some identifiable preventable factor thus emphasizing the vital role of optimum antenatal care with earlier recognition of maternal or fetal risk factors. 29.6% of cases needed early and timely transfer to a tertiary institute before onset of irreversible maternal or fetal complications. 2.3% of perinatal deaths could have been avoided by an earlier resort to caesarean section.
2. Early antenatal registration and a minimum of 3 antenatal visits reduced perinatal mortality by at least 40%. Hence all expectant mothers should be covered by services of trained community health workers providing primary care. They should screen all high risk pregnancies and refer them at the earliest to tertiary institutes better equipped to handle such cases. Regular examination for maternal and fetal well being, basic hematological and urine examination and an ultrasound examination in the first trimester would go a long way to have an optimum perinatal outcome. Advice should also be given on diet, rest, iron, folic acid and vitamin supplementation. Every high risk pregnancy should be individualised and if needed objective tests should be performed for assessment of fetal well being. Intensive intrapartum fetal surveillance and a standby neonatologist for high risk neonates would give the best possible perinatal outcome.
3. A composite perinatal audit is the need of the hour. Hence concentrated efforts should be put in to start the system of auditing. Coordination between departments of obstetrics, neonatology and pathology should be maintained to collect epidemiological data, planning and discussion. Confidential enquiries would be useful to show the scope for prevention through clinical practice. It is essential to understand the implications and limitations because it should be an audit of perinatal management and not the perinatal outcome. A genuine clinical audit of perinatal management and not the perinatal outcome. A genuine clinical audit would therefore imply a flexible attitude towards a change and a professional mechanism should be evolved for implementing (Baveja and Sharan, 1993).

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