International Journal of Community Medicine and Public Health
Dunnapothula A et al. Int J Community Med Public Health. 2024 Jul;11(7):2528-2532
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20241598

Original Research Article

Clinico-socio demographic characteristics of neonates at NICU, Mediciti Hospital, Medchal, Telangana, India

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Received: 08 May 2024
Revised: 28 May 2024
Accepted: 31 May 2024

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ABSTRACT

Background: Children face the greatest risk of disease and death in their first 28 days. Improvements in basic neonatal care such as thermoregulation and breastfeeding have substantially reduced neonatal mortality and morbidity. There is still a need to strengthen the provision of advanced care for neonates. Identifying factors impacting neonatal mortality and morbidity and addressing them through a package of evidence-based interventions are essential to avoiding preventable deaths.
Methods: The current study analyses data from a cross-sectional study in the rural outreach area of a tertiary hospital in Hyderabad, India to assess clinical and socio-demographic factors affecting neonatal morbidity. One hundred and fifty neonates admitted in neonatal intensive care unit and their mothers were included. A semi-structured questionnaire was used to obtain responses through face-to-face interview. Descriptive and inferential analyses were performed using R Statistical Software (version 4.3.2).
Results: Among the 150 neonates, 99 (66%) neonates were admitted for respiratory distress. 39 (26%) males were low birth weight and 28 (18.67%) females were low birth weight. There was no significant association between low birth weight, high risk pregnancy and gender of the neonate. A significant association was obtained between low socio-economic status and low birth weight.
Conclusions: Neonatal mortality and morbidity can be attributed to several factors including neonatal characteristics, maternal characteristics, health infrastructure and health manpower. However, prevalence of socio-demographic risk factors affecting neonates is disproportionately higher in low- and middle-income countries. A multi-pronged approach is required to address the multimodal causation of low birth weight and morbidity in neonates

Keywords: Neonatal morbidity, Low birth weight, Neonatal intensive care unit

INTRODUCTION

Children face the greatest risk of disease and death in their first 28 days. The risk of mortality in the first 4 weeks of life is 30-fold higher than the post-neonatal period.[1] Globally, there are approximately 6,700 newborn deaths every day. 47% of all child deaths under the age of 5-years occur during the neonatal period.[2] Neonatal mortality rate in India is 24.9 per 1000 live births and 16.8 per 1000 live births in Telangana.[3] In addition to mortality, neonatal morbidities constitute a huge burden to the health system and society in general. Improvements in basic neonatal care such as thermoregulation and breastfeeding have substantially reduced neonatal mortality and morbidity. Despite this, there is a need to strengthen the provision of advanced care for neonates for the reduction of neonatal mortality in low- and middle-income countries.[4] Sustainable Development Goals (SDGs) have been adopted by the United Nations to promote healthy lives and well-being of all children. SDG Goal 3.2.1 aims to end preventable deaths of newborns.

SDGs called on all countries to reach a NMR of at least as low as 12 deaths per 1000 live births by 2030. As per the National Health Policy, 2017, India has set it the goal to reduce NMR to 16 by 2025. In order to achieve this goal, all the factors associated with neonatal morbidity and mortality needs to be addressed. The Government of India has also launched the India Newborn Action Plan which aims to strengthen immediate and equitable newborn care, including care for small and sick newborns. In addition, programs to improve NICU and labour room care have also been launched. The LaQshya initiative includes certification as part of National Quality Assurance Standards for both labour rooms and neonatal intensive care units (NICUs) in the public sector, whereas the National Neonatal Forum promotes and provides accreditation of newborn care units in the public and private sector.[4] Identifying factors impacting neonatal mortality and morbidity and addressing them through a package of evidence-based interventions are essential to avoiding these unwanted and preventable disease and deaths. The current study analyses data from a cross-sectional study conducted in the rural outreach area of a tertiary hospital in Hyderabad, India to assess clinical and socio-demographic factors affecting neonatal morbidity. The study also assessed the association of socioeconomic factors with low birth weight. The study may be utilized to assess and mitigate neonatal morbidity through socio-behavioral change in low-resource settings.

METHODS

A hospital based cross-sectional study was conducted. One hundred and fifty neonates admitted in NICU (neonatal intensive care unit) and their mothers who came for safe institutional delivery at Mediciti institute of medical sciences, a tertiary care hospital in Ghanpur, Telangana, India were included in the study. The study was conducted over a period of 6 months from June to December 2023. Mothers who had a delivery in the past 28 days and with neonates who were admitted in the NICU and willing to provide valid consent and participate in the study were included. Mothers not willing to provide consent and neonates without morbidity requiring admission to NICU were excluded from the study.

Pre-testing and validation of the questionnaire were performed via a pilot study on 20 mothers. The purpose of the study was explained and informed consent was obtained from all the respondents. Privacy and confidentiality were ensured during the whole process. All the mothers who were not willing to participate were excluded from the study. A Semi-structured questionnaire was prepared and responses were obtained through face-to-face interview. The questionnaire consisted of 3 parts, namely; Socio-demographic characteristics such as age, education of parents, total family income, gender of the neonate and date of birth of newborn. Socio-economic status was obtained using the BG Prasad's Socio-economic classification and the respondents were divided into upper class (I), Upper middle class (II), Middle class (III), Lower middle class (IV), Lower class (v) based on Per-capita monthly income.[5] Data regarding age at marriage, birth order, age at present pregnancy, contraceptive use, early registration and high risk pregnancy were recorded. Data regarding mode of delivery, period of gestation, birth weight, indication for NICU referral, details of breast feeding and prelacteal feed practices were recorded. According to the world health organization (WHO) definition, neonates with birth weights of less than 2500 g are classified as low birth weight (LBW) regardless of gestational age. Subcategories include Very low birth weight, which is less than 1500 g and extremely low birth weight, which is less than 1000 g.[6] All analyses were performed using R Statistical Software (version 4.3.2). Descriptive statistics were used to calculate counts and percentages. Association between variables was analysed using the chi-square test. A p value less than 0.05 was considered significant.

RESULTS

A total of 150 mothers consented and participated in the study. Education of the mother and father were obtained across seven categories as outlined in Table 1. Most of the mothers had attained an education of 12th standard (34%) followed by graduate degree (28%).

Table 1: Socio-demographic characteristics of the parents.

Parameters	Mothers N (%)	Fathers N (%)
Education		
Graduate	42 (28)	45 (30)
High school	37 (25)	40 (26)
Illiterate	5 (3)	10 (7)
Intermediate	51 (34)	46 (30)
Middle school	5 (3)	3 (2)
Post graduate	6 (4)	4 (3)
Primary school	4 (3)	2 (1)
Occupation		
Professional	3 (2)	2 (1)
Semi-professional	0 (0)	13 (9)
Skilled	4 (3)	77 (51)
Semi-skilled	2 (1)	44 (29)
Unskilled	2 (1)	11 (7)
Unemployed	139 (92)	3 (2)
Socio-economic status		
I	30 (20)	
II	62 (41)	
III	47 (31)	
IV	10 (7)	
V	1 (1)	
Grand total	150 (100)	150 (100)

Among fathers, most of them had attained an education of 12th standard (30%) followed by graduate (30%).

Table 2: Clinical characteristics of the neonate.

Parameters	Female child N (%)	Male child N (%)	Chi square value	P value
LBW				
Low birth weight	28 (18.67)	39 (26.00)	0.22213	0.6374
Normal weight	39 (26.00)	44 (29.33)		
High risk pregnancy				
No	44 (29.33)	46 (30.67)	1.2239	0.2686
Yes	23 (15.33)	37 (24.67)		
Period of gestation				
Pre term	11 (7.33)	18 (12.00)	0.36532	0.5456
Term	56 (37.33)	65 (43.33)		
Grand total	67 (44.66)	83 (55.33)	-	-

Table 3: Association of socio-economic characteristics with low birth weight.

Parameters	Low birth weight N (%)	Normal weight N (%)	Chi square value	P value
Mother's education				
Post graduate	2 (1.33)	4 (2.67)	12.918	0.04436
Graduate	14 (9.33)	28 (18.67)		
Intermediate	25 (16.67)	5 (3.33)		
High school	22 (14.67)	15 (10.00)		
Middle school	1 (0.67)	4 (2.67)		
Primary school	3 (2.00)	1 (0.67)		
Illiterate	0 (0.00)	5 (3.33)		
Father's education				
Post graduate	1 (0.67)	3 (2.00)	12.406	0.0535
Graduate	19 (12.67)	26 (17.33)		
Intermediate	20 (13.33)	26 (17.33)		
High school	25 (16.67)	15 (10.00)		
Middle school	0 (0.00)	3 (2.00)		
Primary school	0 (0.00)	2 (1.33)		
Illiterate	2 (1.33)	8 (5.33)		
SES				
I	12 (8.00)	18 (12.00)	9.620	0.04734
II	22 (14.67)	40 (26.67)		
III	25 (16.67)	22 (14.67)		
IV	8 (5.33)	2 (1.33)		
V	0 (0.00)	1 (0.67)		
Grand total	67 (44.67)	83 (55.33)		

Table 4: Association between low birth weight and clinical characteristics.

Parameters	Low birth weight N (%)	Normal weight N (%)	Chi square	P value
Period of gestation				
Pre term	26 (17.33)	3 (2.00)	27.227	0.0001
Term	41 (27.33)	80 (53.33)		
High risk pregnancy				
No	39 (26.00)	51 (34.00)	0.055071	0.8145
Yes	28 (18.67)	32 (21.33)		
Grand total	67 (44.67)	83 (55.33)		

Despite the relatively high education, 139 (92%) of the mothers were unemployed. Among fathers, 77 (51%) were employed in a skilled occupation. This is depicted in (Table 1). The socio-economic status of the families was calculated based on the per capita monthly income using the BG Prasad scale.

Most of the families (41%) belonged to class II of the BG Prasad scale, which corresponds to the upper middle class. This was followed by 47 families (31%) belonging to class III, corresponding to the middle class. Eleven (8%) belonged to the lower middle and lower class while 30 (20%) of the families belonged to the upper class. This represents an equitable distribution across socio-economic class with a skew towards the upper class (Table 1).

Figure 1 depicts the reason for the admission of the neonate in NICU. The most common reason for admission was respiratory distress with 99 (66%) neonates being admitted for respiratory distress. The next most common reasons for admission included neonatal jaundice and meconium aspiration syndrome. Among the 150 neonates, 67 (44%) had a birth weight of less than 2500 g and were classified as low birth weight babies. 83 (55%) of the neonates had a birth weight of more than 2500 g. Among the neonates, 83 (55.33%) were male and 67 (44.67%) were female. Among these 39 (26%) males were low birth weight and 28 (18.67%) females were low birth weight. There was no significant association between low birth weight and gender. Similarly, 37 (24.67%) of the male neonates were high risk pregnancies and 23 (15.33%) female neonates were high risk pregnancies but there was no significant association between gender and high-risk pregnancy.

Among the neonates, 29 (19.33%) were preterm and there was no significant association between gender and term of pregnancy (Table 2).

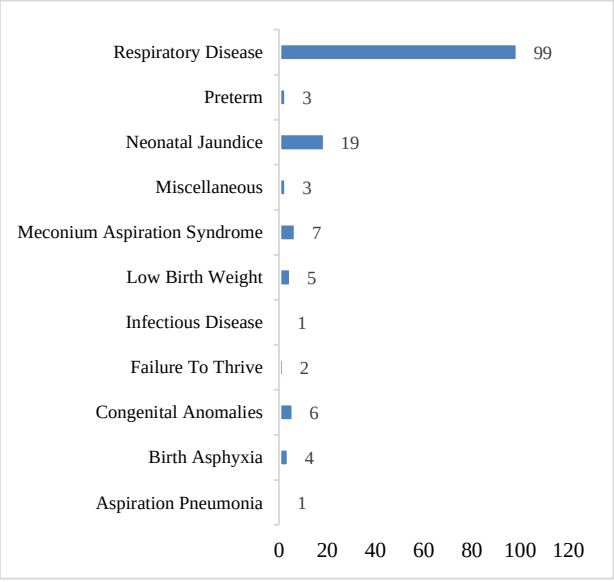

Figure 1: Reasons for admission to NICU.

Table 3 explores the association between socio-demographic variables and low birth weight. Lower educational status of the mother was significant for the outcome of low birth weight with a chi square value of 12.918 and a p value of 0.04. A similar association was obtained between low socio-economic status and low birth weight with a Chi-square value of 9.62 and a p value of 0.04. However, father's educational status was not significant for the outcome of low birth weight. Table 4 explores the association between clinical characteristics of the neonate and low birth weight. Pre-term gestation of the neonate, that is delivery prior to completion of 37 weeks of gestation was significant for an outcome of low birth weight. The Chi-square value with application of Yates continuity correction was 27.22 and a $p<0.0001$. The categorization of pregnancy into high-risk pregnancy was not significant for an outcome of low birth weight.

DISCUSSION

Neonatal mortality and morbidities can be attributed to a range of factors, obstetric, maternal, socio-demographic and genetic. Low birth weight babies have a high risk of neonatal and infant morbidity and hence the proportion of babies with low birth weight is considered as a sensitive index of nation's health and development.[7] In the current study, factors affecting low birth weight including educational status of the mother and father, socio-economic status of the family, clinical characteristics including term of delivery and high risk pregnancy were evaluated. The parents of the neonates in the study had relatively better educational status with most having an education beyond 12th standard and above. Poorer educational status of the mother was significantly associated with low birth weight. However, educational status of the father was not significantly associated with low birth weight. Low socio-economic status of the family was also associated with low birth weight. This is a crucial distinction in a low-middle income country where education of the mother significantly impacts the seeking of regular ANC health checkups, the health literacy impacts nutrition and healthcare during pregnancy and the ability to seek and adhere to health advice. A study by Kumar et al observed similar associations. In their study, the most common socio-demographic risk factors associated with low birth weight and neonatal morbidity were low socio-economic status, educational status, delay in seeking antenatal care and poor pregnancy weight gain.[7] Another prospective study at NICU of SKIMS Srinagar demonstrated that age of the mother, gender of the neonate, gestational age, dwelling place, weight, place of delivery, type of family, monthly income of the family, education level of mother, education level of father, occupation of mother, occupation of father and socio-economic class of the family of neonate were very strongly associated ($p<0.001$) with neonatal morbidity.[8] In the current study, we obtained associations only between education of the mother, socio-economic status and low birth weight. The differences may be attributed to cultural differences between the study sites. A study conducted in Solapur (Maharashtra) observed that socio-demographic factors like age of mother, socio-economic class of the family, occupation of father, maternal health, illiteracy, high fertility rates and birth weight of baby were associated

with neonatal mortality.[9] The most common clinical presentation in NICU was observed to be due to prematurity and respiratory distress in the study by Kumar et al.[7] A similar study by Parvin et al observed that perinatal asphyxia and neonatal sepsis were the main reasons for NICU admission followed by neonatal jaundice, preterm low birth weight and preterm very low birth weight.[10] Similar observations were seen in the current study where the predominant reasons for admission were respiratory distress followed by neonatal jaundice and meconium aspiration syndrome. Prevalence of socio-demographic risk factors affecting the morbidity and mortality of neonates is disproportionately higher in low- and middle-income countries.[11] While neonatal mortality and morbidity can be attributed to several factors including neonatal characteristics, maternal characteristics, health infrastructure and health manpower, socio-demographic characteristics are an immutable part of the determinants of neonatal mortality and morbidity. A one-pronged approach may fail to achieve a broad and holistic impact required to impact and reduce neonatal mortality and morbidity. A multi-pronged approach is required to address the multimodal causation of low birth weight and morbidity in neonates. The advantage of addressing socio-demographic factors in neonatal morbidity and mortality is that they tend to have a broad reaching and wide impact which not only tends to improve neonatal health and indicators but also other social determinants and health indicators in general. Experience across low middle income countries have suggested the need to adopt a comprehensive strategy to address the individual, maternal, and intrapartum factors associated with neonatal mortality. Larger studies at scale of a similar nature will uncover the delineation of factors impacting neonatal morbidity in India and also uncover the dose-response relationship enabling the development of a targeted intervention based on these studies.

CONCLUSION

The current study obtained data from 150 mothers whose children were admitted to the NICU of a tertiary care hospital. Socio-demographic and clinical factors associated with NICU admission, low birth weight, neonatal morbidity and mortality were evaluated. Neonatal mortality and morbidity can be attributed to several factors including neonatal characteristics, maternal characteristics, health infrastructure and health manpower. However, prevalence of socio-demographic risk factors affecting neonates is disproportionately higher in low- and middle-income countries such as India. Addressing clinical, health infrastructure and health manpower factors alone may not impact neonatal morbidity and morbidity. It is crucial to have a multi-modal approach which addresses socio-demographic factors to address all determinants of neonatal morbidity and mortality.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Dunnapothula A, Vaz LS, Valsangkar S, Dummpala S. Clinico-socio demographic characteristics of neonates at NICU, Mediciti Hospital, Medchal, Telangana, India. Int J Community Med Public Health 2024;11:2528-32.