

Original Research Article

Epidemiological determinants of infant deaths occurring in a teaching hospital: an observational study

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Received: 20 December 2018

Revised: 03 February 2019

Accepted: 04 February 2019

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ABSTRACT

Background: India has the highest number of infant deaths, contributing about 23% to the global burden of infant deaths. Sustainable development goal states that, by 2030, preventable deaths of new-borns and children under 5 years of age should be ended, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births. Aims of the study: (1) to understand the socio-demographic profile of the study cases, (2) to correlate the causes of infant deaths with age, parity and other obstetrics parameters.

Methods: The present study was undertaken for the period of one year from January to December 2016. The study included 120 deceased infants from department of Pediatrics, Belagavi Institute of Medical Sciences (BIMS) Hospital, Belagavi. Information regarding socio-demographic profile, antenatal, intranatal and infant details were collected using a structured questionnaire.

Results: 61.6% of study cases were male and three-fourth of them resided in rural area. 56.2% of the deceased infants were LBW, followed by VLBW (34.9%) and ELBW (8.9%). The common causes of death among the deceased infants were prematurity (45%) followed by birth asphyxia (34.2%), sepsis (12.5%), pneumonia (3.3%) and congenital anomalies and other (2.5%).

Conclusions: Age of the infants, gestational age, place of delivery, delivery assisted and LBW were associated with infant deaths. There is a need for proper implementation of programmes related to mother and child health care.

Keywords: Determinants, Infant deaths, Teaching hospital

INTRODUCTION

Today's children are tomorrow's citizens of the country. Thus the normal health and growth of children plays an important role in the prosperity of the country.¹ In India, 39% of total population is contributed by children. Infant mortality is not only an important factor in population growth; it is also an important measure of economic development.² The infant and child mortality rate is negatively associated with the level of living and reflects

the country's level of socio-economic development and quality of life.³

Currently IMR is 41 and 28 per 1000 live births (2015-2016) for India and Karnataka respectively.^{4,5} Despite several interventions implemented for the improvement of infant survival, the pace of decline in IMR has been slow; a lag in achieving millennium development goals (MDG) goal 4 (IMR-27).⁶ Goal three, target two of sustainable development goal (SDG) states that, by 2030, preventable deaths of newborns and children under 5

years of age should be ended, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births.^{7,8} The present study is an attempt to fill the knowledge gaps in understanding the socio-demographic profile of the infants dying in a teaching hospital and to assess the etiological factors responsible for the infant deaths.

METHODS

An observational study was conducted among the expired infants in Department of Pediatrics, BIMS, Belagavi during the period of January to December 2016. Ethical clearance was obtained from Institutional Ethical Committee (IEC). A formal permission to conduct the study was obtained from the authorities of the hospital and consent was taken from mother or the close relatives of study participants. Sample size was estimated by considering the proportion of the most common cause of infant deaths. According to a study in southern India by Upadhyaya et al the proportion of the most common cause of infant deaths was found to be birth asphyxia which contributed 26.2%.⁹ Considering 10% of allowable error, minimal sample size was calculated to be 75; however, the present study included 120 study participants. All infant deaths occurring in paediatric department (NICU, PICU and ward), BIMS hospital, Belagavi, who fulfilled selection criteria were studied till the required sample size of 120 was reached.

A structured, pre-validated, questionnaire was used to collect relevant data from the informant of the deceased infant i.e., either mother or the close relatives through personal interviewing. The information regarding condition of the infants before the death and cause of death of each deceased infant was collected from the treating doctors. Infants admitted under paediatric department (neonatal intensive care unit (NICU), paediatric intensive care unit (PICU) and ward), BIMS hospital, Belagavi, who expired during their stay in the hospital and all inborn/outborn deceased infants were included. Infant age or date of birth not known, mothers or relatives not willing to give information and mothers seriously ill and relatives not knowing the details of antenatal, intranatal and postnatal period were excluded. Data was entered in Microsoft excel sheet 2007 and analyzed in SPSS version 22. Chi square test was used to test the association between different qualitative variables. At 95% Confidence interval, $p \leq 0.05$ was considered as statistically significant.

RESULTS

As shown in Table 1, nearly half the of the mothers of deceased infants belonged to the age group of 21–25 years (47.5%), followed by less or equal to 20 years (28.3%). 74 (61.6%) and 46 (38.4%) of them were found to be male and female respectively. 87 (72.5%) of them resided in rural area whereas, 33 (27.5%) resided in urban

area. majority (42.5%) lived in joint family followed by nuclear family (30.8%).

In the present study, majority (52.5%) of deceased infants were found in first birth order of the mother, followed by second birth order (29.2%). 32 (26.7%) of them were born within 1-2 years of birth interval, 12.5% of the study cases were found to have 3-4 years of birth interval. Most (84.2%) of them were born in Government health facilities, followed by private health facility (8.3%), home (5.8%). Surprisingly 2 (1.7%) cases were born in vehicle during travel to the health facility. Three-fourth of study subject were born by full term normal vaginal delivery.

Table 1: Socio-demographic profile of the study cases.

Variables	Participants (n=120)
Mothers age (years)	N (%)
≤20	34 (28.3)
21–25	57 (47.5)
26–30	24 (20.0)
≥31	05 (04.2)
Sex	
Male	74 (61.6)
Female	46 (38.4)
Residential area	
Rural	87 (72.5)
Urban	33 (27.5)
Religion	
Hindu	112 (93.4)
Muslim	07 (05.8)
Christian	01 (00.8)
Type of family	
Nuclear	37 (30.8)
Joint	51 (42.5)
3 generation	32 (26.7)
Socioeconomic status	
Class II	14 (11.7)
Class III	29 (24.2)
Class IV	32 (26.7)
Class V	45 (37.4)

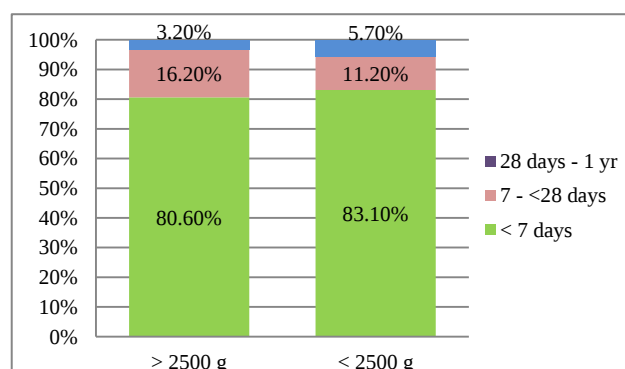


Figure 1: Birth weight of study cases.

Table 2: Distribution of obstetrical parameter of the mothers of deceased infants.

Variables	<7 days n=99 (%)	7-<28 days n=15 (%)	28 days-1 year n=6 (%)	Total n=120 (%)
Birth order				
1	50 (50.5)	08 (53.3)	05 (83.3)	63 (52.5)
2	32 (32.3)	02 (13.3)	01 (16.7)	35 (29.2)
3	15 (15.2)	04 (26.7)	00 (00.0)	19 (15.8)
≥4	02 (02.0)	01 (06.7)	00 (00.0)	03 (02.5)
Birth interval (years)				
1-2	26 (26.3)	05 (33.3)	01 (16.7)	32 (26.7)
3-4	14 (14.1)	01 (06.7)	00 (00.0)	15 (12.5)
5-6	06 (06.1)	00 (00.0)	00 (00.0)	06 (05.0)
>6	03 (03.0)	01 (06.7)	00 (00.0)	04 (03.3)
Not applicable	50 (50.5)	08 (53.3)	05 (83.3)	63 (52.5)
Gestational age				
≤30 weeks	20 (20.2)	01 (6.7)	02 (33.3)	23 (19.2)
31-35 weeks	30 (30.3)	05 (33.3)	03 (50.0)	38 (31.7)
36-40 weeks	45 (45.5)	08 (53.3)	01 (16.7)	54 (45.0)
≥41 weeks	04 (04.0)	01 (06.7)	00 (00.0)	05 (04.1)
Place of delivery				
Government health facilities	85 (85.9)	12 (79.9)	04 (66.6)	101 (84.2)
Private health facility	08 (08.1)	01 (06.7)	01 (16.7)	10 (08.3)
Home	05 (05.0)	01 (6.7)	01 (16.7)	07 (05.8)
Transit	01 (01.0)	01 (6.7)	00 (00.0)	02 (1.7)
Type of delivery				
FTND	73 (73.7)	12 (80.0)	05 (83.3)	90 (75.0)
Caesarean section	21 (21.2)	02 (13.3)	00 (00.0)	23 (19.2)
Assisted delivery	05 (05.1)	01 (06.7)	01 (06.7)	07 (05.8)

Table no 3: Association of socio-demographic factors with the age of study cases.

Variables	<7 days n=99 (%)	7–<28 days n=15 (%)	28 days–1 year n=6 (%)	Total n=120 (%)	P value
Mother age (years)					
≤20	31 (31.3)	02 (13.3)	01 (16.7)	34 (28.3)	>0.05
21 – 25	43 (43.4)	10 (66.7)	04 (66.7)	57 (47.5)	
26 – 30	21 (21.2)	02 (13.3)	01 (16.6)	24 (20.0)	
≥31	04 (04.0)	01 (06.7)	00 (00.0)	05 (04.2)	
Mothers education					
Illiterate	27 (90.0)	03 (10.0)	00 (00.0)	30 (25.0)	<0.01
Primary	11 (57.9)	05 (26.3)	03 (15.8)	19 (15.8)	
Secondary	45 (91.8)	03 (06.1)	01 (02.0)	49 (40.8)	
>Higher secondary	16 (72.7)	04 (18.1)	02 (9.2)	22 (18.4)	
Wash hands					
Yes	39 (73.6)	11 (20.8)	03 (5.6)	53 (44.2)	<0.05
No	60 (89.6)	04 (06.0)	03 (04.4)	67 (55.8)	
Sex					
Male	62 (83.8)	08 (10.8)	04 (05.4)	74 (61.6)	>0.05
Female	37 (80.4)	07 (15.2)	02 (04.4)	46 (38.4)	
Sanitary latrine					
Present	70 (79.5)	13 (14.8)	05 (05.7)	88 (73.4)	<0.05
Absent	29 (90.6)	02 (06.3)	01 (03.1)	32 (26.6)	

Table 3 shows, age of the deceased infant (early neonates, late neonates and post neonates) was significantly associated with educational status of the mothers ($p < 0.05$) and practice of washing hands with soap water after defecation ($p < 0.05$). No relationship was found with the sex of the study cases ($p > 0.05$). Figure 1 shows, birth weight of study cases. Birth weight less than 2500 g were found to be 83.1%, 11.2% and 5.7% among early neonates, late neonates and post neonates respectively. The common causes of death among the deceased infants were prematurity (45%) followed by, birth asphyxia (34.2%), sepsis (12.5%), pneumonia (3.3%) and congenital anomalies and other (2.5%) (Figure 2).

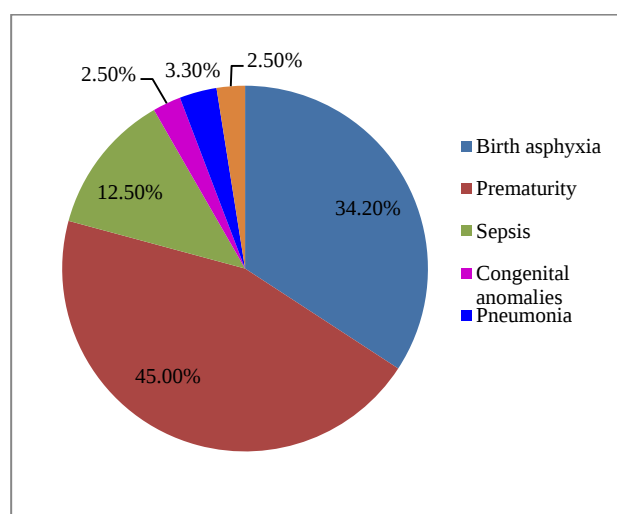


Figure 2: Cause of deaths of study cases.

DISCUSSION

In this study, 82.5% of the deceased infants were early neonates, 12.5% and 5% of them were late neonates and post neonates respectively. Similar findings were found in studies conducted in Government hospitals in Andhra Pradesh and Maharashtra, majority of the study cases were neonates followed by post neonates.^{2,10} Similar findings were noted in a study conducted in Iran.¹¹

In the current study majority of the deceased infants were found to be male. Similar findings were found in studies conducted in by Upadhyaya et al, Patil et al, Dube et al, Manandhar R et al, Titaley et al, and Weldearegawi et al.^{9,12-16} This shows biological vulnerability of males to infection is more than females in their early ages. In the present study, majority (55%) of deceased infants were found in first birth order of the mother, followed by second birth order (26.7%). Similar results were seen in a study done in rural India by Singh et al.¹⁷ However in other studies done at Mumbai and Nigeria it was found that, neonates of birth order two were at higher risk of dying.^{18,19} In few studies infant mortality was high among birth order 5 and above.²⁰⁻²²

Nearly three-fourth 88 (73.3%) of them had sanitary latrine facility at their house and there was significant association between infant deaths and not washing hands with soap and water after defecation. Similar finding was found in study done in Andhra Pradesh by Kunsniwar et al.²⁰ Access to toilet and hand washing practices with soap and water after defecation reduces the risk of dying through less exposure of neonates to contamination making them less susceptible to diseases and infections, and eventually death. 74.1% of the deceased infants were born with a birth weight less than 2500 g, whereas comparatively lesser number of infants were LBW in other countries, majority of them had normal birth weight.^{23,18,15} LBW predisposes newborns to increased risk of infections, low blood sugar and low body temperatures, which increase the risk of death compared to normal newborns.

In this study, the common causes of death among the deceased infants were prematurity (45%) followed by, birth asphyxia (34.2%) and sepsis (12.5%). Prematurity was the commonest cause of deaths in studies done by Prasad et al and Patil et al.^{2,12} However, birth asphyxia was the commonest cause in studies done in southern India, Maharastra, Karnataka (Bagalkot) and Bangladesh.^{9,10,24,25} As this study was hospital based, the findings cannot be generalized at the community level and a prospective follow up study of all newborns would have been ideal to know the risks associated with infant deaths these were the limitations of the study.

CONCLUSION

Most common cause of deaths was prematurity, followed by birth asphyxia. Promotion of Institutional delivery is on greater need. Mothers and their close relatives should be explained about the warning signs of labor and the need for timely referral to the health care centers for safe delivery. Proper implementation of programmes related to mother and child health care is required.

ACKNOWLEDGEMENTS

Authors are grateful to thank the beloved Director, Dr. S T Kalsad, BIMS, Belagavi for permitting to conduct the present study. We extend sincere thanks to all the participants and staff of the Department of Community Medicine and Department of Pediatrics BIMS, Belagavi for co-operating during the study period.

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: Soumyashree MN, Viveki RG, Halki S. Epidemiological determinants of infant deaths occurring in a teaching hospital: an observational study. *Int J Community Med Public Health* 2019;6:1192-6.