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Original Research Article

A cross sectional study on morbidities pattern among the low birth weight infants in the rural field practice area of a tertiary care teaching hospital in Karnataka

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ABSTRACT

Background: Low birth weight (LBW) is an important known risk factor associated with neonatal morbidity and mortality. LBW infants are at risk of growth impairment and poor cognitive development. The reduction of LBW is an important contribution to the achievement of Sustainable Development Goal (SDG) for reducing child mortality. Objective was to determine the morbidity pattern among the low birth weight infants in the rural field practice area of Mandya Institute of Medical Sciences, Mandya.
Methods: A cross sectional study was conducted over a period of one year in the rural field practice area of Mandya Institute of Medical Sciences (MIMS), Mandya. Using a pre-tested semi structured questionnaire, data was collected by interviewing parents/ caregivers of infants at their homes. Data was collected from households of 166 infants by house to house visit after obtaining informed consent. Descriptive statistics and inferential statistics like chi-square test were used for analysis of the data.
Results: The common morbidity among LBW infants were acute respiratory infections (18.7%) and fever (12.5%). Most of the LBW infants had delayed vaccination (50%) and developmental milestones as compared to that of the normal birth weight infants.
Conclusions: Acute respiratory infections (18.7%) and fever (12.5%) were the common morbidities among the infants. Delayed vaccination (50%) and delayed developmental milestones were common among LBW infants. Health care services should be strengthened in rural area to reduce the morbidities among the LBW infants.

Keywords: Infants, Low birth weight, Morbidity, Rural

INTRODUCTION

The reduction of LBW is an important contribution to the achievement of sustainable development goal (SDG) for reducing child mortality.[1] The SDG 3.2 states that by the year 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality and under-5 mortality.[2,3]

Growth and survival of infants in the future is closely related to birth weight of the infant.[4] Studies have shown that infant mortality is about 40 times more among underweight infants as compared to that of infants with normal weight.[5]

Acute respiratory infection (ARI) and diarrhoea are more common in infants from lower socioeconomic status. Prematurity, LBW and malnutrition, early weaning, lack of hygiene are the risk factors for ARI and diarrhoea. Overcrowding and Intense indoor air pollution are the main risk factors for ARI.[6]

Infants are at higher risk of developing health problems especially among infants with LBW in rural area. Identification of health problems among infants is important in the reduction of infant morbidity and mortality rate. Hence this study was undertaken among the infants in the rural field practice area of a tertiary care teaching hospital in Karnataka.

METHODS

A community based cross sectional study was conducted among the infants in the rural field practice area of Department of Community Medicine, Mandya Institute of Medical Sciences, Mandya.

This study was initiated after obtaining approval from institutional scientific committee (ISC) and institution ethics committee (IEC) of MIMS, Mandya. The data for the present study was collected over a period of one year from 1st July 2019 to 15th July 2020. The data collection period was extended from 30th June to 15th July in order to collect data regarding any illnesses in last 2 weeks also from the infants born from 16th June to 30th June 2020.

The birth rate in rural Karnataka state is 18.8 per 1000 population per year according to sample registration system bulletin December 2016; Registrar General of India.[7] The total population under the area of Keragodu PHC was 8632 for the year 2018. The sample size (n) was calculated by multiplying the crude birth rate with the total population of Keragodu and this multiplied product is divided by 1000. Thus the sample size (n) of this study was 162.

Inclusion criteria

All the infants from the study area were included in this study and infants born during the period of data collection were also included in the study.

Exclusion criteria

The infants of the seasonal/circular migrants were excluded from the study.

Method of data collection

This study was done in the rural field practice area of Mandya Institute of Medical Sciences. The data collection was done in 10 villages; those were Keragodu, Marilinganadoddi, Hosurmuddanadoddi, Siddegowdanadoddi, Kodidoddi, Keragodu Mole, Kalmantidoddi, Ankanannadoddi, Panchegowdanadoddi and Talemeledoddi. The list of all infants in the selected first village was prepared with the help of junior health assistant female (JHA-F), accredited social health activist (ASHA) and anganawadi worker (AWW). To begin the data collection, the first village was selected by using simple random sampling method that is, the names of all the 10 villages numbered and written on separate pieces of papers and they were picked randomly by using lottery method. The informed written consent was obtained from the infant's parents and the data was collected regarding each infant form their parents during home-to-home visits.

The pretested semi-structured questionnaire was used for interviewing the infants' parents. Preliminary data like name, age and sex of the infant was noted and then parent's details were also taken. At the time of interview, the infant's present health issues and complaints in the past 2 weeks were noted and personal history, family history and treatment history were taken. Birth history including antenatal, natal and postnatal history along with immunization history and developmental history was recorded in the proforma.

General physical examination including anthropometry and systemic examination was done for all infants. Health related data of the child was correlated and noted from source of information like mother card, neonatal intensive care unit (NICU) discharge card and hospital discharge cards. Parents were interviewed about the various known risk factors affecting the birth weight of the baby. Housing and environmental factors were also assessed.

The data collection was started in the first village, after completing the data collection of all the infants in the first village, the data collection was continued in the adjacent village and like wish all the 10 villages coming under the rural health training centre (RHTC), Keragodu were covered. During the first month of study period, data collection was finished in all the 10 villages then again visited to all the 10 villages on monthly basis to include all the newly infant born in that particular month and the study was continued by visiting the all the 10 villages on monthly basis till the end of last month of period of data collection. After the collection of data at each home, health education about the seeking the health care, frequent breast feeding, keeping the baby warm, immunization, family planning and environmental sanitation was given to infants' parents.

Statistical analysis

Descriptive statistics like proportions, mean, standard deviation and range, inferential statistics like chi-square test were used.

RESULTS

In this study, total 166 infants were included from the rural field practice area of Mandya Institute of Medical Sciences, Mandya. Among the total 166 infants, 94 (56.6%) were males and 72 (43.4%) were females. The mean age of the infants was found to be 6.45±4.51 months. Majority of the study subjects 61 (36.7%) were from the age group of 0-1 month followed by 52 (31.4%) in the age groups of 2-6 months (Figure 1).

The mean age of infants' mother and father were found to be 25.3±4.0 years and 32.2±4.0 years respectively. In this study, 71.2% of the infants' mothers and 52.4% infants' fathers studied up to pre-university or above educational qualification. Most of the infants' fathers completed graduation or above qualification whereas majority of the infants' mothers had completed pre university and/or above education.

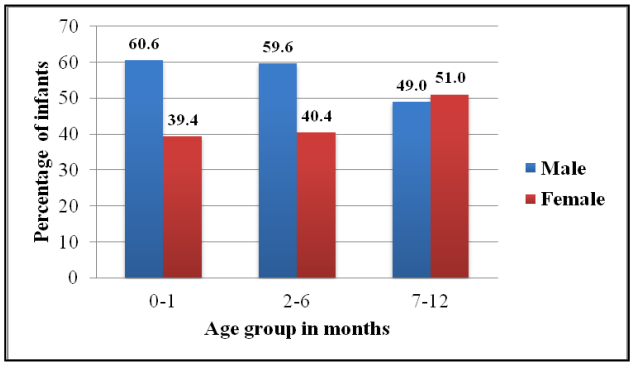

Figure 1: Bar diagram showing distribution of infants according to age and sex.

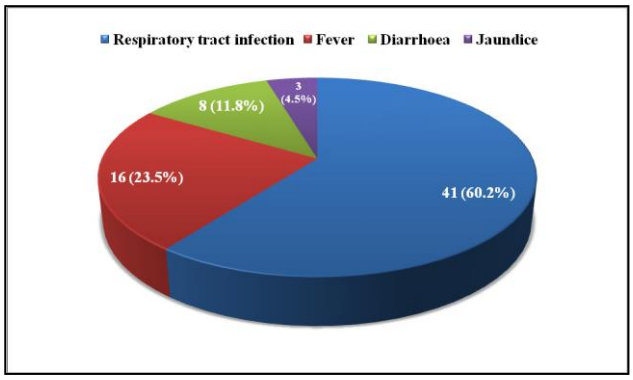

Figure 2: Pie diagram showing distribution of infants with illness in last 2 weeks.

The most of the families (74.7%) were three generation families, 21.1% families were nuclear families and only 4.2% belonged to joint families. Most of the families 45.2% belonged to SES class-III followed by 27.1% and 16.8% who belonged to SES class-II and SES class-IV respectively according to Modified BG Prasad classification.

In our study, among total 166 infants, 68 (40%) of them had history of various morbidities in last 2 weeks with respect to the day of home visit. The most common morbidity among infants was respiratory tract infection 41 (60.1%) followed by fever 16 (23.5%), diarrhoea 08 (11.8%) and 3 (4.5%) infants had jaundice (Figure 2).

Among the total 32 LBW infants, 6 (18.7%) suffered from acute respiratory infection, 4 (12.5%) had fever, and 01 (3.2%) infant had jaundice. The difference of LBW infants between occurrences of different morbidities was not statistically significant (Table 1).

Among 166 infants, 30 (18.0%) had history of admission to neonatal intensive care unit (NICU) for treatment of various morbidities. Of 30 infants with history of NICU admission, 17 (53.1%) were LBW infants. Early onset sepsis and respiratory distress were the most common causes for NICU admission. Among total 32 LBW infants, 17 (53.1%) of them had history of NICU admission. This difference of LBW infants between with and without NICU admission was statistically significant ($p<0.001$) (Table 2).

Among 166 infants, 19 (11.4%) of them were fed with pre-lacteal food. Among 32 LBW infants, 6 (18.7%) of them were fed with pre-lacteal food. Breast feeding was initiated for majority of the infants 73 (44.0%) within 1 hour of delivery. For 18 (10.8%) infants, breast feeding was initiated after more than 6 hours following delivery. Among LBW infants, 11 (34.4%) were breast fed within 1 hour after delivery and 9 (28.1%) were breast fed after more than 6 hours following delivery. This difference of LBW infants between different timings taken to initiate breast feeding was statistically significant. Among 166 infants, 53 infants were aged more than 6 months. Of 53 infants, 34 (64.1%) were exclusively breast fed. Many reasons were given by the mothers for not-exclusively breast feeding their infants, regarding exclusive breast feeding, majority of the mothers had adequate knowledge, favorable attitude but practice was poor (Table 2).

Table 1: Illness among infants in last 2 weeks and association with LBW (n=166).

Illness in last 2 weeks	Yes/No	LBW		Total (%)	P value
		Yes (%)	No (%)		
Acute respiratory infection	Yes	06 (18.7)	35 (26.1)	41 (24.7)	
	No	26 (81.3)	99 (73.9)	125 (75.3)	0.385
Fever	Yes	04 (12.5)	12 (9.0)	16 (9.6)	
	No	28 (87.5)	122 (91.0)	150 (90.4)	0.542
Diarrhoea	Yes	0	07 (5.2)	7 (4.2)	
	No	32 (100.0)	127 (94.8)	159 (95.8)	0.186
Jaundice	Yes	01 (3.2)	02 (1.4)	3 (1.8)	
	No	31 (96.8)	132 (98.6)	163 (98.2)	0.533

Table 2: Distribution of low birth infants according to their NICU admission, pre-lacteal feeding, breast feeding initiation and immunization status (n=166).

Factors	Low birth weight		Total (%)	P value
	Yes (%)	No (%)		
NICU admission				
Yes	17 (56.6)	13 (43.4)	30 (18.0)	<0.001
No	15 (11.0)	121 (89.0)	136 (82.0)	
Pre-lacteal feeding				
Yes	06 (18.7)	13 (09.7)	19 (11.4)	0.149
No	26 (81.3)	121 (82.3)	147 (88.5)	
Breast feeding initiation (In hours)				
<1 hour	11 (34.4)	62 (46.2)	73 (44.0)	0.005
1-3 hours	9 (28.1)	54 (40.2)	63 (38.0)	
4-6 hours	3 (9.4)	9 (6.7)	12 (7.2)	
>6 hours	9 (28.1)	9 (6.7)	18 (10.8)	
Immunization status				
Delayed	16 (50.0)	16 (12.0)	32 (19.3)	< 0.001
Up to date	16 (50.0)	118 (88.0)	134 (80.7)	

Table 3: Distribution of infants according to their developmental milestones (n= 166).

Developmental milestones	Delayed/attained	LBW		Total (%)	P value
		Yes (%)	No (%)		
Gross motor	Delayed	06 (18.8)	03 (02.3)	9 (5.5)	<0.001
	Attained	26 (81.2)	131 (97.7)	157 (94.5)	
Fine motor	Delayed	12 (37.5)	06 (04.5)	18 (10.8)	<0.001
	Attained	20 (62.5)	128 (95.5)	148 (89.2)	
Social	Delayed	09 (28.2)	02 (01.5)	11 (6.6)	<0.001
	Attained	23 (71.8)	132 (98.5)	155 (93.4)	
Language	Delayed	11 (34.4)	06 (04.5)	17 (10.3)	<0.001
	Attained	21(65.6)	128 (95.5)	149 (89.7)	

In our study, it was found that, 32 (19.3%) infants had delayed immunization status and 134 (80.7%) infants had received up to date immunization. Among 32 LBW infants, immunization of 16 (50.0%) infants was delayed. This difference of LBW infants between complete immunization status and delayed immunization status was statistically significant (p<0.001). In this study, 96 (57.2%) infants were immunized at government hospitals and 70 (42.2%) immunized at both private hospital and government hospitals. That is 70 (42.2%) infants born at private hospital and birth dose of vaccines were given in the same hospital and then subsequent vaccines were taken at government hospitals (Table 2).

Among 32 LBW infants, 06 (18.8%) of them had gross motor delay and 12 (37.5%) of them had fine motor delay. Among 32 LBW infants, 09 (28.2%) of them had social milestone delay and 11 (34.4%) of them had language milestone delay. This difference of LBW infants between attained developmental milestones status and delayed developmental milestones was statistically significant (p<0.001) (Table 3).

DISCUSSION

Among total 166 infants, 68 (40%) of them had history of various morbidities in last 2 weeks with respect to the day of home visit. The most common morbidity among infants was respiratory tract infection, 41 (60.1%) followed by fever 16 (23.5%) and diarrhoea 08 (11.8%). Among the total 32 LBW infants, 6 (18.7%) suffered from acute respiratory infection, and 4 (12.5%) had fever.

According to National Family Health Survey 2019-20 (NFHS-5) for Karnataka state, the prevalence of symptoms of acute respiratory infection (ARI) in the last 2 weeks preceding the survey for rural 1.7%, urban 1.2% and overall it was 1.5%. Prevalence of diarrhoea (reported) in the last 2 weeks preceding the survey for rural 5.6%, urban 4.6% and overall it was 5.3%.[8]

According to National Family Health Survey 2019-20 (NFHS-5) for Mandya district, the prevalence of symptoms of acute respiratory infection (ARI) in the last 2 weeks preceding the survey was 2.3%.[9]

A study conducted by Borah et al showed that, among the 100 infants, 20 (20%) of them had acute respiratory infection (ARI), 7% had diarrhea and 5% had fever. Among 30 LBW infants, 12 (40%) of them had acute respiratory infection (ARI), 4 (13.3%) of them had diarrhea and 3 (10%) of them had fever.[10]

The studies conducted by Jackson et al and Sharma et al.[11,12] shown that LBW was a significant risk factor for ARI. A study by Barros et al also found that preterm and LBW babies presented with increased morbidity during infancy.[13]

Because of hepatic immaturity, the bilirubin production is increased due to excessive hemolysis which cannot be conjugated adequately for excretion as bile, leading to rise in unconjugated bilirubin which leads to exaggerated physiological jaundice.[14]

In India the most common causes of neonatal mortality are preterm birth (43.1%), birth asphyxia (18.9%), neonatal sepsis (13.6%) and congenital anomalies (11.1%). Pneumonia (5.1%) neonatal tetanus (0.8%) and diarrhea (0.7%) are also causes for the neonatal deaths. To decrease neonatal mortality, rapid scale-up of maternal health interventions is necessary in order to improve neonatal health outcomes.[15]

According to a systematic review and meta-analysis conducted by Daliri et al, the cost of care and treatment of complications in infants with LBW is 6 times more as compared to that of the normal birth weight infants.[16]

The studies by Vijayalaxmi et al and Sreedevi et al revealed that the incidence of diarrhea, ARI and fever were high during infancy.[17,18] The incidence of morbidities was significantly associated with poor feeding practices.

Among 166 infants, 30 (18.0%) had history of admission to neonatal intensive care unit (NICU). Of 30 infants with history of NICU admission, 17 (53.1%) were LBW infants.

A follow up study by Borah et al found that the LBW infants had more episodes (65%) of hospitalization than the normal birth weight (NBW) infants.[10] Similar findings were found in the studies conducted by Sharma et al and Paul et al.[12,19]

Among 166 infants, 19 (11.4%) infants were fed pre-lacteal food. Of 19 infants fed with pre-lacteal food, 6 (31%) of them were LBW infants. The commonly given pre-lacteal foods were cow's milk and milk powder.

A study by Sanjana et al shown that, delayed initiation of breast-feeding unhygienic feeding practices led to the infections among infants.[20] The increased incidence of ARI, diarrhea and other morbidities during the infancy may be attributed to administration of pre-lacteal feeds, delayed initiation of breastfeeding, improper weaning and cultural practices.

Among 166 infants, breast feeding was initiated for 73 (44.0%) infants within 1 hour after delivery. Among 32 LBW infants, 11 (34.4%) were breast fed within 1 hour after delivery.

According to the National Family Health Survey 2019-20 (NFHS-5) for Karnataka state, the percentage of children under age 3 years breastfed within one hour of birth was 49.1%.[8] According to the National Family Health Survey 2019-20 (NFHS-5) for Mandya district, Children under age 3 years breastfed within one hour of birth was 63.7%.[9]

Singh et al showed that, breast feeding was initiated early in majority 88.87%.[21] The burden of low birth weight babies in India is about 20-30% with significant mortality and morbidities. Promotion of human milk banking is useful for feeding newborns.[22] The incidence of infection is increased by 3 to 10 folds in preterm babies because these infants have less passive immunity.[23]

Among 166 infants, 53 infants were aged more than 6 months. Of 53 infants, 34 (64.1%) were exclusively breast fed. Among these 53 infants, 3 (05.6%) were LBW infants. Many reasons were given by the mothers for non-exclusive breast feeding their infants, those were not aware of importance of exclusive breast feeding, insufficient breast milk, etc. Regarding exclusive breast feeding, majority of the mothers had adequate knowledge, favourable attitude but practice was poor.

According to National Family Health Survey 2019-20 (NFHS-5) for Karnataka state, children under age 6 months exclusively breastfed for rural was 63.0%, urban 56.7% overall it was 61.0%.[8]

A study conducted by Borah et al shown that, among the 30 LBW infants, 26 (86.6%) were exclusively breast fed up to 6 months of age.[10] Risk of infection among exclusively breast fed was lower. Tallo et al and Lamberti et al found similar findings in their studies.[24,25]

A study conducted in South India by Kattula et al shown that, acute respiratory infection and other morbidities risk is lower in exclusively breastfed infants.[26] Singh et al showed that, the commonest morbidity was diarrhea (49.09%) followed by ARI (32.73%).[21]

In our study, it was found that, 32 (19.3%) infants had delayed immunization status and 134 (80.7%) infants were received up to date immunization. Among 32 LBW infants, immunization of 16 (50.0%) infants was delayed and 16 (50.0%) of them received up to date immunization. This difference of LBW infants between complete immunization status and delayed immunization status was statistically significant ($p<0.001$). According to National Family Health Survey 2019-20 (NFHS-5), the

percentage of children aged 12-23 months fully vaccinated based on information from vaccination card only, was 88.3% and 96.9% in Karnataka state and Mandya district respectively.[8,9]

In this study, 96 (57.2%) infants were exclusively immunized at government hospitals and 70 (42.2%) immunized at both private hospital and government hospitals. That is 70 (42.2%) infants born at private hospital and birth dose of vaccines were given in the same hospital and then subsequent vaccines were taken at government hospitals. According to National Family Health Survey 2019-20 (NFHS-5), the percentage of children age 12-23 months who received most of their vaccinations in a public health facility was 91.7% and 100% in Karnataka state and Mandya district respectively.[8,9] The percentage of children aged 12-23 months who received most of their vaccinations in a private health facility was 7.9% and 0.0% in Karnataka state and Mandya district respectively.[8,9]

Among 32 LBW infants, 06 (18.8%) of them had gross motor delay and 12 (37.5%) of them had fine motor delay. Among 32 LBW infants, 09 (28.2%) of them had social milestone delay and 11 (34.4%) of them had language milestone delay. This difference of LBW infants between attained developmental milestones status and delayed developmental milestones was statistically significant ($p<0.001$).

A study conducted by Agarwal et al showed that among total 458 under-5 years children, 56 (12.2%) had developmental delay and among 35 infants, 6 (5.7%) had developmental delay.[27] A study conducted by Sharma et al. showed that among 450 children aged 2 months-6 years, 73 (16.2%) of them had developmental delay.[28]

CONCLUSION

Acute respiratory infection (ARI) and fever were the common morbidities among LBW infants. Most of the LBW infants had delayed immunization and developmental milestones as compared to that of the normal birth weight infants.

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