Original article

Sociodemographic, biological and cultural factors affecting morbidities among infants: A longitudinal study in rural Karnataka

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ABSTRACT

Background: Morbidities during infancy have a deadly effect on growth and development among infants. Globally, more than 0.5 million newborns die a year due to morbidities. In India, fifty percent of them are underweight.

Objectives: To study morbidities during first year of life and to assess socio-demographic, biological and cultural factors influencing morbidity during first year of life.

Methodology: This Longitudinal study was carried out in rural community of Kinaye, Vantamuri and Handignur PHC. Study population constituted of Babies born during May 2013–March 2014. Sample size was calculated and 962 infants were enrolled by using random number tables. Data was obtained from mothers using semi structured pretested questionnaire. The baseline data was collected within first week of the birth and were followed up monthly till the child completes 1 year. Descriptive statistics and inferential statistics were used for analysis.

Results: The incidence of morbidities during first year of life was 14.18 episodes per child-year. The incidence of Acute respiratory infections, Diarrhea and Fever during twelfth month was 0.31/infant-year, 0.25/infant-year and 0.22/infant-year. The socio demographic factors associated with Morbidities were non working (AOR: 1.320) illiteracy (AOR: 1.964) among mothers from low socio economic status (AOR: 1.651), Biological factors associated were low Gestational age (AOR: 2.594), No ANC registration (AOR: 3.047) and Low birth weight (AOR: 1.771). Cultural factors associated were Delayed initiation of breast feeding (AOR: 2.284) and Delayed bathing (AOR: 1.383).

Conclusion: Improving female literacy and employment plays a major role in alleviating the morbidity among infants in rural areas.

1. Introduction

Today's child is tomorrow's hope, Children are precious and are crown jewels not only of the family but also of nation. Their development is also the development of the nation as a whole. As the saying goes, home is the first school for the child and mother is the first teacher, hence the cultural and behavioural practices of the parents are passed on to their progeny. Globally, over five lakh newborns die of serious infections and majority of these deaths occur in developing countries as compared to developed countries.¹ The mortality and morbidity among infants and mothers can be controlled by skilled attendants and skilled care. Accessibility to quality health care during ante and postnatal care is crucial to reducing these.¹ More than 98% of neonatal deaths occur in

developing countries, their major cause being infections accounting for 37%, followed by birth asphyxia and congenital anomalies.² Morbidities during infancy have a deadly effect on growth and development among infants. Globally, more than 0.5 million newborns die a year due to morbidities during neonatal period and 9 to 10 million under-five die yearly.^{3,4} Longitudinal studies are more advantageous since it is useful to observe the morbidity pattern of infants over a duration of time.⁵ Environmental factors have a major role as compared to biological factors in influencing the morbidity of infants. But no such studies have been carried out in India to assess the effect of all the factors together on morbidity among infants.

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2. Methodology

This was a Observational, descriptive study adopting longitudinal study design carried out in rural area of Belagavi district. Babies born during study period in the all three Primary Health Centers which fit the inclusion criteria were enrolled in the study. Only the infants who were followed till the completion of 1 year were taken for analysis. Considering annual birth rate of May 19, 1000/year as per the SRS data, approximately 160 babies (subtracting 15% attrition) were born per months in our study area. Sample size was calculated using the formula: $N = (Z_{1-\alpha})^2 \times pq/d^2$ Prevalence of ARI (p): 28.8. Prevalence of normal health(q): 100-p: 71.2 Standard Normal variate ($Z_{1-\alpha}$):1.96, Tolerable error (d):3%. Sample required, $n = [(1.96)^2 \times 28.8 \times 71.2]/3^2 = 875.27 = 875$. Adding 10% attrition rate. Sample Size = 963.

963 babies born were selected using random number table and followed up from birth till 1 year at a interval of 1month. The infants born were numbered in 3 digits starting from 001 to 244 who fit into inclusion criteria. A three digit random number was generated from random number table and followed column wise till the desired enrollment. The number greater than 244 was skipped. Every month Random number table was used for enrollment of babies till we got the desired number i.e 963. The enrollment was continued till the subsequent month.

2.1. Inclusion criteria

Singleton live born babies. Whose weight at birth was recorded and is more than 1500 gms, with no congenital abnormalities and mothers have been residing in PHC areas for at least 6 months, before the commencement of study; Infants available for study from birth till 1 year.

2.2. Exclusion criteria

Were Multiple births and Home deliveries.

Detailed information like types of morbidities, duration of morbidities were collected using detailed interview technique. Questionnaire was used to collect data pertaining to socio demographic and obstetric history whereas interview schedule was used to obtain data pertaining to feeding practices, morbidities and cultural practices. The baseline data was collected within first week of the birth. Every neonate enrolled were followed up at monthly intervals till the child completes 1 year. During the follow up visits, data regarding infants feeding and cultural practices, morbidity in the earlier month and immunization were obtained. Anganwadi workers were trained to collect the data.

The results were presented with appropriate tables, graphs and narrative forms. Descriptive and inferential statistics were used for analysis of data. Descriptive statistics used were frequency, mean, standard deviation, percentage, median and range. Inferential statistics used for analysis were Chi square test, Z scores, correlation and binary logistic regression models. Logistic regression model was used to check the relationship of socio demographic, maternal and cultural factors affecting morbidity. Odds ratio and P value was used to check the association. P value < 0.05 was considered significant.

Ethical clearance was obtained from Institutional Ethical Committee of KLE University Belgavi before the commencement of research. Informed consent was obtained from the study participants.

3. Results

A total of 962 new born were enrolled in our study. 37 infants were loss to follow up, whereas a total of 925 infants were followed for 1 year duration. 925 infants enrolled were analyzed as per the objectives. Out of 925 mothers, majority of the mothers belonged to age group of 19–30 years. Teenage pregnancy was seen among 4% of mothers. Mean Age of the Mothers was 24.76 ± 3.914 . As per the age at first pregnancy, 24 of them had first pregnancy before the age of 18yrs, whereas 72% had

pregnancy during the 19–20 years.

In our study majority of mothers were house wives (62%) and 25% of Mothers worked as cooli.16% of the mothers were illiterate whereas 41.6% of mothers had completed secondary education. The mean age of father was 29.43 ± 3.363 . Around 34% of fathers worked on daily wages while 30% of them practiced farming.

51% were Hindu followed by Muslim comprising 32%. According to the family size, 53% of the family had more than 6 members in the family, whereas 42 families had 1 to 3 members. In our study majority of the family belonged to class III socio economic status comprising 40% followed by class II 32%. About 48% infants belonged to third generation family whereas 37% of infants belonged to nuclear family. Only 15% belonged to joint family.

95% of women had ANC registered. 52% of women had 4 to 6 ANC visit and 26% of women had more than 6 ANC visits. 61% of women had consumed 100 to 200 IFA tablets during ANC and 86% of women had received the appropriate doses of Tetanus injections.76% of infants were born through vaginal delivery and 24% of infants were born through caesarean section.

Out of 925 infants 54% were male. All the infants were given neonatal vaccinations like OPV, BCG and Hep B at birth. 21% of infants were born without proper birth spacing of 2 years, whereas 76% of infants were born with proper birth spacing of 2–5 years. Majority 53% of infants belonged to more than third birth order. 6% of infants birth weight was between 1800 and 2000 gms and 11% of infants birth weight was between 2100 and 2400 gms. The mean birth weight of infants being 2.85 ± 0.365 .

79% of infants were started with breast feeding within 30 min of birth. 7% of women stated feeding between 31 and 60 min of time, whereas 14% infants initiated breast feeding after 8 h of birth. Colostrum was given to 96% infants. Prolactal feeds was given among 15% of infants. 88% of mothers followed demand feeding whereas 4% were exclusively breast feed for less than 3 months. 85% of infants were exclusively breast fed for 6 months and more.

The total numbers of episodes of morbidities during first year of life were 13120. The incidence rate of morbidities during 1st year of life was 14.18 episodes per child-year during the 1st year of life. Our study revealed incidence of ARI being 3.21/infant year. Diarrhea incidence being 2.88/infant year, fever incidence being 2.54/infant year. The incidence of ARI was slightly more (1.73 episodes per infant) during second six months of life. The incidence of Diarrhea was drastically increased during second six months of life (2.09 episodes per infant) as compared to 0.9 episodes per infant during first six month of life this can be attributed to poor feeding practices.

The incidence of fever was also slightly more during second six months of life. The incidence of fever during second six months of life was 1.34 episodes per infant, more as compared during first six months of life. The incidence of other morbidities like otitis media, conjunctivitis, acute rhinitis and other infection were decreased during second six months of life. The incidence being 0.34, 0.34, 0.21 and 0.03 episodes per infant respectively (Fig. 1).

3.1. Socio-demographic profile affecting morbidity among infants

As per the socio-demographic profile the factors that were significantly associated with ARI were mothers occupation ($p = 0.015$), Educational status of mothers ($p = 0.004$), and socio economic status ($p = 0.001$). The factors significantly associated with incidence of diarrhea were religion ($p = 0.009$) and socio economic status ($p = 0.006$). The factors significantly associated with fever were mothers occupation ($p = 0.012$), mothers education ($p = 0.001$) and fathers education ($p = 0.033$) (Table 1).

3.2. Biological factors affecting morbidity among infants

As per the biological profile, the factors that were significantly

Fig. 1. Diagram representing the incidence of morbidities among infants.

Table 1

Socio demographic, biological and cultural factors associated with morbidity among infants.

Variable	ARI Episodes	Diarrhea Episodes	Fever Episodes
Mothers Occupation			
Housewife N = 606	168	77	322
Working N = 319	67	50	144
χ^2 , Df, P, OR	4.979, 1, 0.015, 1.320	1.554, 1, 0.126, 1.035	5.343, 1, 0.012, 1.177
Mother Education			
Illiterate N = 150	24	25	57
Literate N = 775	211	102	366
χ^2 , Df, P, OR	8.357, 1, 0.004, 1.964	1.304, 1, 0.156, 1.266	10.973, 1, 0.001, 1.823
Fathers Education			
Illiterate N = 140	43	16	81
Literate N = 785	192	111	385
χ^2 , Df, P, OR	2.453, 1, 0.074, 1.256	0.738, 1, 0.237, 1.276	3.691, 1, 0.033, 1.180
Socio- Economic Status			
Class III, IV and V N = 376	75	65	181
Class I and II N = 549	160	62	285
χ^2 , Df, P, OR	9.961, 1, 0.001, 1.651	6.769, 1, 0.006, 1.531	1.272, 1, 0.144, 1.163
Gestational Week			
≤37 Weeks N = 182	88	23	79
>37 Weeks N = 743	197	104	367
χ^2 , Df, P, OR	32.70, 1, <0.001, 2.594	0.228, 1, 0.366, 1.125	4.406, 1, 0.022, 1.417
IFA tablets			
<100 tablets N = 370	282	118	191
χ^2 , Df, P, OR	220.76, 1, <0.001, 8.89	45.413, 1, <0.001, 2.996	29.526, 1, <0.001, 2.09
Sex			
Male N = 502	229	169	260
Female N = 423	106	108	206
χ^2 , Df, P, OR	42.00, 1, <0.001, 2.508	7.23, 1, 0.007, 1.48	0.879, 1, 0.192, 1.064
Birth Weight			
<2500 gms N = 156	27	16	65
χ^2 , Df, P, OR	6.493, 1, 0.006, 1.771	1.911, 1, 0.102, 1.476	5.697, 1, 0.011, 1.526
Umbilical oil application			
Yes N = 245	73	24	136
χ^2 , Df, P, OR	3.390, 1, 0.041, 1.251	4.354, 1, 0.022, 1.644	3.511, 1, 0.036, 1.144

associated with ARI were Gestational week ($p < 0.001$), Birth order ($p = 0.03$), consumption of IFA tablets ($p < 0.001$), Sex of the new born ($p < 0.001$) and birth weight ($p = 0.006$). The factors significantly associated with incidence of diarrhea were type of delivery ($p = 0.02$), ANC registration ($p = 0.05$), Consumption of IFA tablets ($p < 0.001$) and Sex of newborn ($p = 0.007$). The factors significantly associated with incidence of fever were weeks of gestation ($p = 0.022$), Consumption of IFA tablets ($p < 0.001$) and birth weight ($p = 0.011$) (Table 1).

3.3. Impact of cultural factors on morbidity among infants

As per the cultural and feeding factors that were significantly associated with ARI were initiation of breast feeding ($p = 0.016$), application of oil to umbilicus ($p = 0.041$), bathing within 24 h of birth ($p = 0.048$), and application of black carbon to inner canthus ($p = 0.041$). The factors significantly associated with incidence of diarrhea were application of oil to umbilicus ($p = 0.022$) and application of black carbon to inner canthus ($p = 0.022$). The factors significantly associated with incidence

of fever were application of oil to umbilicus ($p = 0.036$), bathing within 24 h of birth ($p = 0.022$) and application of black carbon to inner canthus ($p = 0.036$) and depositing of oil drops into ears ($p = 0.048$) (Table 1).

4. Discussion

Infancy is an important stage in childhood growth and development, and numerous landmark programmes have been set in place to improve their survival and growth. Some of the major programmes include Reproductive, Maternal, Newborn Child and Adolescent Health (RMNCH + A) strategy, National Health Mission (NHM) and ICDS (Integrated Child Development Services). NHM program focuses on the provision of resources for newborn's health, whereas RMNCH + A and ICDS are devoted to the continuation of the care model to health and nutritional status of infants, children and adolescents. Morbidities like ARI, Diarrhea and fever have a serious effect on the infant's nutritional status and development leading to reduced appetite, underweight, stunting and wasting. Diarrhea is significantly associated with underweight and ARI has a chronic impact on stunting among children.

The study revealed that the incidence of Diarrhea increased steadily during the second half of infancy, and ARI and fever were high during the neonatal period and the first six months of life. Our results are similar to a study in rural areas of Jammu, where the incidence of ARI and Diarrhea was the same compared to fever.⁸ In various studies in Guntur and south India, the incidence of morbidities like ARI and Diarrhea was more common during the second six months of life.^{7,8} The increased incidence of morbidities during the second six months of life may be attributed to faulty feeding practices like inappropriate exclusive breast feeding, improper weaning and cultural practices leading to malnutrition and increased morbidities.⁹

The cultural and feeding factors that were significantly associated were initiation of breastfeeding, application of oil to umbilicus, bathing within 24 h of birth, and application of black carbon to inner canthus. A study in Jammu revealed that the annual incidence of morbidity was 4.6/child -year. The incidence was more of ARI and Diarrhea and was more associated with the female sex, malnourishment and infancy. No association was seen with parental literacy status.⁷ A longitudinal study in Guntur showed that morbidities were more during the second six months of infancy as compared to the first six months. The incidence of morbidities was significantly associated with poor feeding practices.⁸

Breastfeeding had a protective effect on the incidence of morbidity among infants. Lower odds ratio of morbidities was seen among the infants who were exclusively breastfed. Income was not associated with the incidence of morbidities. Infants with siblings had significantly increased incidence of morbidities as compared with those with no siblings.⁹ A longitudinal study in Dundee revealed that the infants who were breastfed for 13 weeks or more had less incidence of morbidity as compared to those who were breastfed for less than 13 weeks.¹⁰ Another longitudinal study on the effect of feeding practices on infant's health showed that the factors significantly associated with the infant's health and the incidence of morbidities were inappropriate exclusive breast-feeding and sanitation. Introduction of water during the first six months was also significantly associated with increased incidence of morbidities.¹¹

Longitudinal studies in Delhi and south India among infants revealed that the morbidity rate was low during the first six months as compared to the next six months. There was positive correlation among socio-economic status, literacy rate and the sex of the infants.^{2,3,12,13} Longitudinal studies in semi-urban areas and the Safdurjung Hospital in New Delhi and Hadassah Hospital in Jerusalem revealed that morbidity was more during the first half of infancy than in the second half. The majority of illnesses were due to RTI and diarrhea. The incidence was found to decrease with rise in family income and proper feeding practices.^{14,15,16}

A longitudinal study in Aligarh among infants to study the morbidity pattern and feeding practices showed that top-fed infants had more

incidence of RTI, diarrhea, severe malnutrition, anemia and Vitamin A deficiency. The incidence of RTI among artificially fed infants showed an abrupt increase after six months of age.^{17,18} A prospective study at Vajira Hospital in Thailand revealed that iron-deficiency anemia was significantly higher among formula-fed infants.^{19,20}

A one-year longitudinal study conducted among Malawian infants during March 2006 with monthly visits to assess morbidity and growth parameters revealed that the infants with early complementary feeding were significantly associated with increased risk of RTI.^{21,22} A cross-sectional study on infant feeding and rearing practices among rural and urban infants of Jammu including various faulty feeding practices showed delayed initiation of breastfeeding, administration of prelacteal feeds and early weaning practices. All these factors contribute to an increased incidence of diarrhea and vomiting.^{23,24}

Faulty feeding practices were seen in a study carried out in the rural areas of Pondicherry and Jammu on infant feeding and rearing practices. These included delayed initiation of breast feed, and rearing practices like instillation of oil into eyes, nose, ears and mouth which led to morbidity among infants. Diarrhea and vomiting occurred with greater frequency among the top-fed infants.^{6,26}

5. Conclusion

The incidence of ARI, Diarrhea and fever among infants in our study was quite less as compared to the national figures of these morbidities among under five children. Morbidities were significantly high during second six month of life due to inappropriate feeding practices. Improving female literacy and employment plays a major role in alleviating the morbidity.

Declarations

Funding

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Ethical approval

Obtained.

Declaration of competing interest

None.

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