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CLINICO-EPIDEMIOLOGICAL, NUTRITIONAL AND MORBIDITY PROFILE OF HOSPITALIZED INFANTS 1-6 MONTHS OF AGE AT TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT **INTRODUCTION-**Early infancy represents a period of transition from neonatal life to childhood during which there is rapid growth, neurological and immunological development and changes in the mode of feeding. Nutrition programs and surveys have traditionally excluded infants under 6 months of age because adequate nutrition is assumed to be ensured by breastfeeding. **METHODOLOGY-** Hospital-based prospective observational study conducted from October2018 to September 2019 which included 342 infants between 1 to 6 months of age group admitted at our hospital. Socio-demographic profile, clinical history, nutritional assessment, general physical and systemic examination and morbidity profile were recorded and analysed statistically. **RESULTS-**Out of 342 infants, 224 (65.5%) infants were between 1-3 months of age and 118(34.5%) infants were greater than 3 months of age. Male:Female ratio was 1.86:1.Most common causes of morbidities were pneumonia (20.3%), severe acute malnutrition (16.0%), diarrhoea (14.3%), bronchiolitis (7.6%) and congenital heart disease (6.4%). **CONCLUSION-** Study concluded that Infant's nutritional status was found to be significantly associated with mother's nutritional status. Morbidities like Pneumonia, diarrhoea, Bronchiolitis, under nutrition in the present study was very common in infants upto 6 month of age. Community health workers should be trained adequately so that they are able to pick up signs of illness and encourage people in the community to seek treatment.

KEYWORDS : infancy, morbidity, Pneumonia, Bronchiolitis, Diarrhoea

INTRODUCTION

Infants constitute 2.92 percent of the population of India [1]. Early infancy represents a period of transition from neonatal life to childhood during which there is rapid growth, neurological and immunological development and changes in the mode of feeding. Any adverse influences during this period may result in severe limitations in their development. Nutritional programs and surveys have traditionally excluded infants under 6 months of age because adequate nutrition is assumed to be ensured by breastfeeding.[2,3] However, there is increasing recognition that malnutrition occurs before age 6 months and is associated with mortality.[4] 30% of infants at the time of birth are of Low Birth Weight (below 2.5 kg) out of which 1/3rd of them are premature (less than 37 weeks) and 2/3rd of them are IUGR. These low birth weight babies are more prone to malnutrition and various health problems like infections in the infancy period.[5]Prevalence, severity and frequency of morbidity due to infections depend upon infant and young child feeding and caring practices, nutritional status of the child and environmental hygiene. Effect of morbidity on nutritional status depends upon severity and duration of infection, health care provided, feeding during illness and convalescence.[6]Optimal infant and young child-feeding (IYCF) practice are crucial for nutritional status, growth, development and health of the infant.[7] Breast milk is an important source of energy and nutrition for infants and it provides immunity to fight against illness and reduce mortality. Exclusive breast feeding for six months is an essential component for growth and development of the infant.[8]

This study was planned to assess the clinico-epidemiological, nutritional and morbidity profile of hospitalized infants in 1-6 months age group at tertiary care centre in Southern Rajasthan. Keeping in mind an aim that the study will enable policymakers to design suitable interventions and to provide suggestions for measures that can be instituted to alleviate the observed problems.

MATERIALAND METHODS

This study was a hospital-based prospective observational study, carried out in Department of Paediatrics, Balchikitsalaya, MB Govt. Hospital, RNT Medical College, Udaipur, (Rajasthan) over a period of 12 months from October 2018 to September 2019.Prior approvel from Institutional Ethics Committee was obtained. All the infants of 1-6 months age group, admitted in BalChikitsalaya, MB Hospital, RNT Medical College, Udaipur, and their parents gave written informed consent, were enrolled for the study.

Infants whose parents/caregiver refuse to give consent excluded from study. Information regarding infant's bio data, socio economic status by modified Kuppuswamy Classification January 2018 , details of parents, child caring practices, parental characteristic and nutritional status(BMI) , environmental conditions etc. were collected. Thereafter detailed clinical history, nutritional assessment, general physical and systemic examination was done. Nutritional assessment was done by anthropometric measurements and physical signs of wasting and pedal oedema.The anthropometric measurements were interpreted as per WHO Growth charts for the age & sex and nutritional status was classified .Morbidity profile were recorded as per clinical history, examination and laboratory findings/investigations.The collected data were entered in Microsoft Excel and then analyzed and statistically evaluated using SPSS-PC-21 version.Quantitative data were expressed by mean and standard deviation while qualitative data were expressed in percentage. Difference between the proportions were tested by Chi Square test or Fisher's exact test. 'P' value less than 0.05 was considered statistically significant.

RESULTS

A total of 342 infants of age group 1-6 months included, There were 224 (65.5%) males and 118 (34.5%) females infants exhibiting sex ratio of 1.89:1(Table-I). Out of 342 infants, 222 (64.9%) infants were between 1-3 months of age and 120(35.1%) infants were greater than 3 months of age.

Table I: Gender wise distribution of hospitalized infants

Gender	No.	%
Male	224	65.5
Female	118	34.5

Immunization of 112 (32.8%) infants was incomplete upto the age while in 229 (66.9%) infants it was complete upto the age.(Table-II)

Table II: Immunization status in hospitalized infants

Immunization status	No.	%
Complete	229	66.9
Incomplete	112	32.8
Unimmunized	1	0.3

Severe wasting was seen in 58 (16.9%) infants admitted in our hospital

while severe stunting was seen in 64 (18.6%) infants. More than one third (36.5%) infants were severe underweight.(Table-III)

Table III: Nutritional status of hospitalized infants

Nutritional status	Number	%
Weight for age (Underweight)		
<-3 SD	125	36.5
<-3 SD to <-2 SD	133	38.9
<-1 SD to +1SD	84	24.6
Length for age (Stunting)		
<-3 SD	64	18.7
<-3 SD to <-2 SD	83	24.3
<-1 SD to +1SD	195	57.0
Weight for Height (Wasting)		
<-3 SD	58	16.9
<-3 SD to <-2 SD	116	33.9
<-1 SD to +1SD	168	49.1

Most common presenting symptom was fever (48.5%) followed by cough/cold (30.7%), difficulty in breathing (28.4%), loose stool (25.1%), vomiting (24.6%), abnormal body movement (12.3%) and refusal to feed (8.8%). Other symptoms were not gaining weight (2.3%), rapid breathing (1.7%), swelling in face/neck/thigh (1.2%) etc.(Table-IV)

Table IV: Presenting symptoms in hospitalized infants

Presenting symptoms	No.	%
Fever	166	48.5
Loose stool	86	25.1
Vomiting	84	24.6
Abnormal body movement	42	12.3
Cough/cold	105	30.7
Refusal to feed	30	8.8
Difficulty in breathing	97	28.4
Rapid breathing	6	1.7
Not gaining weight	8	2.3
Swelling in face/neck/thigh	4	1.2
Abdominal distension	2	0.6
Larger head	2	0.6
Umbilical discharge	1	0.3

On general physical examination pallor was present in 62 (18.1%) infants, cyanosis in 21 (6.1%), jaundice in 4 (1.2%) and oedema in 1 (0.3%) infants. Visible wasting was observed in 46 (13.4%) infants.(Table-V)

Table V: General physical examination finding in hospitalized infants

General physical examination	No.	%
Pallor	62	18.1
Cyanosis	21	6.1
Jaundice	4	1.2
Oedema	1	0.3
Visible wasting	46	13.4

Most common cause of morbidity in infant 1-6 month of age was pneumonia (20.5%) followed by severe acute malnutrition (16.1%), diarrhoea (14.6%), bronchiolitis (7.6%) and congenital heart disease (6.4%). Other important causes of admission were septicaemia (4.7%), hypocalcemic convulsion (4.1%), malaria (3.8%) and failure to thrive (3.2%).(Table-VI)

Table VI: Final diagnosis in hospitalized infants

Final diagnosis	No.	%
Pneumonia	70	20.5
Acute Diarrhoea/vomiting	50	14.6
Acute bacterial meningitis	7	2.0
Septicaemia	16	4.7
Septicaemia with DIC	3	0.9
CHD	22	6.4
Malaria	13	3.8
Failure to Thrive	11	3.2
Hypo calcaemic convulsion	14	4.1
ICH	9	2.6
Bronchiolitis	26	7.6
SAM	55	16.1
Wheeze associated respiratory infection	5	1.5
URTI/LRTI	9	2.6
UTI	4	1.2
Cellulitis	2	0.6
Seizure disorder	7	2.0
Abscess	1	0.3
Breath holding spell	1	0.3
Cholestatic jaundice	1	0.3
Hydrocephalus	4	1.2
Late onset HDN	2	0.6
Cleft lip/palate	1	0.3
Laryngomalacia	1	0.3
Simple febrile convulsion	2	0.6
Galactosemia	1	0.3
Pertusoid cough	1	0.3
Fever without focus	2	0.6
Sabacute intestinal obstruction	1	0.3

Association between mother's nutritional status with weight for age (underweight). Percentage of underweight babies were higher if mother was also underweight (62.9%) compare to if mother's nutritional status was normal (27.9%). This association was found to be statistically significant (p<0.01)(Table-VII)

Table VII: Association of Mothers nutritional status with weight for age (underweight)

weight for age for infant	Underweight		Normal		Overweight		p-value1
	No.	%	No.	%	No.	%	
<-3 SD	56	62.9	70	27.9	0	0.0	<0.01
<-3 SD to <-2 SD	25	28.1	106	42.2	1	50.0	
<-1 SD to +1SD	8	9.0	75	29.9	1	50.0	

The association between mother's nutritional status with length for age (stunting). Percentage of stunted babies were higher if mother was also underweight (57.3%) compare to if mother's nutritional status was normal (5.2%). This association was found to be statistically significant (p<0.01).(Table-VIII)

Table VIII: Association of Mothers nutritional status with length for age (stunting)

Length for age of infant	Underweight		Normal		Overweight		p-value1
	No.	%	No.	%	No.	%	
<-3 SD	51	57.3	13	5.2	0	0.0	<0.01
<-3 SD to <-2 SD	12	13.5	71	28.3	0	0.0	
<-1 SD to +1SD	26	29.2	167	66.5	2	100.0	

The association between mother's nutritional status with weight for height (wasting). Percentage of wasting in babies were higher if mother was also underweight (37.1%) compare to if mother's nutritional status was normal (10.0%). This association was also found to be statistically significant (p<0.01). (Table-IX)

Table IX: Association of Mothers nutritional status with weight for height (wasting)

Weight for height	Underweight		Normal		Overweight		p-value
	No.	%	No.	%	No.	%	
<-3 SD	33	37.1	25	10.0	0	0.0	<0.01
<-3 SD to <-2 SD	30	33.7	86	34.3	0	0.0	
<1 SD to +1SD	26	29.2	140	55.8	2	100.0	

DISCUSSION

This study only analyzed hospital admissions, which did not include children seen in the emergency and outpatients department (OPD). Out of 342 infants, 224 (65.5%) infants were males and 118 (34.5%) were females infants exhibiting sex ratio of 1.89:1. There were 222 (64.9%) infants between 1-3 months of age and 120(35.1%) infants were greater than 3 months of age. Higher morbidity rate among males babies is explained by the known fact that they are biologically weaker than female babies. Studies have found that sons are preferred over daughters for a number of economic, social and religious reasons (perceived greater economic, social, and religious utility of sons than of daughters), including financial support, old age security, property inheritance, dowry, family lineage, prestige and power, birth and death rituals, and beliefs about religious duties and salvation.[9-13] Out of 342 infants, 90 were low birth weight (26.3%) and out of them 3 (0.9%) were less than 1.5 kgs at birth. Birth weight have influence on the nutritional status of an infant as shown in previous studies.[14]In another study in Bangladesh have shown that the prevalence of malnutrition

was markedly higher in children with LBW than those with normal birth-weights.[15]

Severe wasting was seen in 58 (16.9%) infants admitted in our hospital while severe stunting was seen in 64 (18.6%) infants. More than one third (36.5%) infants were underweight. In our study, 36.5% infants were found to be underweight while in study by Biswas B et al[16], 30.6% of the children were found to be underweight. Finding of our study was similar to NFHS 3[17] data [38.7%], and studies[18,19] but it was higher than NFHS 4.[20,21] Malnutrition causes children to have defective cell-mediated immunity secondary to thymolymphatic depletion leading to Gram-negative bacterial infections and sepsis. There may also be qualitatively deficient immunoglobulins and impairment of leukocytic enzymes involved in the bactericidal activity. As the secretory IgA is generally reduced, the recovery from infections is delayed and infections tend to be severe in malnourished subjects. The period of infection is prolonged. Because of increased duration of replication and shedding of pathogens, the systemic spread is also more likely.[22] Also, the skin and mucous membranes do not offer effective physical barriers against infection. Malnutrition is invariably associated with deficiency of vitamins like A, B and D. Vitamin A is mainly necessary for maintaining the integrity of the epithelial cells, deficiency of vitamin D may lead to deformity in the thoracic cavity which predisposes for ALRI.[23]Severe acute malnutrition was found in 16% of cases in our study.

Most common symptom in infants was fever (48.5%) followed by cough/cold (30.7%), difficulty in breathing (28.4%), loose stool (25.1%), vomiting (24.6%), abnormal body movement (12.3%) and refusal to feed (8.8%). Other symptoms were not gaining weight (2.3%), rapid breathing (1.7%), swelling in face/neck/thigh (1.2%) etc.Batista NOW et al[24] also found cough as most common presenting symptom in infant between 1 to 6 month of age group.

Most common morbidity in infant 1-6 month of age was pneumonia (20.5%) followed by severe acute malnutrition (16.1%), diarrhoea (14.6%), bronchiolitis (7.6%) and congenital heart disease (6.94%). Other important causes of admission were septicaemia (4.7%), hypocalcemic convulsion (4.1%), malaria (3.8%) and failure to thrive (3.2%). The commonest morbidity seen in the study by Joseph N et al[25] was RTI followed by diarrhoea. While Studies conducted in Malawi and Alexandria reported diarrhoea as commonest morbidities in their infants, diarrhoea.[26,27] Alexandria study also found skin and eye infection to be the next most common ailments. This variation with the present study may be due to the difference in study settings and varying local environments. In study by Joseph N et al[25], there were 4 (2.1%) newborns with congenital anomalies of which 2 had consanguineous parents. Two other studies conducted in South India also reported that congenital malformations were significantly higher in their study among offsprings born to consanguineous mothers.[28,29] .In study by ShaliniS et al[30] from Uttar Pradesh, ARI was found to be the most frequent morbidity 43.4%, followed by Diarrheal diseases 16.8% but this study was also conducted in under five year of age group. As Earlier studies from India have shown that diarrhoea and acute respiratory infections are the most important reasons for utilization of paediatric emergency services at a primary as well as a tertiary care hospital,[31-34] similar are the findings of our study but in contrast to these studies though the most important causes of morbidity turn out to be pneumonia and ADD but the morbidity due to ARI is quite more 20.3% of all the infant admissions. Similar to our study, Batista NOW et al[24] also found pneumonia as most common diagnosis in infant admitted between 1 to 6 month of age group. Congenital heart disease was observed in 6.4% cases. In study by QuaziM et al[35] from Jammu & Kashmir, 5552 neonates admitted during the study period out of which 68 were found to have CHD. The prevalence was 12.24 per 1000 admitted neonates. Study conducted by Sawant SP from Mumbai showed a prevalence of 13.28 per 1,000 live births quite near to our study.[36] Studies conducted by Bhat NK from Uttarakhand, India and Kapoor R from Kanpur India showed a prevalence of 8.54% per 1,000 and 26.4% per 1000 patients respectively.[37,38] Percentage of wasting in babies were higher if mother was also underweight (37.1%) compare to if mother's nutritional status was normal (10.0%). This association was also found to be statistically significant ($p<0.01$).Percentage of stunted babies were higher if mother was also underweight (57.3%) compare to if mother's nutritional status was normal (5.2%). This association was found to be statistically significant ($p<0.01$).Percentage of underweight babies were higher if mother was also underweight (62.9%) compare to if mother's nutritional status was normal (27.9%). This association was found to be statistically significant ($p<0.01$). Finding of our study was also consistent with the study by Kumar L et al[39].

Though immunization prevents the infectious diseases as the child grows but in this study the infants who received up to date immunization did better. Death was significantly higher in infants with incomplete immunization (22.1%) compare to those with complete immunization (9.6%). This might be due to the fact that the immunization presents the opportunity to the health care giver to assess the baby and if baby is lagging behind in any domain they can start intervention before it is too late. Another study by Vyas S et al[40] reported that morbidity was found to be higher (75%) in children who were unimmunized as compared to those who were fully immunized (48.8%) as the unimmunized children are at risk of developing these infections but this study was conducted in children 0 to 3 year of age group. Similarly, a significant association was found between ARI and Immunization by Pore at Solapur which was conducted on children under five years.[38]

CONCLUSION

This study concluded that as mother's nutritional status was associated with infants nutritional status, focus on mother's nutritional status during ANC and postnatal period is vital for infant's proper nutrition. Immunization status and adequate breast feeding are also very important in prevention of morbidity and mortality in infant upto 6 month of age so health education should be given to caregiver regarding these. Community health workers should also be trained adequately so that they are able to pick up signs of illness and encourage people in the community to seek treatment. Micronutrient supplementation, immunization of infants and health education of the caregivers through simple health packages would go a long way in alleviating the co-morbidities.

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