Research Paper

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A Follow up Study of Nutritional Status Along With Morbidity, Mortality and Immunization Status Among Registered Neonates up to 12 Months of age in Jodhpur, A Desert District of Rajasthan

Medical Science

KEYWORDS : Morbidity, mortality, underweight, Wasting, infant

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ABSTRACT

Objective: Estimation of nutritional status, morbidity, mortality, immunization and their causes, in children

Method: Earlier registered 283 neonates followed up monthly up to 12 months and clinically examined for morbidity, mortality, nutritional status and immunization

Results: Overall underweight was significantly higher in boys (Mean 36.3%) than girls, found maximum at 10 months (37.5%). Stunting showed an inclining trend from 1 month (17.7%) up to 3rd month (27.2%) and found higher in boys (Mean 23.9%) than girls.Wasting showed an inclining trend from 1 month (22.1%) upto 11 months (32.9%). Overall wasting was higher in boys (Mean 29.1%) than girls. Main morbidities observed were fever, ARI, GIT, Eye, Ear Disease and skin infection. All morbidities showed inclining trend from 1 month upto12 months. Discoloration of hair, Vitamin A deficiency i.e. Bitot spot and Vitamin B complex deficiency i.e. Angular stomatitis and Glossitis found 8th month onward. Immunization is also low i.e. compliance of 1st, 2nd and 3rd dose of DPT was 57 to 66 percent.

Conclusion: Long term, short term malnutrition, morbidities, nutritional deficiencies observed high and inclined with age which needs attention. Immunization is low. Intervention plan should be made to facilitate State Health Department Functionaries for management of malnutrition.

Introduction

Malnutrition is a burning problem among infants in developing countries. In desert areas of Rajasthan deep routed traditions pass from generation to generations and prevent their rational thinking which directly or indirectly influences their nutritional status. In addition to this, harsh climate of desert area viz. low-rainfall, extremes of temperature, high intensity of UV rays, scorching sun-light andfrequent occurrence of drought affects their agriculture, economy which in turn affects their health and nutrition status of rural population especially infants and children. Breast Feeding and Weaning Practices have a major effect on short term and long term nutritional status of infants [1].

With over 25 million births every year India has the difficult task of caring for the highest number of new born of infants than any other country in the world. At present 1.3 million of them die before completing four weeks of life [2]. The challenge of preventing this high toll of lives has been the focus of major initiatives by the Government of India and the Health Profession in the recent years.

Protein energy malnutrition is still a major cause of health problems in infants in developing countries, despite the decrease in its prevalence in recent years. At hospital level, the rate of malnutrition has been still around 40% in the last decades, significantly contributing to the increase in child mortality. Breast milk, mainly through its anti-infectious and nutritional values is thought to protect the nutritional status of infants from infectious diseases such as Diarrhea and pneumonia. In children who are no longer breastfed or are only partially breastfed, relactation is possible if the mother is made aware of its importance and is well supported [3]. In the developing world, major pediatric illness are fever, diarrheal and respiratory illness which are also affects infant and child mortality rates in developing countries.

However such information is lacking from desert part of Rajasthan where conditions are very harsh, demanding a great amount of work to be done. So far very few longitudinal studies available from this part of the country [4] and other studies also reported that nutritional status of under five children is poor and suffer from childhood illnesses and feeding practices are also traditional which needs attention [5-8]. This study is a continuation of earlier study on neonates with main aim to follow up the earlier registered neonates up to twelve months in order to study the trend of extant of malnutrition i.e. Nutritional status along with morbidity and mortality, immunization and feeding practices in desert area of Rajasthan.

Material and Methods

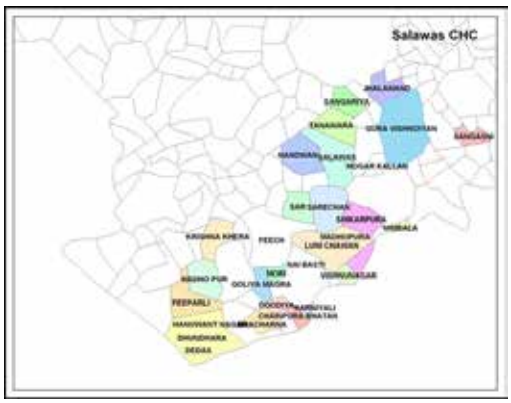
Study design: The study carried out in the rural areas of Jodhpur district. One CHC from Jodhpur district namely Luni was selected randomly and villages in that CHC were selected systematically.

This is a longitudinal study in continuation of the earlier Neonate Project study in desert areas which have been carried out on earlier registered 300 neonates from 28 villages belonging to Luni Panchayat Samitiof Jodhpur District [4]. Out of 300 neonates registered earlier, 7died up to the age of one month and 10 were not available/ not co-operated. In the present study, these neonates were followed up to 12 months (infant) of age group at the interval of one month.The details of the baby were obtained from the mother who was respondent for filling up the schedule (Fig. 1).

All the subjects were examined clinically for morbidity, mortality, immunization, and nutritional status from one month up to 12 months at interval of month. Information regarding mortality along with clinical examinations for morbidities viz. Fever, Acute Respiratory infection (ARI), Gastroenterological (GIT), Eye and Ear diseases along with nutritional deficiency signs and socio- cultural / economic causes responsible for mortality were recorded from mother of each child registered in the study. Anthropometric measurements i.e. recumbent length and Weight were taken on each child following standard techniques of WHO

[9]. The feeding practice was also collected for nutritional assessment along with immunization.

Fig. 1. Map of study villages



Results

The extent of different types of malnutrition viz. under nutrition (Weight for age), wasting (Weight for Length), stunting (Length for age) were computed by adopting standard deviation classification using WHO standards from one month to 12 months age group at interval of one month (Fig. 2-4). All the children with any of the above anthropometric measurement less than Median-2SD of WHO values were considered as undernourished.

Underweight (Weight for age) showed an inclining trend from 1 month (20.1%) up to 12 months (24.2%) and found maximum at 10 months (37.5%) (Fig. 2). Underweight both in boys and girls showed similar trend. Underweight observed significantly higher in boys than girls ($p<0.05$). The proportion of severe underweight also showed inclining trend i.e. from 4.9% (1 month) to 9.3% (11 months) and found maximum at 9 months (15.9%). The proportion of children suffering from moderate underweight category was significantly higher in boys than girls ($p<0.05$). Overall the percentage of underweight was significantly higher in boys (Mean 36.3%) than girls (Mean 26.1%) ($p<0.05$). Overall the percentage of boys suffering from moderate under nutrition was significantly higher in boys (Mean 24.1%) than girls (Mean 15.8%) whereas the percentage of severe under nutrition was also higher in boys (Mean 12.1%) than girls (Mean 10.1%) though not statistically significant.

Stunting (Recumbent Length for age) showed an inclining trend from 1 month (17.7%) up to 3rdmonth (27.2%) and then declines up to12 months of age (15.4%). Stunting was significantly higher in boys than girls ($p<0.05$). Overall the percentage of stunting was higher in boys (Mean 23.9%) than girls (Mean 15.8%) statistically significant ($p<0.05$). Overall the percentage of boys suffering from moderate stunting was significantly higher in boys (Mean 15%) than girls (Mean 10.1%) whereas the percentage of severe stunting was also higher in boys (Mean 8.9%) than girls (Mean 5.6%) though not statistically significant (Fig. 3).

Wasting (Weight for Recumbent Length) showed an inclining trend from 1 month (22.1%) up to 11 months (32.9%) whereas wasting was highest at 8 and 10 months of age (33.3%). Severe wasting also showed gradual rise from 10.4% to 20.9% (12 month) which was significantly higher in boys than girls ($p<0.05$). Overall the percentage of wasting was higher in boys (Mean 29.1%) than girls (Mean 26.2%) though statistically insignificant ($p>0.05$) (Fig. 4). Overall the percentage suffering from moderate wasting was higher in boys (Mean 16.3%) than girls (Mean 13.7%) whereas the percentage of severe wasting was similar in girls (Mean 12.5%) and boys (Mean 12.9%) (Fig. 4).

Fig. 2. Weight for age in children of one month followed up to 12months

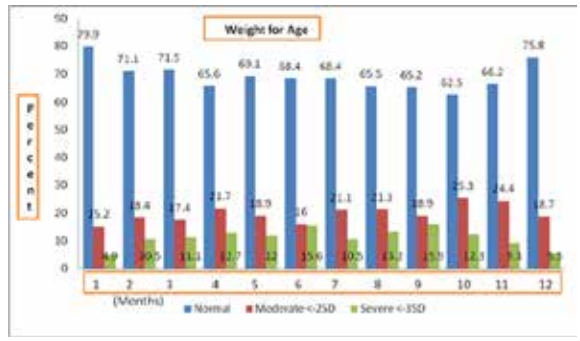


Fig. 3.Recumbent Length (Height) for age in children of one month followed up to 12months

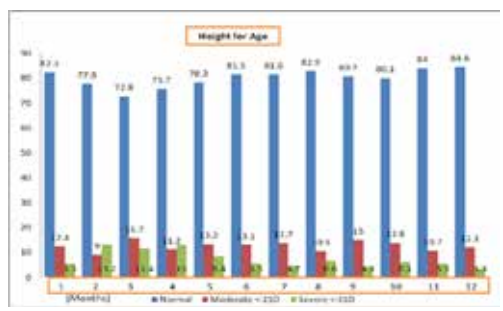
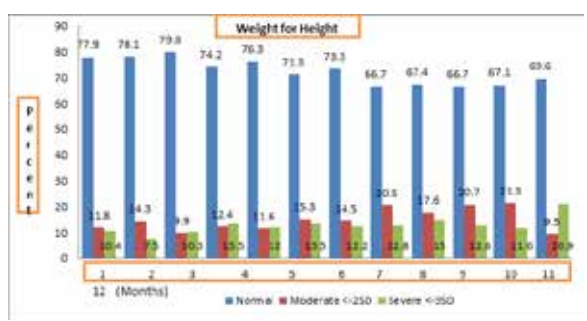


Fig. 4. Weight for Recumbent Length (Height) in children of one month followed up to 12 months



Main morbidities observed in population were fever, acute respiratory infection, gastroenterological (GIT), Eye, Ear Disease and skin infection. Fever showed inclining trend from 1 month (4.0%) up to 12 months (28.3%) both in case of boys and girls. Overall the percentage of fever was 16.6% in boys and 16.9% in girls though statistically insignificant ($p>0.05$).Gastroenterological (GIT) infection also showed inclining trend from 1 month (6.0%) up to 12 months (25.3%) both in case of boys and girls. Overall the percentage of GIT was 18.3% in boys and 18% in girls though statistically insignificant ($p>0.05$). Acute Respiratory Infection (ARI) also showed inclining trend from 1 month (6.3%) up to 12 months (31%) both in case of boys and girls. Overall the percentage of ARI was 18.9% in boys and 20.4% in girls though statistically insignificant ($p>0.05$). Eye Diseases showed gradual rise from 1 month (1.0%) up to 12 months (1.7%) both in case of boys and girls. Overall the percentage of Eye Diseases was 1.2% in boys and 1.3% in girls though statistically insignificant ($p>0.05$). Ear Diseases also showed an inclining trend from 2 months (2.7%) up to 12 months (5%) both in case of boys and girls. Overall the percentage of Ear Diseases was higher in boys i.e. 3.7% than girls (2.3%) though statistically insignificant ($p>0.05$).Skin infection showed an declining trend from 1 month

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(3.0%) up to 12 months (2.0%) both in case of boys and girls. Overall the percentage of skin infection was lower in boys i.e. 1.6% than girls (2.2%) though statistically insignificant (p>0.05). Gender difference was statistically insignificant (p>0.05) in all the morbidities (Table 1).

Table 1. Distribution of 1 month neonates followed upto 12 months according to morbidities

Morbidity		Age in months											
		1	2	3	4	5	6	7	8	9	10	11	12
N.A.D.	M	74.5	41.4	57.9	63.4	53.1	58.6	53.8	54.5	50.3	48.3	42.8	51.0
	F	78.7	49.7	51.0	60.0	47.7	52.9	54.8	54.2	49.0	42.6	37.4	45.8
	T	76.7	45.7	54.3	61.7	50.3	55.7	54.0	54.0	49.7	45.3	40.0	48.3
Fever	M	6.2	17.9	11.7	13.1	9.7	14.5	19.3	20.0	15.2	22.8	22.8	26.2
	F	1.9	21.9	14.8	13.5	10.3	20.6	11.0	14.2	16.8	25.2	23.2	30.3
	T	4.0	20.0	13.3	13.3	10.0	17.7	15.0	17.3	16.0	24.0	23.0	28.3
GIT	M	8.3	28.3	15.2	11.7	15.2	16.6	21.4	22.8	13.1	24.8	20.7	21.4
	F	3.9	19.4	12.9	11.0	14.8	25.2	16.8	16.1%	15.5	25.8	25.8	29.0
	T	6.0	23.7	14.0	11.3	15.0	21.0	19.7	19.7	14.3	25.3	23.3	25.3
ARI	M	6.9	22.8	20.0	16.6	20.0	15.2	18.6	22.1	15.2	22.1	17.2	30.3
	F	5.8	22.6	20.6	18.1	19.4	19.4	23.9	20.6	12.9	27.1	23.9	31.0
	T	6.3	22.7	20.3	17.3	19.7	17.3	21.3	21.7	14.0	24.7	20.7	31.0
Eye Disease	M	0.7	0.0	0.7	2.8	1.4	1.4	0.7	0.7	1.4	1.4	2.1	2.1
	F	1.3	0.6	0.6	0.6	0.6	1.9	0.6	1.3	1.3	4.5	1.9	1.3
	T	1.0	0.3	0.7	1.7	1.0	1.7	0.7	1.0	1.3	3.0	2.0	1.7
Ear Disease	M	0.0	3.4	1.4	4.1	4.1	4.8	3.4	4.8	4.8	2.1	2.8	9.0
	F	0.0	1.9	3.2	1.3	3.2	7.1	0.0	1.3	1.3	3.9	3.9	1.3
	T	0.0	2.7	2.3	2.7	3.7	6.0	1.7	3.0	3.0	3.0	3.3	5.0
Skin Infection	M	4.1	1.4	1.4	0.7	0.7	2.1	2.1	1.4	2.1	2.1	0.7	1.4
	F	1.9	1.3	1.3	0.6	1.9	1.9	0.6	1.3	2.6	5.8	3.2	4.5
	T	3.0	1.3	1.3	0.7	1.3	2.0	1.3	1.3	2.3	4.0	2.0	3.0

Regarding nutritional deficiency signs, mainly discoloration of hair, a sign of protein calorie malnutrition was observed to be high and showed inclining trend with age i.e. 0.3 percent at 1 month and 55.3 percent at 12 months. Overall it was higher in boys (Mean 24.5%) thangirls (Mean 23.6%) statistically insignificant (p>0.05). No case of Marasmus was observed up to 12 months of age. Angular stomatitis, signs of Vitamin B complex deficiency was found from 9th month (0.4%) to 12 month (0.7%). Glossitis, another sign of Vitamin B complex deficiency was found from 9th month (0.4%) to 12 month (0.3%) only in boys. Other signs of Vitamin B complex deficiency observed was Chelosis which increased with age i.e. 0.3 percent at 1 month and 8.8 percent at 12 months and found higher in boys (Mean 24.5%) than girls (Mean 23.6%) statistically insignificant (p>0.05). Vitamin A deficiency i.e. Bitot spot was observed from 8th month (1.2%) to 12 month (1.5%) and found higher in boys (Mean 0.4%) than girls (Mean 0.2%) statistically insignificant (p>0.05). Gender difference was statistically insignificant (p>0.05) in all the nutritional deficiencies.

Table 2 revealed the distribution of 1 month neonates followed up to 12 months according to immunization. This table showed that very low percentage of children got BCG vaccination at 1 month. Overall 89.1 percent children got BCG vaccination at 12 months age. Very low percentage of children received 1st dose of DPT (13.1%) at 1 month of age whereas overall 66.1 percent children received the 1st dose of DPT at the age 12 month. 2nd and 3rd dose of DPT received by children at 12 months was low i.e. 57 and 62.8 percent respectively. Measles and Vitamin A was received by 30.3 and 29.2 percent children at the age 12 months which is very low.

Table 2. Distribution of 1 month neonates followed up to 12 months according to immunization

Child Age	Cumulative Percentages					
Follow Up	BCG	DPT 1st Dose	DPT 2nd Dose	DPT 3rd Dose	Measles	Vitamin A
1st month	39.2	13.1	0.3	0	0	0
2nd month	57.8	37.9	3.1	0	0	0
3rd month	65.8	46.6	17.7	2.5	0	0
4th month	73.3	52.6	32.7	13.5	0	0
5th month	76.5	56.2	38.7	23.1	0	0
6th month	78.6	59.4	46.3	32.0	0	0
7th month	81.5	61.6	49.5	40.9	0	0
8th month	83.9	63.3	52.6	48.7	1.8	1.4
9th month	85.7	63.3	53.4	53.0	10.3	9.2
10th month	87.8	64.3	54.6	55.7	21.1	19.6
11th month	88.5	65.6	55.5	58.7	30.1	29.0
12th month	89.1	66.1	57.0	62.8	30.3	29.2

Out of 300 neonates registered earlier in neonate project (4), 7 died up to the age of one month and 10 were not available/ not co-operated. Neonatal mortality was 13.3 per thousand and infant mortality was 43.3 per thousand in the studied population. Mortality IMR occurred at home was 76.9% and 23.1% at Hospital. Main causes of mortality reported were fever (viral), premature delivery-2 (7 months Wt. 1.7 & 1.3 Kg.), stop suckling, congenital abnormality-bi- lateral cleft lip & hard palate, fever, stiffed body, convulsion, stop suckling-3 days before death, pneumonia, high fever, asthma, jaundice, diarrhea, septicemia, immunization not done.

Table 3. Distribution of neonates according to mortalities rate

Types	Age	No.	Per 1000's
Perinatal	0-7 days	3	10/1000
Neonatal	0-28 days	4	13.3/1000
Post-neonatal (Infant)	29 – 12 months (1 year)	6	20/1000
Infant Mortality Rate	0-12 months	17	43.3/1000

Discussion

Malnutrition is a burning problem in India that too more in Rajasthan as reported in NFHS III and other studies [10-12]. In desert areas of Rajasthan deep routed traditions pass from generation to generations and prevent their rational thinking which directly or indirectly influences their nutritional status. In the present study, malnutrition showed an increasing trend with age and gender difference was less that too statistically insignificant. Underweight was high and found maximum at 10 months (37.5%). The proportion of severe underweight also showed inclining trend and found maximum at 9 months (15.9%) which needs attention. The proportion of children suffering from moderate underweight category was higher in boys than girls. NFHS III study reported underweight as 44.0 % in children up to 3 years[10] whereas during drought conditions it was reported high in desert area i.e. 60% in preschoolers and the highest underweight prevalence in the age group of 1-2 years [5].

Stunting is a sign of long term malnutrition. Present study showed an inclining trend from 1 month up to 3rd month (27.2%) and higher in males than females. Earlier studies i.e. NFHS III, NNMB reported 33.7 % (up to 3 years) [10] and (49.3 %)[11]. In the present study, severe stunting found high which needs immediate attention. Wasting is a sign of short term malnutrition and present study showed an inclining trend with age and found highest at 8 and 10 months of age (33.3%). Severe wasting was also high which needs attention. In the present study both short and long term malnutrition found higher which may be due lower literacy among women, early marriage below the age of 18 years (41.6%) and low consumption of Iron FA tablets by mothers during pregnancy (66.3%) and inadequate dietary intakeas reported earlier [4].

Main morbidities observed in population were fever, acute respiratory infection, gastroenterological (GIT), Eye, Ear Disease and skin infection. All the morbidities showed inclining trend from 1 month up to 12 months both in case of boys and girls. Gender difference was statistically insignificant ($p>0.05$) in all the morbidities. Discoloration of hair, a sign of protein calorie malnutrition was observed to be high and showed inclining trend with age. No case of Marasmus was observed. Vitamin A deficiency i.e. Bitot spot and Vitamin B complex deficiency i.e. Angular stomatitis and Glossitis were found 8th to 9th month onward whereas Chelosis was observed from 1 month onward and increased with age also (8.8% at 12 months). This incline with age in nutritional deficiencies and in morbidities may be due to their old deep routed traditional practices as they do not start giving supplementary food to their child in addition to breast milk at 6 months of age as prescribed by WHO, which in turn affects their health and nutritional status as observed earlier also [3]. The immunization is also low in the present study. The compliance of 1st, 2nd and 3rd dose of DPT was 57 to 66 percent which needs attention. The compliance of Measles and Vitamin A drops was very low i.e. 29 to 30 percent.

Conclusion

Present study revealed that Long term as well as short term malnutrition observed high and showed increasing trend with age in the desert which needs attention. Immunization is low. All the morbidities and nutritional deficiencies were also high and showed increasing trend with age which can be reduced by formulating the intervention plan, on the basis of the present study results' and implementing the intervention plan in the desert area so as to facilitate the State Health Department Functionaries in the management of malnutrition in desert.

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