

An epidemiological study of feeding practices, immunization status and childhood infections between 6 months to five years of age and its association with acute malnutrition in a rural area of Palghar district of Maharashtra

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Abstract

Background: Malnutrition is a global health problem, more prevalent in developing countries; 'It often starts in womb and ends in tomb' Aim and objectives: The study aims to find out feeding practices, immunization status and childhood infections along with this to know whether there is association between acute malnutrition with these factors and to suggest appropriate recommendations based on observations. **Methods:** The area selected for our study is the rural field practice area of Topiwala National Medical College. The Study Population taken for this was children between the age of 6 months to 5 years. The study was a community based descriptive cross-sectional epidemiological study. **Results:** Exclusive breastfeeding for initial 6 months in this area was only 42.96 but majority i.e. 91.11% children were fully immunized for their respective age. Only 11.5% were getting enough calories and protein as per recommended dietary allowance. **Conclusion:** The diet of children was inadequate for calories and proteins as well as micronutrients, immunization status of children in this area was satisfactory. Malnutrition and infections together is the worst enemy in child's development. **Keywords:** Malnutrition in children, immunization, feeding practices, rural area.

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INTRODUCTION

Acute malnutrition is a global health problem, more prevalent in the developing countries; 'It often starts in womb and ends in tomb'.¹ India is world's second largest food producer yet home to the second highest population of undernourished children in the world (FAO2015). This has been highlighted again in report of Global Hunger

Index.² NFHS-4 data shows that there is high prevalence of malnutrition among urban and rural area but comparatively higher in rural part.³ As stated by Jelliffe malnutrition is caused by multiple factors like conditioning influences, cultural factors, factors related to production of food and its influences and utilization of health services etc.⁴ Malnutrition is associated with very high mortality rates when it is associated with infection; e.g. lower respiratory tract infection, measles, diarrhea, malaria etc.⁵

Objectives of Study

1. To determine the prevalence of malnutrition in children from 6 months to five years of age.
2. To study feeding practices, immunization coverage and infections affecting during childhood, and to study the association between malnutrition and these factors.
3. To suggest appropriate recommendations based on observations.

METHODS

Study population and place: The area selected for our study is the rural field practice area of Topiwala National Medical College Mumbai which is situated in Palghar district of Maharashtra. Study population was the total beneficiary population of one PHC having seven subcenters under it and total population under it is 19,423 of which 2150 is the under five population. Study population was the children between 6 months to 5 years of age.

Study Duration: February 2017 to January 2018.

Study design: Community based descriptive cross-sectional epidemiological study.

Inclusion criteria: Children from 6 months to 5 years of age. Family residing at least for six months in that community. Mother or immediate care taker (informant) who had given consent to participate in the study

Exclusion criteria: Those children who were suffering from severe illness. Cases with potential causes for organic failure to thrive e.g. Chronic diseases, malformations, disabilities, and chronic infections. Children whose mother / Immediate care taker (informant) were not present during the visit.

Sample size: It was calculated using NFHS (IV) prevalence of malnutrition in underfive children years of age in rural area of Maharashtra 40%.³ The sample size was calculated using the formula $n=4pq/l^2$ Calculated sample size was 270.

Sampling technique: Data was collected by Systematic Simple Random Sampling Method. The population of under five children in the area of rural primary health centre having seven sub centres namely A, B, C, D, E, F, G is known, i.e.=2150. Sampling Interval = $2150 \div 270 = 7.9 \sim 8$. Hence, every 8th child from 6 months to five years of age in each sub-centre was selected; line listing of houses was obtained from local Surpanch/village guide. Sample size was taken in proportion to under five population of each sub centre. In those families having two under five children, the elder child was included in the study.

Methodology: Data was collected using pre-structured and pretested Performa. The age of the child was confirmed either by parents or immunization card card/birth certificate or local calendar event system. The

informed written consent was taken from parent after the purpose of study was explained to them. The weight of child was recorded by using weighing machine with 100 gm (0.1kg) least count. Before taking weight if any child came with shoes and/or Chappal, they were removed before the weight was taken. The height of child was recorded by the measuring tape with 1cm least count. While measuring it, posterior occipital protuberance, posterior part of heel and buttocks was touching the wall. Infantometer, with 1cm least count was used to record the length of the infant, in proper lying down position. Mid upper arm circumference was measured to the nearest mm at midpoint of the left arm (The point between acromion process of scapula and olecrenon process of ulna) using flexible and non- stretchable tape with 1 mm least count. Nutritional status indices like weight for age (underweight), height for age (stunting) and weight for height (wasting) were expressed in standard deviation units (z score) from the reference median as per WHO standards.⁶ These findings were then compared with reference data for age and sex based on WHO growth standards. Weight for height (wasting) and Weight for age (underweight), height for age (stunting) were taken as deciding criteria for malnutrition. For feeding practices parents/mothers were asked about exclusive breastfeeding for initial 6 months after delivery, after 6 months weaning, and then for older children recent three days food intake by them in breakfast, lunch and dinner; the food items included for each of them respectively. Then their calories and protein intake and deficit for them by using standard values. Immunization status of children is retrieved by using immunization card of child if available and if not, then by asking history of it to parents. We have taken last one month history of diarrhea, respiratory tract infections, worm infestation by asking about symptoms/signs related them. Then the association between above variables and malnutrition is studied. The study was approved by Institutional Ethics committee of T.N. Medical College Mumbai.

Ethical approval: Taken from institutional ethical committee.

RESULTS

Table 1: Prevalence of Malnutrition

Prevalence of Malnutrition		
Indices	Number	Percentage
Underweight	152	56.30
Stunting	143	52.96
Wasting	75	27.8

This table 1 shows the prevalence of malnutrition in study area by WHO criteria for underweight, stunting, and wasting was 56.30%, 52.96% and 27.8% respectively.

Table 2: Distribution of children according to dietary adequacy.

Recommended Dietary Allowance (RDA %)	Calories (%)	Proteins (%)
>90	31 (11.5%)	68(25.2%)
70-90	135 (50.0%)	166(61.4%)
50-70	103 (38.1)	35(13.0%)
<50	1 (0.4%)	1(0.4%)
Total	270	270

Table no 2 shows that only 11.5% and only 25.2% children have their calorie and protein intake above 90%, of RDA (Recommended Dietary Allowance) respectively. Majority of children have deficit of either calorie or protein or both.

Table 3: Distribution of children according to clinical findings.

Clinical sign	Number	%
1. Pallor	93	34.40
2. Dental Carries	47	17.40
3. Angular stomatitis	16	5.92

In this table out of total 270 children examined 34.4% have pallor, followed by dental carries (17.4%), and angular stomatitis (5.92).

Table 4: Distribution of children on the basis of History of infection in last one month.

Type of history of infection in last one month	Frequency	Percentage
Respiratory infection	64	43.53
Worm infestation	44	29.93
Diarrhea	39	26.54
Total	147	100.00

Table no.4 shows maximum (43.53%) children had history of respiratory tract infection followed by worm infestation (29.93%) and diarrhea (26.54%).

Table 5: Association between acute malnutrition and various factors.

Factors	Acute malnutrition (WHO criteria)		Total
	Normal	Malnourished	
Immunization Status			
Completely immunized for age	184	62	246
Partially Immunized for age	11	13	24
Pearson Chi-square value($X^2=9.144$) df=1 P value=0.002 Significant			
Exclusive Breastfeeding			
Given for 6 months	96	20	116
Not given for 6 months	99	55	154
Pearson Chi-square value($X^2=11.25$) df=1 P value=0.001 Significant			
History of Respiratory tract infection in last one month			
Present	38	26	64
Absent	157	49	206
Pearson Chi-square value($X^2=6.901$) df=1 P value=0.009 Significant			
History of diarrhea in last one month			
Present	22	17	39
Absent	173	58	231
Pearson Chi-square value($X^2=5.681$) df=1 P value= 0.017 Significant			
History of worm infestation in last one month.			
Present	25	19	44
Absent	170	56	226
Pearson Chi-square value($X^2=6.217$) df=1 P value=0.013 Significant			

Table no 5 shows that there is significant association between malnutrition and respiratory infection, diarrhea and worm infestation. Children who were completely immunized for their respective age have less prevalence of undernutrition and statistical association is also significant. Children who had not being exclusive breastfed for initial 6 months and malnutrition has significant association.

DISCUSSION

This community based cross-sectional epidemiological study showed that the prevalence of underweight, stunting and wasting was 56.30%, 52.96% and 27.8% respectively. A study conducted by K .Mallikharjuna *et al.* among primitive tribe of Saharia in Rajasthan found higher prevalence i.e. 72%, 68% and 13% respectively.⁷ Children living in rural area have too much of deficit about calorie and protein. Only 11.5% children have adequate calorie intake and 25.2% children have adequate protein intake, rest all children have deficit of both protein and calories. A study was done by A. Jyothi, Begum Khyrunnisa *et al* found that dietary intake of all nutrients was inadequate among rural pre school children of their study area and extent of calorie and protein deficit in relation to RDA (Recommended Dietary Allowance) ranged between 40 and 50%.⁸ Malnutrition and micronutrient deficiency usually comes with hand in hand. Majority of children in study area had pallor (34.4%), followed by dental carries (17.4%) and angular stomatitis(5.9%). In a study conducted by Neha Thakur, Jagdish Chandra *et al.* found that among malnourished children of their study area 67% children had severe anemia and 13.8% children had moderate anemia.⁹ Another study conducted by Chandrasekhar Janakiraman *et al.* found that undernutrition of preschool children was significantly associated with dental carries.¹⁰ Out of 270 study population, 147(54.4%) had history of illness in last one month. History of respiratory tract infection was major 43.53% followed by worm infestation 29.9% and diarrhea 26.5%, repeated history of infection is responsible for deterioration of child health which them susceptible to undernutrition. A similar study conducted by Giri V. C., V.R. Dhage *et al.* among tribal children of Maharashtra found that prevalence of acute respiratory tract infections were highest among them 25.5% followed by diarrheal diseases(5.8%)¹¹ Children who have been completely immunized for their age had 25.2% malnutrition while children who are partially immunized had 54.2% malnutrition, which was statistically significant. In this area immunization coverage was satisfactory i.e. 91.11%. In a study conducted by Sandip Kumar Ray, Akhil Bandhu Biswas *et al.* in Siliguri found higher prevalence of malnutrition among partially immunized (81.25%), and non immunized (88.23%) children in comparison to fully immunized children(62.07%).¹² Those children who were exclusively breastfed for minimum 6 months after birth have lower rate of malnutrition (17.2%) compared to who were not exclusively breastfed for 6 months (35.7%) and this difference was statistically significant.(P-0.001). In a study conducted by Dinesh kumar, N.K. Goel, Poonam C. Mittal *et al.* noted that exclusive breastfeeding for 6 months, initiation of breastfeeding within 6 hours of birth and children who were fed colostrum and were given proper

complementary feeding found to be less malnourished than their respective counterparts.¹³ In a case control study carried out among preschool children of rural karnataka by Anusaya, Baby S. Nayak it was found that risk of being malnourished was 1.89 times higher among those children who were not exclusively breast fed for 6 months.¹⁴ Repeated respiratory tract infections leads to malnutrition, children having history of respiratory infection in last one month have 40.6% of malnutrition as compared to 23.8% in those who doesn't have any history of respiratory infection.(P-0.009). In another study carried out by S.S. Avachat *et al.*; an epidemiological study of malnutrition among underfive children in a rural area also found significant association between history of respiratory infection and malnutrition.¹⁵ Children having history of diarrhoea in last one month have 43.6% malnutrition and those without such history have 25.1% malnutrition. The difference is statistically significant. Diarrhea in children is an indicator of poor environmental condition which gives rise to infection in children, thus vicious cycle of malnutrition and infection sets in. A study done by Naveen C Khargekar *et. al* found significant association between history of diarrhoea one month prior to study and malnutrition. P value less than 0.05 (P= 0.003) children having history of diarrhoea were 65.58% malnourished in contrary to 43.30% in those who don't have history of diarrhoea.¹⁶ Repeated diarrheal infections were negatively associated with stunting in a study conducted by Jennifer Saxton *et al.* among 6-24 months of children in rural indigenous communities of Jharkhand and Odisha.¹⁷ Prevalence of malnutrition among children who have history of worm infestation in last one month was 43.2%, in contrary to 24.8% among children having absence of such history. Worm infestation is very common during preschool or underfive period which leads to undernutrition in them. In a study conducted by Paramita Sengupta, Nina Philip *et al.* for epidemiological correlates of undernutrition in underfive children found that prevalence of malnutrition was higher in those with history of worm infestation than their respective counterpart (52.6%) and(27.1%) respectively.(P value = 0.020.)¹⁸

CONCLUSION

Exclusive breastfeeding, weaning and knowledge about complementary feeding is lacking in this area. Immunization coverage was satisfactory. Childhood infections worsens the situation of undernutrition.

RECOMMENDATIONS

1. At family level: Child care sessions should be held for mothers to teach them about importance of breastfeeding, child care and weaning practices.

2. At community level: Regular sessions should be held at village level by health personnel to educate mother about use of locally available nutrient rich food to avoid undernutrition. Community participation is necessary to maintain environmental sanitation and provide aid to families to build sanitary latrines to avoid diarrheal and other diseases related with it.

3. At state level: ICDS (Integrated child development Services) need to be strengthened and supervised at regular interval

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