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An assessment of the nutritional status of underfive children in a rural area of Thrissur district, Kerala, India

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ABSTRACT

Background: India contributes to more than one-third of the under-nourished children in the world. According to NFHS 3 survey, 43% under-five children in India were under-weight, and 48% were stunted. In Kerala, the prevalence of underweight among under-five children was 28.8%, and stunting 21.1%. The objectives of the present study were to assess the nutritional status of under-five children and to find the factors associated with undernutrition.

Methods: A community based cross sectional study was conducted among 360 under-five children. Sociodemographic, dietary and clinical details of the children were collected using pre-tested semi-structured questionnaire. Weight and height of children were measured using standard protocols. Children were considered as having underweight and stunting if their weight for age and height for age Z scores were below -2 SD of WHO standards.

Results: Out of 360 children, 48.9% were males and 51.1% were females. The prevalence of under-weight and stunting was 28.3% and 14% respectively. The prevalence of underweight and stunting was found to be higher among females. Risk factors like low birth weight, inadequate protein intake, respiratory infections and diarrheal disease in the past year, and presence of worm infestation were significantly associated with under-nutrition. Full immunization was found to be protective against under-nutrition.

Conclusions: The risk factors for under-nutrition start from the womb itself. This, together with inadequate dietary consumption and frequent infections plays a significant role in the occurrence of under-nutrition among under-five children.

Keywords: Assessment, Nutritional status, Rural area, Stunting, Under-five children, Under-weight

INTRODUCTION

Children are considered as the future of a nation. The health and nutritional status of the child population is a true reflection of the overall health and economic development of a country. Child malnutrition is a widespread public health problem having national and international consequences as adequate nutrition is an

essential input for the well being of children. It is well documented that under-nutrition, particularly among children under the age of five years, is the most tragic form of human deprivation. Malnutrition in its several forms of under-nutrition, namely wasting, stunting and under-weight has been coined as the "silent emergency" by the United Nations children's fund (UNICEF). It has been associated with endangering the health of women and children across the world. Children below the age of

five years constitute the most vulnerable segment of the community. Their nutritional status is a sensitive indicator of community health and nutrition, and undernutrition among them is one of the greatest public health problems in developing countries.²

According to WHO, malnutrition is associated with about half of all child deaths world-wide. Malnutrition among under-five children has serious consequences. Malnourished children have lowered resistance to infection; they are more likely to die from common childhood ailments like diarrheal diseases and respiratory infections, and for those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness, faltering growth and diminished learning ability (UNICEF 2007).³

Globally, in 2012, an estimated 99 million (15%) under five children were under-weight, 162 million (25%) were stunted, and 51 million (8%) were wasted, with 80% of these stunted children living in just 14 countries. In India, according to the findings of Hunger and Malnutrition survey (2012), 42.3% of under-five children are under-weight, 58.8 % are stunted and 11.4% are wasted. The rural-urban variation in the prevalence of child malnutrition is also very wide in India. According to NFHS 3 (2005 -06), the prevalence of under-weight among pre-school children was 30.1% in urban areas, whereas, it was as high as 43.7% in rural areas.

Kerala is known world over for its high human development achievements attained without much rural – urban disparities. But, the state is now facing serious threats, in the realm of health, especially in the field of nutritional status among pre-school children in the rural areas. Kerala accounts for 23% of under-weight, 24.5% of stunted and 16% of wasted children, according to the latest estimates of UNICEF in 2011.

There is a dearth of studies on the assessment of nutritional status of under-five children in rural areas of Thrissur district, in spite of the fact that the prevalence of under-weight in Thrissur is higher than the overall prevalence in Kerala. In this context, the present study focus its attention on the assessment of nutritional status of children aged 0-5 years in Varandarapilly, which is truly representative of the rural picture of Kerala, with the hope that this study will help to optimize preventive and promotive strategies to address the problem of under-five malnutrition in this area.

Aim: To study the nutritional status of children of the age group 0–5 years in a rural area of Thrissur, India.

Objectives

- To assess the nutritional status using anthropometric measurements
- To estimate the prevalence of malnutrition

 To determine the influence of socio demographic characteristics, immunization status, feeding practices, and clinical profile on the nutritional status of under-five children

METHODS

A community based cross sectional study was conducted in five selected wards of Varandarapilly panchayath in Thrissur district. Varaddarapilly is a rural area, located about 20 km from Thrissur Corporation. The total population of under five children in this panchayath is 2,927 with 1366 males and 1561 females. The study subjects include children between the age group 0-5 years of both sexes of the selected clusters in Varandarapilly panchayath.

Inclusion criteria

Children between the age group 0–5 years residing in Varandirapilly panchayath, whose parents were willing to participate in the study.

Exclusion criteria

Children who are critically ill and those with congenital diseases.

Sample size and sampling method

Cluster sampling method was used. The 22 wards in Varandarapilly panchayath, were considered as 22 clusters. Sample size was calculated by taking the prevalence of malnutrition among pre-school children in rural Kerala as 34.8% (National Nutrition Monitoring Bureau-NNMB Rural Survey-Kerala-2003-06). As cluster sampling method was used, design effect (D) was taken into account, where, D=1+ (b-1) p. (b=number of responses (participants) in a cluster; ρ (Rho) = Intra cluster correlation coefficient, which is taken as, $\rho = 0.01$ for non communicable diseases). Thus, the sample size turned out to be 360. From a pilot study, the number of responses in a cluster was found to be 72. To obtain 360 children, 5 clusters were selected by simple random sampling and 72 under-five children were studied in each of these 5 clusters. Study was initiated after obtaining ethical clearance from the Institutional ethics committee.

After getting written informed consent from the parents, they were interviewed using pretested semi structured interview schedule. The questionnaire covered the sociodemographic characteristics, breast-feeding and complementary feeding practices, immunization status, dietary habits and morbidity profile of the child. For assessing nutritional status, clinical examination and anthropometric measurements of the children were performed. Weight was measured using an electronic weighing machine (Salter scale for children less than two years) to the nearest of 0.1 kg. Height/length was measured using stadiometer to the nearest 0.1 cm.

Data analysis

The data was collected, coded and entered into Microsoft Excel. Using WHO Anthro plus software, the Weight for age and Height for age Z scores were calculated. The WHO 2006 cut off points (-2 SD or less than -2 SD from the median) were used to assess the degree of underweight and stunting. After getting the standard deviation of underweight and stunting, the whole data was rechecked and analyzed using SPSS statistical software version 16. Underweight and stunting was measured in terms of prevalence. Association between under-nutrition and its determinants were assessed by unadjusted odds ratio (OR). Binary logistic regression analysis was also carried out to determine the influence of individual factors on under-nutrition. The level of significance was estimated with 95% confidence intervals and p value < 0.05.

RESULTS

Out of the total 360 under-five children who were included in the study, 176 (48.9%) were males and 184 (51.1%) were females. Majority of the participants, 116 (32.2%) were in the age group 36-47 months. Hindus constituted 52.5% of the subjects, 32.8% were Muslims and 14.7% were Christians. 176 children (48.9%) belonged to nuclear family and 184 (51.1%) to joint family. None of the mothers of the study participants were illiterate and majority 205 (57%) were educated up to higher secondary school. Majority of the mothers, 322 (89.4%) were housewives and 38 (10.6%) were working mothers. There were 191 (53.1%) children who belong to middle and upper socioeconomic class and 169 (46.9%) from lower class, according to Modified B.G Prasad's classification. Majority of children, 280 (77.8%) utilized anganwadi services (Table 1). There were 69 (19.2%) children who were born as low birth weight babies. There were no unimmunized children in the study group, but 32 (8.9%) were partially immunized. Exclusive breast feeding was given to 240 (66.7%) children.

Calorie consumption (elicited by twenty-four hour recall method) was not adequate (<80% of RDA) in 241 (66.9%) of children and protein intake was not adequate in 209 (58.1%). The overall prevalence of under-weight (Weight for age <-2SD) was 28.3% (95% CI=23.7-33.01) and stunting (Height for age <-2SD) was 14% (95% CI=10.3-17.5). There were 49 (13.6%) children in the study group who were both under-weight and stunted. The prevalence of underweight among females was higher (32.6%) as compared to males (23.9%). The prevalence of stunting was also found to be higher among females (16.3%), as compared to males (11.4%).

On analyzing the clinical profile of the study subjects, there were 34 (9.4%) children who had more than 3 episodes of illness in the past year. History of acute respiratory tract infection was present in 89 (24.7%) children and 73 (20.3%) had history of acute diarrheal

disease in the past one year. There were 196 (54.4%) children who had clinical signs of nutritional deficiency. There were 153 (42.5%) children in the study who had symptoms (as told by the mothers) of worm infestation, such as peri-anal itching/passage of worms in stools (Table 2).

Table 1: Sociodemographic profile of the study subjects.

| Variable | Number (N=360) | Percentage | | |
|-----------------------------------|-------------------|------------|--|--|
| Age group (months) | | | | |
| 0-11 | 68 | 18.9 | | |
| 12-23 | 50 | 13.9 | | |
| 24-35 | 77 | 21.4 | | |
| 36-47 | 116 | 32.2 | | |
| 48-60 | 49 | 13.6 | | |
| Sex | | | | |
| Males | 176 | 48.9 | | |
| Females | 184 | 51.1 | | |
| Religion | | | | |
| Hindu | 189 | 52.5 | | |
| Muslim | 118 | 32.8 | | |
| Christian | 53 | 14.7 | | |
| Type of family | | | | |
| Nuclear | 176 | 48.9 | | |
| Joint | 184 | 51.1 | | |
| Educational status of mo | ther | | | |
| Illiterate | 0 | 0 | | |
| Lower primary | 2 | 0.6 | | |
| Upper primary | 45 | 12.5 | | |
| High school | 108 | 30 | | |
| Higher secondary | 157 | 43.6 | | |
| Degree & above | 48 | 13.3 | | |
| Socioeconomic status | | | | |
| High | 7 | 1.9 | | |
| Upper middle | 32 | 9 | | |
| Lower middle | 152 | 42.2 | | |
| Upper lower | 160 | 44.4 | | |
| Lower | 9 | 2.5 | | |
| Utilization of anganwadi services | | | | |
| Present | 280 | 77.8 | | |
| Absent | 80 | 22.2 | | |

On analysis of the various factors which influenced the nutritional status of the study subjects, it was found that the prevalence of underweight was high among the age groups 48-60 months (38.8%) and 12-23 months (38%) than among other age groups and this difference was statistically significant. The prevalence of stunting was also found to be higher in 12-23 months (24%) and 48-60 months (20.4%) age groups, and this difference was also statistically significant. The rates of under-weight among females (32.6%) were higher than that of males (23.9%), but this was not statistically significant. The stunting rate was also found to be high among females (16.3%) than

among males (11.4%), although not statistically significant.

Table 2: Distribution of study subjects according to maternal and child health (MCH) factors.

| MCH Factors | Number | Percentage | | | |
|---------------------------------|----------------|------------|--|--|--|
| Birth weight | | | | | |
| Low birth weight | 69 | 19.2 | | | |
| Normal birth weight | 291 | 80.8 | | | |
| Birth order | | | | | |
| 1 | 203 | 56.4 | | | |
| 2 | 141 | 39.2 | | | |
| ≥3 | 16 | 4.4 | | | |
| Exclusive breast feeding | 5 | | | | |
| Given | 240 | 66.7 | | | |
| Not given | 120 | 33.3 | | | |
| Immunization status | | | | | |
| Fully immunized | 328 | 91.1 | | | |
| Partially immunized | 32 | 8.9 | | | |
| Daily calorie intake | | | | | |
| ≥80% of RDA | 119 | 33.1 | | | |
| <80% of RDA | 241 | 66.9 | | | |
| Daily protein intake | | | | | |
| ≥80% of RDA | 151 | 41.9 | | | |
| <80% of RDA | 209 | 58.1 | | | |
| No. of episodes of illness | in the past o | ne year | | | |
| ≤3 episodes | 326 | 90.6 | | | |
| >3 episodes | 34 | 9.4 | | | |
| Clinical signs of nutritio | nal deficiency | y | | | |
| Present | 196 | 54.4 | | | |
| Absent | 164 | 45.6 | | | |
| History of ARI in past one year | | | | | |
| Present | 89 | 24.8 | | | |
| Absent | 271 | 75.2 | | | |
| History of ADD in past | one year | | | | |
| Present | 73 | 20.3 | | | |
| Absent | 287 | 79.7 | | | |
| Symptoms of worm infestation | | | | | |
| Present | 153 | 42.5 | | | |
| Absent | 207 | 57.5 | | | |

The proportion of underweight was higher among children whose mothers were educated less than higher secondary school (31%), than among those whose mothers are educated up to higher secondary school and above, but this difference was not statistically significant. Stunting was also found to be higher in those children whose mothers had lower than higher secondary education (16.1%) than among those with education of higher secondary and above (12.2%). The rate of stunting was higher (16.6%) among lower class than among middle/upper class (11.5%), even though, no significant association was found between SES and nutritional status of the study subjects. The present study found a decreased prevalence of underweight (27.5%) and

stunting (12.9%) among children who utilized anganwadi services, but it was not statistically significant (Table 3).

The present study showed no significant association between high birth order and underweight, but there was a statistically significant association between high birth order and stunting. The proportion of underweight (37.7%) and stunting (26.1%) was significantly higher among children who were born with low birth weight than among those born with normal birth weight. The prevalence of under-weight and stunting was lower in fully immunized children than among those who are partially immunized, and this difference was statistically significant. The prevalence of underweight (18.3%) and stunting (8.8%) was much lower among children who were given exclusive breast feeding as compared to those who were not given exclusive breast feeding, and it was statistically significant. Underweight and stunting was also found to be higher among children who consume less than 80% of the recommended daily allowance of calories and proteins and this was found to be statistically significant. Underweight and stunting was higher among children who had suffered more than three episodes of illness in the past one year, and it was statistically significant. Children who suffered from Acute respiratory tract infection in the last year was found to have a higher proportion of under-weight 62 (69.7) and stunting 27 (30.3) than those who did not suffer from respiratory infections, and this difference was found to be statistically significant. The proportion of underweight and stunting was also significantly high among children who had suffered from acute diarrheal disease in the past year. The prevalence of underweight (43.4%) and stunting (20.9%) was significantly higher among children with clinical signs of nutritional deficiency as compared to those with no clinical signs of nutritional deficiency. The study also found a higher proportion of underweight and stunting among children with symptoms of worm infestation, which was also found to be statistically significant (Table 4).

The risk factors which were shown to have a statistically significant association with under-weight and stunting in the univariate analysis were considered for binary logistic regression analysis. After adjusting for all the other factors, reduced protein intake (<80% of RDA), presence of Acute respiratory disease and acute diarrheal disease in the past one year and presence of symptoms of worm infestation, were found to be significant risk factors for under weight. Full immunization of the child, was found to be a protective factor against under-weight which was statistically significant. Low birth weight, presence of acute respiratory infections in the past one year and presence of symptoms of worm infestation were found to be significant risk factors for stunting. Full immunization was found to be a protective factor against stunting, which was also statistically significant (Table 5).

Table 3: Nutritional status of under-five children according to socio-demographic variables.

| Variable | Number | Underwe | Underweight | | Stunting | | |
|-----------------------------------|----------------|---------|-------------|------|-------------|--|--|
| | | OR | 95% CI | OR | 95% CI | | |
| Sex | | | | | | | |
| Male | 176 | 1 | | 1 | | | |
| female | 184 | 0.65 | 0.4-1.03 | 0.65 | 0.35-1.2 | | |
| Type of family | Type of family | | | | | | |
| Nuclear | 176 | 1 | | 1 | | | |
| Joint | 184 | 0.85 | 0.54-1.35 | 0.54 | 0.29-1.005 | | |
| Education of mother | | | | | | | |
| Lower than High secondary | 155 | 0.79 | 0.5 - 1.26 | 0.72 | 0.39 - 1.31 | | |
| High secondary & above | 205 | 1 | | 1 | | | |
| SES | | | | | | | |
| Lower class | 169 | 0.9 | 0.59-1.48 | 0.6 | 0.35 - 1.19 | | |
| Middle & upper class | 191 | 1 | | 1 | | | |
| Utilization of Anganwadi services | | | | | | | |
| Yes | 280 | 1 | | 1 | | | |
| No | 80 | 1.2 | 0.69 -2.05 | 1.4 | 0.73-2.82 | | |

Table 4: Nutritional status of under-five children according to MCH factors.

| Numbou | | Underweight | | | |
|---|--|--|----------------------|--|--|
| Number | OR | 95% CI | OR | 95% CI | |
| | | | | | |
| 69 | 1.7 | 1.2-2.97* | 2.85 | 1.5-5.47* | |
| 291 | 1 | | 1 | | |
| | | | | | |
| 240 | 0.24 | $0.14 - 0.39^*$ | 0.3 | $0.16 \text{-} 0.55^*$ | |
| 120 | 1 | | 1 | | |
| | | | | | |
| 328 | 0.12 | $0.05 \text{-} 0.27^*$ | 0.21 | $0.09 \text{-} 0.48^*$ | |
| 32 | 1 | | 1 | | |
| | | | | | |
| 241 | 6.7 | 3.34-13.5 [*] | 4.2 | $1.73 \text{-} 10.2^*$ | |
| 119 | 1 | | 1 | | |
| | | | | | |
| 209 | 9.8 | 5.01-19.2* | 4.5 | 2.04-9.9* | |
| 151 | 1 | | 1 | | |
| ast 1 year | | | | | |
| 34 | 3.2 | 1.58-6.64* | 2.5 | 1.09-5.73* | |
| 326 | 1 | | 1 | | |
| ≤ 3episodes 326 1 1 Clinical signs of nutritional deficiency | | | | | |
| 196 | 6.62 | 3.7-11.7 [*] | 4.5 | $2.14-9.7^*$ | |
| 164 | 1 | | 1 | | |
| | | | | | |
| 89 | 13.2 | 7.5-23.8* | 4.7 | 2.5-8.7* | |
| 271 | 1 | | 1 | | |
| | | | | | |
| 73 | 12.8 | 7.06-23.4* | 2.9 | 1.52-5.52* | |
| 287 | 1 | | 1 | | |
| Symptoms of worm infestation | | | | | |
| 153 | 2.3 | 1.4-3.6* | 3.4 | 1.8-6.4 [*] | |
| 207 | 1 | | 1 | | |
| | 291 240 120 328 32 241 119 209 151 ast 1 year 34 326 al deficiency 196 164 89 271 73 287 attion 153 | 69 1.7 291 1 240 0.24 120 1 328 0.12 32 1 241 6.7 119 1 209 9.8 151 1 past 1 year 34 3.2 326 1 deficiency 196 6.62 164 1 89 13.2 271 1 73 12.8 287 1 attion 153 2.3 | Number OR 95% CI | Number OR 95% CI OR 69 1.7 1.2-2.97* 2.85 291 1 1 240 0.24 0.14-0.39* 0.3 120 1 1 328 0.12 0.05-0.27* 0.21 32 1 1 241 6.7 3.34-13.5* 4.2 119 1 1 209 9.8 5.01-19.2* 4.5 151 1 1 1sast 1 year 1 1 34 3.2 1.58-6.64* 2.5 326 1 1 1 1deficiency 196 6.62 3.7-11.7* 4.5 164 1 1 1 89 13.2 7.5-23.8* 4.7 271 1 1 1 73 12.8 7.06-23.4* 2.9 287 1 1 1 153 2.3 | |

^{*:} P<0.05.

Table 5: Adjusted odds ratio and 95% CI of various risk factors and nutritional status by logistic regression analysis.

| Dial-factor | Underweight | | Stunted | |
|--|-------------|---------------------------|-------------|-----------------|
| Risk factor | Adjusted OR | 95% CI | Adjusted OR | 95% CI |
| Exclusive breast fed Vs not Exclusive breast fed | 0.446 | 0.18 - 1.06 | 0.52 | 0.24 - 1.12 |
| Fully immunized Vs partially immunized | 0.17 | $0.049 - 0.64^*$ | 0.39 | $0.15 - 0.90^*$ |
| Low Vs Normal birth weight | 1.74 | 0.60 - 5.02 | 3.6 | $1.6 - 8.3^*$ |
| Daily calorie intake(< 80% of RDA Vs ≥ 80% of RDA) | 1.68 | 0.22 – 12.93 | 1.38 | 0.23 - 8.14 |
| Daily protein intake($< 80\%$ of RDA $Vs \ge 80\%$ of RDA) | 14.5 | 2.14 – 57.32 [*] | 2.09 | 0.4 - 10.5 |
| No of illness episodes in past year (≤ 3 episodes Vs > 3 episodes) | 4.53 | 0.81 – 25.14 | 2.14 | 0.64 – 7.14 |
| History of ARI in the past year (Present Vs absent) | 13.9 | 5.33 – 36.3* | 4 | 1.7 – 9.2* |
| History of ADD in the past year (Present Vs absent) | 15.09 | 4.9 – 46.3* | 0.93 | 0.37 - 2.29 |
| Clinical signs of nutritional deficiency (Present Vs absent) | 0.17 | 0.02 - 1.56 | 0.25 | 0.028 - 2.3 |
| Symptoms of worm infestation (Present Vs absent) | 2.5 | $1.02 - 6.18^*$ | 2.9 | 1.29 – 6.94* |

^{*:} p<0.05.

DISCUSSION

The prevalence of underweight and stunting among the study subjects was found to be 28.3% and 14% respectively. There were 49 (13.6%) children in the study group who were both under-weight and stunted. This finding was almost similar to NFHS-3 survey (2005), in which the prevalence of underweight and stunting was 28.8% and 21.1% respectively. Another study by Varghese K T et al (2009) found that the prevalence of underweight and stunting among underfives was 28% and 17% respectively. The present study showed an increased proportion of females (32.6%) to be underweight than males (23.9%). This is consistent with the study done by Joseph B et al, in rural Karnataka, where the prevalence of under nutrition was higher among females than among males. 10 A higher prevalence of stunting was also seen among females (16.3%) than among males (11.4%). Similar study by Gangadharan K et al among children in rural areas of Kannur, the prevalence of stunting was higher among females than among males. 11 The prevalence of under nutrition was found to be significantly higher among children in the age groups 48-60 months and 12-23 months. Study by Joseph B et al in rural Karnataka, also found that the prevalence of malnutrition is higher in the age group 12-35 months. 10

The present study showed no significant association between maternal education and nutritional status of the children and majority of the mothers in the study group were educated up to higher secondary and above. This finding is similar to the findings in a study done by Mathad V et al, in Karnataka which found that mother's literacy status was not significantly associated with under-weight and stunting.¹² There was a statistically significant association between high birth order and stunting. This is due to the fact that, as birth order of child increases, the care given to them decreases, because mothers will have to take care of more number of children, which will have a negative impact on their nutritional status. The risk of under-weight (OR=1.7; p=0.049) and stunting (OR=2.85; p=0.002) was found to be significantly higher among children who were born with birth weight less than 2.5 kg than among those with birth weight 2.5 kg or more. In a study by Jose Manuel et al in rural parts of Orissa, low birth weight was found to be a significant risk factor for under weight (OR = 1.8; 95% CI = 1.11-2.92; p = 0.01). ¹³

Full immunization was found to be a significant protective factor against under weight (OR = 0.12; 95% CI = 0.05-0.27) and stunting (OR = 0.21; 95% CI = 0.09-0.48). Immunization protects the children from the vaccine preventable diseases and those who are not fully immunized are at risk of developing recurrent infections, and under-nutrition. In a study by Sandip Kumar Ray et al, significantly higher prevalence of malnutrition was seen among un-immunized (88.23%) and partially immunized (81.25%) children, compared to fully immunized children (62.07%). Exclusive breast feeding was found to be a significant protective factor against under weight (OR = 0.24; 95% CI = 0.14-0.39) and stunting (OR = 0.3; 95% CI = 0.16-0.55). Breast feeding

will provide all the necessary nutrients essential for the proper growth and development of the child during infancy and protects the child from infections. Study by Stalin P et al, in rural Tamil Nadu, also found that underfive children who were not exclusively breast fed were more malnourished than exclusively breast fed children.¹⁵

The risk of under nutrition was found to be higher among children who consume less than 80% of the recommended daily allowance of calories and proteins. Similar observation was made in a study by Saxena N et al, in Delhi, in which, the energy and protein intake among under nourished children was found to be low when compared to that of normal children. ¹⁶ Children who had suffered more than three episodes of illness in the past year were found to have significantly higher risk of being underweight and stunted. Study done by Jesmin A et al, in Bangladesh also found a significant association between frequent episodes of illness and nutritional status of children. ¹⁷

The study also found that the risk of underweight and stunting was significantly higher among children who suffered from acute respiratory infections and acute diarrheal diseases in the past one year as compared to other children. These findings are corroborated by a study by Ray SK et al. ¹⁴ Presence of one or more clinical signs of nutritional deficiency among the study subjects placed them at a higher risk of underweight and stunting. Similar finding was made in a study by Sharma B et al in Madhya Pradesh, in which, clinical signs of nutritional deficiency, like sparse hair, conjunctival xerosis, angular stomatitis, cheilosis and gum bleeding were associated with poor nutritional status of pre-school children. ¹⁸

The study also found a significant association between symptoms of worm infestation and under nutrition among children, which is similar to the finding in another study done by Sengupta P et al, in Ludhiana. On doing binary logistic regression analysis, reduced protein intake, presence of respiratory infection and diarrheal disease in the past year, presence of symptoms of worm infestation were found to have a significant risk association with under-weight. Full immunization of the child was found to be significant protective factor against under-weight.

On doing binary logistic regression analysis of the risk factors for stunting, low birth weight, presence of respiratory infection in the past year, and presence of symptoms of worm infestation were found to have a significant risk association with stunting. Full immunization of the child was a significant protective factor against stunting.

Limitations

The study was limited to small geographic area with small sample size. Information regarding the daily calorie and protein intake was assessed by recall method in subjective manner, which might have influenced the calculation of calories and proteins. Details regarding the history of illness of the child was assessed based on the information furnished by the parents, and is subjected to recall bias. The presence of worm infestation was based on the symptoms alone and confirmatory tests (stool examination) were not done due to lack of resources.

CONCLUSION

The study shows that under-weight and stunting is prevalent among the under five children in Varandairppilly panchayath. It is understood from this study that the risk of under-nutrition begins in a child in the womb itself; as evidenced by the high risk of underweight among children who were born with low birth weight. Inappropriate feeding practices like decrease consumptions of calories and proteins was also noticed in this study. The absence of these macronutrients has detrimental effect on the nutritional and health status of children. The present study also finds that, inappropriate dietary practices coupled with frequent infections, are the major factors which are significantly associated with under-nutrition rather than the socio-demographic characteristics of the families.

It may be concluded that adequate care of pregnant mothers, newborns and infants; exclusive breast feeding, appropriate dietary practices, full immunization of children, prevention of recurrent infections, will help to reduce the problem of under-nutrition in this locality.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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