IMPACT OF LOW BIRTH WEIGHT AND BREASTFEEDING PRACTICES ON THE NUTRITIONAL STATUS OF CHILDREN AGED 2 TO 5 YEARS IN THE SLUMS

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Abstract

Malnutrition among children in developing countries is a major public health problem, especially in India. Inappropriate feeding practices, in combination with other causes such as infection and food shortage, may be responsible for 1/3rd of malnutrition. Moreover, the risk of mortality is inversely related to children's height-for-age and weight-for-height.

The aim: To assess the nutritional status of children aged 2 to 5 years in the urban field practice area of SVIMS-Sri Padmavathi Medical College for Women, Tirupati and to determine the impact of low birth weight, breastfeeding practices and other related factors on the nutritional status of the above study population.

Materials and methods: This is a community-based observational cross-sectional study conducted among 282 children aged 2 to 5 years in the urban field practice area of SVIMS-Sri Padmavathi Medical College for Women, Tirupati. Socio-demographic data, Birth history, breastfeeding practices and anthropometric measurements were noted in the study questionnaire. Nutritional status was determined using HAZ, WHZ and WAZ scores of WHO child growth standards. Data was entered and analyzed using IBM SPSS Statistics 26 version to test for association between categorical variables, and a p-value < 0.05 was considered statistically significant.

Results: A total of 282 school children with mean age of 39.9 (±10.4) months participated in the study, of which 132 (46.8 %) were boys and 150 (53.2 %) were girls. This study observed exclusive breastfeeding in 193 (68.4 %) children. Prevalence of stunting, wasting and being underweight were 22 %, 12.4 % and 23.8 %, respectively. A statistically significant association was found between stunting ($p = 0.006$) and underweight ($p = 0.001$) with low birth weight children.

Conclusions: The present study revealed a high prevalence of malnutrition, especially stunting, a common outcome of long-term malnutrition among young children. Low birth weight and inappropriate breastfeeding practices result in long-term adverse consequences on the nutrition of preschool children, which should be prevented through appropriate strategies.

Keywords: breastfeeding, malnutrition, children, low birth weight, stunting, wasting, Nutritional status, underweight, school children, public health problem.

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1. Introduction

Malnutrition and infection are the two most important factors affecting children's growth. Malnutrition among children in developing countries is a major public health problem, especially in India [1]. The first five years of a child's life is a period of rapid growth and development, greatly influenced by the nutrition they receive. It is estimated that no less than 45 % of children who die

before the age of 5 years are found to have malnutrition as the underlying factor. It is estimated that 80 % of mortality occurs in low birth weight babies (LBW) [2]. Inappropriate feeding practices, in combination with other causes such as infection and food shortage, may be responsible for 1/3rd of malnutrition depending on population, time, season and place [3].

Among preschool children, for many years, a variety of anthropometric measures have been employed successfully to estimate the prevalence of malnutrition. Height-for-age, weight-for-age, and weight-for-height are examples. Height-for-age measures the cumulative effect of malnutrition on a child's life. Weight-for-age shows the combined effects of both recent and long-term dietary levels, whereas weight-for-height indicates the child's recent nutritional experiences [4].

At present, in India, 35.7 % of children less than 5 years of age are underweight. Of these, 7.5 % have moderate to severe wasting, and 38.4 % have moderate stunting [5]. The mortality risk is inversely related to children's height-for-age, and weight-for-height Under-nutrition causes weakness and recurring illness in the short term. In the long run, however, it impairs all vital functions, resulting in low weight, growth retardation in children and adolescents, decreased immunity leading to recurring infections, the occurrence of chronic diseases such as diabetes mellitus, hypertension, and coronary heart disease in later adulthood and impaired mental development [6, 7]. Childhood stunting may result in short and long-term adverse consequences such as increased childhood morbidity and mortality, impaired cognitive development, increased risk of obstetric complications in women of reproductive age, reduced productivity and earnings in adulthood and inter-generational health and nutritional effects [8].

Objectives:

1. To assess the nutritional status of children aged 2 to 5 years in the urban field practice area of SVIMS-Sri Padmavathi Medical College for Women, Tirupati.

2. To determine the impact of low birth weight, breastfeeding practices and other related factors on the nutritional status of the above study population.

2. Materials and methods

Study Design: Community-based observational cross-sectional study

Study Setting: Urban field practice area of the Community Medicine department of SVIMS-Sri Padmavathi Medical College for Women, Tirupati.

Study period: 2 months from December 2019 to January 2020

Study population: Children of age 2 to 5 years in the urban health centre area.

Sample size: NFHS-4 report showed a prevalence of malnutrition to be 28.3 % among children under 5 years of age in urban Andhra Pradesh [5]. The sample size was calculated, assuming a prevalence of 28 % among under-five children. The equation for calculating sample size isn = $Z^2P(1–P)/e^2$, where Z = level of confidence – 95 % (1.96), P = Prevalence of the disease, e = margin of error. Taking relative error as 20 % of the prevalence, the sample size was 257. Assuming the non-response rate to be 10 %, the required sample size is 282 children.

Sampling method: Simple random sampling method

Study Tools:

– Study Questionnaire: a pre-designed semi-structured study questionnaire was used to collect data regarding socio-demographic characteristics, birth history, breastfeeding practices &anthropometric data (Weight, Height).

– Digital weighing scale.

– Measuring Tape.

Inclusion criteria: children who completed 24 months (2 years) of age and were less than or equal to 60 months (5 years) were included in the study according to authentic records of their date of birth.

Exclusion criteria: children aged less than 2 years and more than 5 years. Suffering from any chronic illness that influenced their nutritional status, Born extremely premature (<28 weeks of gestational age).

Data collection: after obtaining IEC clearance, Parents of children were informed about the study objectives, and informed consent was obtained from the parents before obtaining the

related information. A simple random sampling technique was used for sample collection. In the selected households, all children aged 2 to 5 years were included in the study. Socio-economic and demographic data were collected using a pre-designed semi-structured questionnaire. Socio-economic status (SES) was evaluated using modified B.G.Prasad's classification. The child's birth history and breastfeeding practices were also collected in the study questionnaire.

Anthropometry: The weight and height of all the children 2 to 5 years of age were taken using standard procedure. Children were weighed on a digital weighing scale with an accuracy of 0.1 kg. The subject is instructed to stand without footwear, minimum clothing, feet apart and looking straight. The weighing scale was calibrated every time before a new measurement was taken. A non-stretchable measuring tape capable of measuring to an accuracy of 0.1 cm was used to measure the subjects' height. The subject was made to stand without footwear with the feet parallel and with heels, buttocks, shoulders and occiput touching the measuring base, hands hanging by the sides.

Assessment of nutrition status: Nutritional status was determined using HAZ, WHZ and WAZ scores of WHO child growth standards [9, 10].

Operational definitions:

1. Stunting (chronic undernutrition) is defined as low height for age. Children with Z-scores (HAZ) < –2 are considered stunted, and those with HAZ < –3 are severely stunted (SDG 2.2.1).

2. Wasting (acute undernutrition) is defined as low weight for height. Children with Z-scores (WHZ) < –2 are considered wasted, and those with WHZ < –3 are severely wasted (SDG 2.2.2).

3. Being underweight (mixed acute and chronic undernutrition) is defined as low weight for age. For example, children with Z-scores (WAZ) < –2 are considered underweight, and those with WAZ < –3 are severely underweight.

4. Overweight is defined as Children whose weight-for-height Z-score is more than 2 standard deviations (+2 SD) above the median of the reference population are considered (SDG 2.2.2).

Analysis plan: Collected data was entered in MS Excel Sheet 2010, and the outcomes were expressed in numbers and percentages based on Z-scores of height for age(HAZ), weight for height (WHZ) and weight for age (WAZ). Continuous variables were summarized as frequency, mean and standard deviation. Necessary statistical tests like the chi-square test were applied using IBM SPSS Statistics 26 version software to test for association between categorical variables, and $P < 0.05$ was considered statistically significant. Data was represented in the form of tables and figures.

Ethical consideration: The study was approved by the Institutional Ethics Committee (IEC No. 976) of Sri Venkateswara Institute of Medical Sciences, Tirupati on 18 November 2019. Parents of children were informed about the study objectives, and informed consent was taken before inclusion into the study. Strict confidentiality of the participant and collected data was maintained throughout the study.

3. Results

A total of 282 children with mean age of 39.9 (±10.4) months participated in the study, of which 132 (46.8 %) were boys and 150 (53.2 %) were girls. Prevalence of stunting, wasting and being underweight were 22 %, 12.4 % and 23.8 %, respectively (**Table 1).**

Table 1

Prevalence of malnutrition in the study population

Malnutrition		Total n (%)
Stunting	Present	62 (22)
	Absent	220 (78)
Underweight	Present	67 (23.8)
	Absent	215 (76.2)
Wasting	Present	35 (12.4)
	Absent	247 (87.6)

The prevalence of stunting (23.4 %) and underweight (25.2 %) was higher in the 24 to 35 months age group. The prevalence of underweight was higher (25.2 %) in the 24 to 35 months age group.

Stunting and wasting were slightly higher in females than males (**Table 2**).

Table 2

Age and Sex wise distribution of the study population in relation to malnutrition

Variable		N (%)	Stunting n (%)	Underweight n (%)	Wasting n (%)
Age (in months)	24–35	107 (37.9)	25 (23.4)	27 (25.2)	12 (11.2)
	36–47	95 (33.7)	20 (21.1)	21 (22.1)	12 (12.6)
	48–60	80 (28.4)	17 (21.3)	19 (23.8)	11 (13.8)
	p-value		0.90	0.87	0.87
Gender	Male	132 (46.8)	28 (21.2)	32 (24.2)	16 (12.1)
	Female	150 (53.2)	34 (22.7)	35 (23.3)	19 (12.7)
	p-value		0.76	0.85	0.88
Total		282 (100)	62 (22)	67 (23.8)	35 (12.4)

The majority of the study population belongs to the middle socio-economic class (36 %), followed by the upper middle class (34 %), lower middle (20 %), upper class (8 %) and lower class (2 %) (**Fig. 1**).

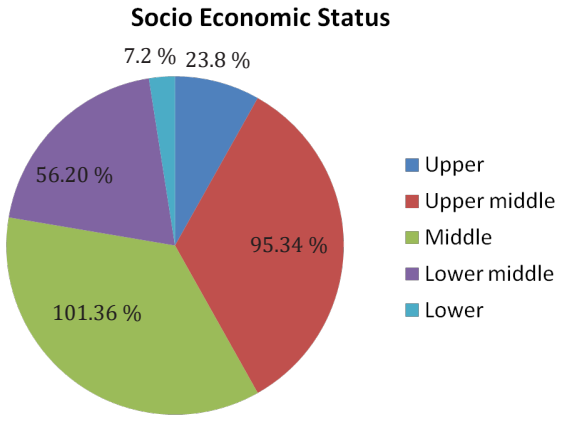

Fig. 1. Distribution of study population by Socio-Economic status

In this study, the prevalence of stunting was higher (28.6 %) among the children belonging to mothers whose age at marriage was less than 18 years. There was no significant association ($p > 0.05$) found between the age of the mother at marriage and malnutrition. About 37.6 % of the children were preterm delivered when compared to 62.4 % of full-term gestational age at birth. There was no significant association ($p > 0.05$) found between gestational age at birth and malnutrition. The prevalence of stunting was higher (36.4 %) among the children belonging to birth order more than two, and there was no significant association ($p > 0.05$) found between birth order and malnutrition. The prevalence of stunting (36.7 %) and underweight (42.9 %) was higher in the low birth weight children. A statistically significant association was found between stunting ($p = 0.006$) and underweight ($p = 0.001$) with low birth weight children. The prevalence of wasting was higher (19.1 %) among the children who were not exclusively breastfed, and there was a statistically significant association ($p = 0.02$) found between the non-practice of exclusive breastfeeding and malnutrition (**Table 3**).

Table 3
Various factors in relation to malnutrition in the Study Population

Variable			N (%)	Stunting n (%)	Underweight n (%)	Wasting n (%)
Age of Mother at marriage (in years)	<18		49 (17.4)	14 (28.6)	14 (28.6)	5 (10.2)
	18–24		205 (72.7)	42 (20.5)	46 (22.4)	27 (13.2)
	>24		28 (9.9)	6 (21.4)	7 (25)	3 (10.7)
		p-value		0.46	0.65	0.81
Gestational age at birth	Preterm		106 (37.6)	22 (20.8)	28 (26.4)	14 (13.2)
	Full Term		176 (62.4)	40 (22.7)	39 (22.2)	21 (11.9)
		p-value		0.69	0.41	0.75
Birth order	≤2		260 (92.2)	54 (20.8)	62 (23.8)	32 (12.3)
	>2		22 (7.8)	8 (36.4)	5 (22.7)	3 (13.6)
		p-value		0.08	0.91	0.85
Low Birth Weight	Yes		49 (17.4)	18 (36.7)	21 (42.9)	9 (18.4)
	No		233 (82.6)	44 (18.9)	46 (19.7)	26 (11.2)
		p-value		0.006	0.001	0.16
Exclusive Breast Feeding	Yes		193 (68.4)	47 (24.4)	45 (23.3)	18 (9.3)
	No		89 (31.6)	15 (16.9)	22 (24.7)	17 (19.1)
		p-value		0.15	0.79	0.02

4. Discussion

A total of 282 school children with mean age of 39.9 (±10.4) months participated in the study, of which 132 (46.8 %) were boys and 150 (53.2 %) were girls. This study's prevalence of stunting, wasting and being underweight were 22 %, 12.4 % and 23.8 %, respectively. In study done by Savanur MS et al. [11] revealed a higher prevalence of stunting, wasting and being underweight, that is 33.8 % and 18.5 % and 35.7 %, respectively. Abubakar A et al. [12] study also observed high rates of stunting (44.2 %) and underweight (19.1 %). The prevalence of stunting (23.4 %) and underweight (25.2 %) was higher in the 24 to 35 months age group. The prevalence of underweight was higher (25.2 %) in the 24 to 35 months age group. Stunting and wasting were slightly higher in females compared to males. No significant association ($p > 0.05$) was found between the age and gender of the child with malnutrition in this study. Whereas R A et al. [13], in their study, showed that the prevalence of undernourishment increased with increasing age, and the difference was found to be statistically significant ($p < 0.05$). RA et al. [13] study also revealed that the prevalence of undernourishment was higher among male children when compared to female children, and a statistically significant association was found between gender and nutritional status.

The prevalence of stunting (36.7 %) and underweight (42.9 %) was higher in the low birth weight children. A statistically significant association was found between stunting ($p = 0.006$) and underweight ($p = 0.001$) with low birth weight children. Similar results were observed in the Yadav SS et al. [14] study, which revealed 41.3 % of children were underweight, and Mittal A et al. [15] study depicted 38.38 % had low WFA & 46.06 % had low HFA. Abubakar A et al. [12] study also revealed that low birth weight showed marginal significance (OR: 2.90 (95 % CI: 1.12–7.44); $p = 0.07$) for predictors of being underweight. The prevalence of wasting was higher (19.1 %) among the children who were not exclusively breastfed, and there was a statistically significant association ($p = 0.02$) found between the non-practice of exclusive breastfeeding and malnutrition. These differences can possibly be due to various factors such as socio-economic status, educational level of the mother, birth weight and feeding practices. Abubakar A et al. (12), in their study, showed that breastfeeding has a significant association (OR: 3.27 (95 % CI: 1.93–5.521);

$p < 0.001$) with predictors of stunting. R A et al. [13] also revealed a statistically significant association between the duration of exclusive breastfeeding and the nutritional status of the children in their study.

Limitations of our study. A follow-up study design is much better for assessing the nutritional status of the children than the current cross-sectional study design but requires more resources and time.

Prospects for further research. The literacy status of the parents should be improved. Mothers can be self-employed through self-help group formation for the economic improvement of the family to some extent. Providing quality antenatal care to pregnant women will reduce the incidence of low birth weight. Reinforcing nutritional education, including IYCF practices, is to be stressed. Parents should be encouraged to send children to ICDS centres regularly.

5. Conclusions

The present study showed the prevalence of stunting, wasting, and being underweight was 22 %, 12.4 % and 23.8 %, respectively. Stunting and wasting were slightly higher in females compared to males. The majority of the study population belongs to the middle socio-economic class. A statistically significant association was found between stunting and underweight with low birth weight children.

The present study revealed a high prevalence of malnutrition, especially stunting, a common outcome of long-term malnutrition among young children. Low birth weight and inappropriate breastfeeding practices result in long-term adverse consequences on the nutrition of preschool children, which can be addressed through appropriate community-based strategies. The current study highlighted the importance of implementing appropriate strategies and context-specific interventions to prevent malnutrition among children.

Conflict of interest

The authors declare that there is no conflict of interest in relation to this paper, the published research results, the financial aspects of conducting the research, obtaining and using its results, and any non-financial personal relationships.

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Data availability

Data will be made available on reasonable request.

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