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ORIGINAL RESEARCH

Evaluation of nutritional status of children aged 1-5 years residing in urban slums of Faridkot

[1]Dr.Saminderpal Kaur, [2]Dr. Shalini Devgan, [3]Dr. Shilpa Arora, [4]Dr. Vishal Gupta, [5]Dr. Gaganpreet Singh, [6]Dr. Urvashi, [7]Dr. Hobinder Arora

[1]PG Resident 3rd Year, [2,4,5]Associate Professor, [6,7]Assisstant Professor Deptt. of Community Medicine, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India
[3]Associate Professor, Deptt. Of Microbiology, Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India

Correspondence:
Dr. Vishal Gupta
Associate Professor, Deptt. of Community Medicine, Guru Gobind Singh Medical College And Hospital, Faridkot, Punjab, India

Abstract

Introduction: The etiology of childhood malnutrition is complex involving interactions of multiple determinants that include biological, cultural and socio-economic influences. Hence the present study was planned and commenced to assess the nutritional status of children aged 1-5 years residing in urban slums of Faridkot.

Material and Methods: The present community based cross sectional study was conducted in urban slums of Faridkot block among children aged 1-5 years and their mothers. House to house survey was conducted and urban slum wise line list of households was made with children required age group. After interview, anthropometric measurements of mother (height and weight) and child (height, weight, mid upper arm circumference (MUAC), head circumference and chest circumference) was measured using standardized tools.The data was analyzed using suitable SPSS (Statistical Package for Social Sciences) version 20.

Results:19.2% children were stunted (on the basis of z-score or standard deviation classification system). 15.66% were underweight (on the basis of z-score or standard deviation classification system). 43.7% were malnourished (according to their BMI), out of which 10% were overweight, 15.6% were obese, 13.3% were thin, and 4.8 % were severely thin. 16.6% children had chest circumference (below desired normal range for age). 12.3% of the study subjects had head circumference (below desired normal range for age). 88% of the children had Mid upper arm circumference below normal range i.e.13.5 cm.

Conclusion: Enhancement of education of mothers and caretakers regarding increased nutritional intake with increasing age, proper child-rearing and feeding practices, and improving hygiene and sanitation forms the basis of child's good health. In our study, we found that majority of the mothers used to breastfed their children till 2 years and delayed their complimentary feeding beyond 6 months. So, the risk of malnutrition among the children of urban slums can be addressed by strict adherence to the Infant and young child feeding (IYCF) guidelines and continuous monitoring of the feeding practices by health workers.

Keywords: Anthropometric; Malnutrition; Undernutrition

Introduction

According to World Health Organization (WHO), 52 million children under 5 years of age are wasted, 17 million are severely wasted and 155 million are stunted all over the world.

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Around 45% of deaths among children under 5 years of age are linked to undernutrition. These mostly occur in low- and middle-income countries. Severely wasted children are 11 times more likely to die than those with a healthy weight. Undernourished children catch infections more easily and have a harder time recovering because their immune systems are impaired.[1]

Children under five years of age present higher risk of malnutrition because of their high nutrient requirements for rapid physical and physiological growth.[2] Undernutrition is one of the major causes of child mortality and morbidity in developing countries. Undernutrition is manifested by protein-energy malnutrition, iodine deficiency disorder, iron deficiency anemia and vitamin deficiency related problems. The combined effect of these problems have an immense impact on child's health, growth, development and academic performance.[3]

The term malnutrition addresses 3 broad groups of conditions i.e. undernutrition, which includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age), micronutrient-related malnutrition, which includes micronutrient deficiencies (a lack of important vitamins and minerals) or micronutrient excess and overweight.[2]The etiology of childhood malnutrition is complex involving interactions of multiple determinants that include biological, cultural and socio-economic influences. The socio-economic cost of the malnutrition burden to the individual, family and country is high resulting in lower cognitive outcomes in children and lower adult productivity.[4]Hence the present study was planned and commenced to assess the nutritional status of children aged 1-5 years residing in urban slums of Faridkot.

Material and Methods

The present community based cross sectional study was conducted in urban slums of Faridkot blockover a period of one year (May 2020-April 2021)among children aged 1-5 years and their mothers. Faridkot one of the twenty-three districts of Punjab which is situated in northwest region of the state between 29 33' N to 32 32' N latitude and 73 53' E to 76 56' E longitude. It is one of the smaller districts, carrying only 2.92% of total area (1458 km2) of the state and accommodating 2.27% of total population (6,17,508). District has 3 blocks namely Faridkot, Kotkapura and Jaito. Faridkot comprises of 102 villages and 22 wards, Kotkapura comprises of 94 villages and 23 wards and Jaito comprises of 42 villages and 16 wards.

Prior to commencement of study, list of all the urban slums in Faridkot block was obtained from municipal corporation office. House to house survey was conducted and urban slum wise line list of households was made with children aged 1-5 years. Line list included survey house number, name of head of family, number of children aged 1-5 years.

After line- listing, unique identification number was allotted to each household, based on which the allocated sample size was randomly selected using lottery method. Selected households were visited and informed written consent was taken from the mother of child aged 1-5 years who satisfied all the inclusion and exclusion criteria. Inclusion criteria was children of age group 1-5 years. Exclusion criteria was children whose mothers refused to give consent, children who were suffering from any chronic illness or from permanent disability and child whose mother was not available (does not live with child or has died). Ethical approval for this study was taken from the institutional ethical committee prior to start of the study. Informed written consent was obtained before each interview from the mother of child. If a household had more than one child of same age group, the elder child was included in the study. One to one interview of mother was held and relevant information regarding socio-demographic profile of the family, feeding and immunization history of the child, past history of illness and treatment received, personal hygiene and environmental sanitation was obtained from mother. After interview, anthropometric measurements of

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mother (height and weight) and child (height, weight, mid upper arm circumference (MUAC), head circumference and chest circumference) was measured using standardized tools as follows:[5]

Weight

Weight of the child was recorded using digital weighing scale. The scale was frequently calibrated with standard weights and zero error was adjusted before weighing. Ideally nude weight should be recorded, but it is acceptable to record weight with minimal or identical clothes each time.

Height

Recumbent length was measured up to 2 years of age with the help of an infantometer, while in older children standing height was measured. The infant was placed supine on the infantometer. His/ her mother was asked to keep the vertex or top of the head snugly touching the fixed vertical plank, so that external auditory meatus and lower margins of the orbits were aligned perpendicular to the table. The legs were fully extended by pressing over the knees, and feet were kept vertical at 90 degree, the movable pedal plank of infantometer was snuggly apposed against the soles and length was read from the scale to the nearest 0.1 cm. In older children (> 2 years age) who can stand, height was measured by simply making the child stand against a wall on which a measuring scale was inscribed. The child was stand with bare feet on a flat floor against a wall with feet parallel and with heels, buttocks, shoulders and occiput touching the wall. The head was held erect with eyes aligned horizontally and ears vertically without any tilt. The child was asked to stand erect and try to make himself as tall as possible without lifting the heels from ground. With the help of a wooden spatula or a plastic ruler, the topmost point of vertex was identified on the wall.

Headcircumference

Head circumference was measured with the help of standarized measuring tape, which encircled over the most prominent parts of occiput and supraorbital frontal areas with sufficient pressure to compress the hair and head circumference was recorded to the nearest 0.1 cm.

Chestcircumference

Chest circumference was measured with the help of standardized measuring tape at the level of nipples.

MUAC

It was measured with the help of standardized measuring tape. This was measured over the left upper arm. A point was marked over the anterior surface of the arm, midway between acromion (shoulder) and the olecranon (elbow) with arm bent at right angle. The child was asked to stand or sit with the arm hanging loose at the side.

Nutritional status was assessed on the basis of Z scores and they were calculated as follows using Anthroplus software.

Z= (Observed value- median value of reference population)÷ SD value of population.

BMI of the mother was calculated using formula= weight (in kg) ÷ height (m^2).

Stool and blood samples of children were collected.

The data was entered in MS Excel and analyzed using suitable SPSS (Statistical Package for Social Sciences) version 20. Data was represented in the form of tables and graphs (whichever was appropriate) for easy interpretation. Z scores for anthropometric measurements were calculated using WHO anthroplussoftware . Based on these, children were classified as underweight, stunted, wasted and normal. Proportions and frequencies

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were calculated for descriptive data analysis. Mean ± Standard deviation for normally distributed variables / median Interquartile Range (IQR) for not normally distributed variables, were calculated in case of continuous variables.

Association of various risk factors with undernutrition, anaemia and intestinal parasitic infections was established using Chi square test. P value <0.05 was considered as statistically significant Strength of association was expressed as Odds ratio by multivariate logistic regression. Following this P value of 0.20 was used as elimination criteria for regression analysis.

Results

Table 1: Distribution of subjects according to type of feeding

Type of feeding	No. (%)
Exclusive breast feeding	270 (90)
Mixed feeding	28 (9.3)
Bottle feeding	2 (.66)

*Figures in parenthesis are percentage

Table 1 illustrates that majority of the subjects under study 270 (90%) were exclusively breast fed. 2 (0.66%) children were bottle fed.

Table 2: Distribution of subjects according to time of breast feeding initiation at birth and its total duration

Breast feeding initiation at birth	
Within 1 hr.	149 (49.6)
1-4 hrs.	135 (45)
4-12 hrs.	14 (4.6)
12-24 hrs.	1 (.33)
>24 hrs.	1 (.33)
Total duration of breast feeding	
<=6 months	12 (4)
>6 months – 2 yrs.	288 (96)

*Figures in parenthesis are percentages

Table 2 depicts that out of total 300 subjects, 149 (49.6%) and 135 (45%) of the children were breastfed within 1 hour and 1-4 hours after delivery respectively. Out of total, 288 (96%) children were breastfed for more than 6 months.

Table 3: Distribution of subjects according to anthropometric measurements

	Range	No. (%)
Height	>or =-2 z score	242 (80.6)
	-3 to <-2 z score	29 (9.6)
	<-3 z score (severe stunting)	29 (9.6)
Weight	>or =-2 z score (well nourished)	252 (84)
	-3 to <-2 z score (moderate)	31 (10.33)
	<-3 z score (severe wasting)	16 (5.33)
Body Mass Index	Normal (-2 -+1 SD)	169 (56.3)
	Overweight (>+1SD)	30 (10)
	Obesity (>+2 SD)	47 (15.6)
	Thinness (<-2SD)	40 (13.3)
	Severe thinness (<-3SD)	14 (4.8)
Chest Circumference	<45 cms	50 (16.6)

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	>45 cms	245 (81.6)
Head Circumference	<45 cms	37 (12.3)
	>45-51 cms	263 (87.7)
Mid upper arm Circumference	>13.5	36 (12)
	11.5-13.5	264 (88)
	<11.5	0 (0)

*Figures in parenthesis are percentages

Table 3 shows distribution of subjects based on their anthropometric measurements. Out of 300 subjects, 58 (19.2 %) were stunted, 47 (15.66 %) were underweight, 131 (43.7%) were malnourished (BMI), 50 (16.6%) had chest circumference less than 45 cms, 37 (12.3%) had head circumference less than 45 cms, 264 (88%) had malnutrition on the basis of Mid upper arm circumference.

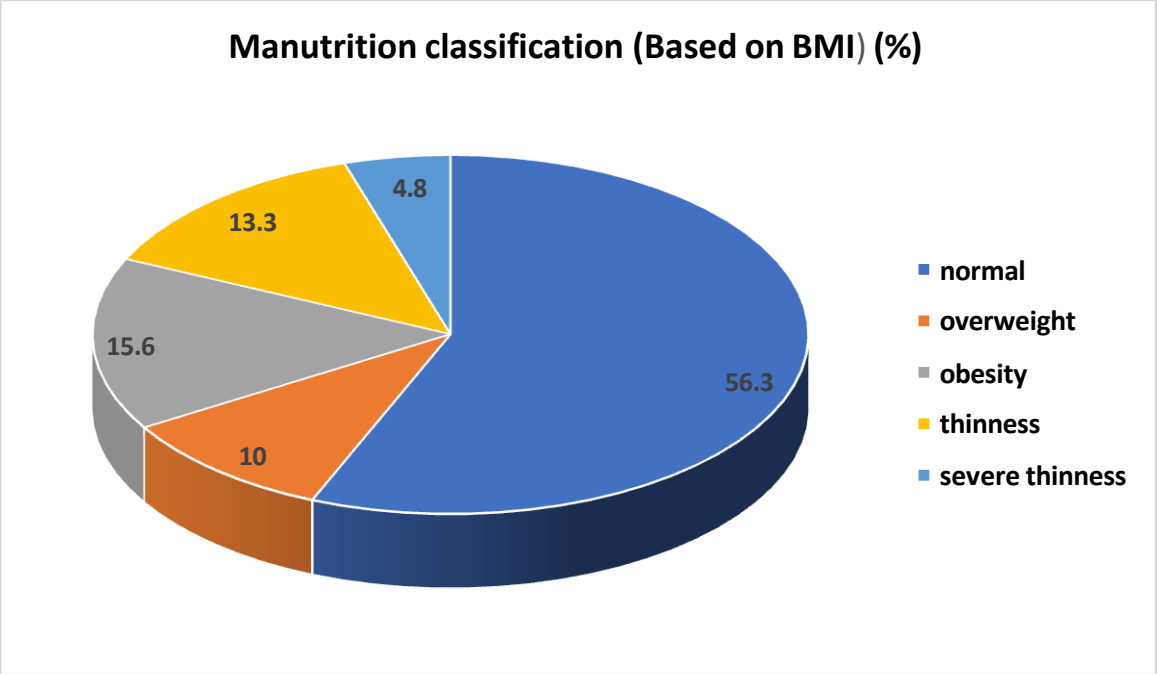

Figure 1: Distribution of subjects based on BMI classification

Figure 1 shows distribution of subjects according to BMI classification . Out of the total subjects, 56.3 % had BMI falling under normal category, 15.6% were obese, 13.3% were thin, 10% were overweight and 4.8 % were severely thin.

Table 4: Analysis showing association of educational and occupational status of mother with BMI of children

Variables		BMI		Total
		Normal	malnourished	
Education of mother	Illiterate	23 (14)	17 (13)	40 (13)
	Primary school	33 (19)	29 (22)	62 (21)
	Middle school	48 (28)	29 (22)	77 (26)
	10^{th} pass	33 (19)	28 (21)	61 (20)
	12^{th} pass	22 (13)	16 (12)	38 (13)
	Graduate	10 (6)	12 (9)	22 (7)
	total	169	131	300
χ^2=6.39, p=.781,df=10				
Occupation of mother	Unemployed	159 (94)	122(93)	281(94)

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	Employed	10 (6)	9 (7)	19 (6)
Total		169	131	300
χ^2=.93, p=.627,df=2				

*Figures in parenthesis are percentages; p value <0.05 is significant.

Table 4 shows association of educational and occupational status of motherwith BMI of children. Out of total malnourished children i.e.131 (44%), same number of subjects i.e., 29 (22%) belonged to those mothers, who were educated upto middle school standard and primary school. Results are statistically insignificant. This table also depicts that out of the total malnourished children, majority 122 (93%) belonged to those mothers who were unemployed. Results were statistically insignificant.

Table 5: Analysis showing association of birth interval of children with their BMI

Variables		**BMI**		**Total**
		Normal	**malnourished**	
Birth interval	**<3**	138 (82)	107 (82)	245 (82)
	>=3	31 (18)	24 (18)	55 (18)
Total		169	131	300
χ^2=1.810, p=.40, df=2				

*Figures in parenthesis are percentages; p value <0.05 is significant.

Table 5 shows association of birth interval of children with their BMI**.** Out of those 245 (82%) subjects, whose mothers had birth interval of less <3 years, 138 (82%) were normal and 107 (82%) were malnourished. Results were statistically insignificant.

Table 6: Analysis showing association of birth weight of subjects with their BMI

Variables		**BMI**		**Total**
		Normal	**malnourished**	
Birth weight	**<2.5 kg**	62 (37)	53 (40)	115 (38)
	>=2.5 kg	107 (63)	78 (60)	185 (62)
Total		169	131	300
χ^2=1169.48, p=0.00, df=4				

*Figures in parenthesis are percentages; p value <0.05 is significant.

Table 6 depicts association of birth weight of subjects with their BMI. Out of those subjects, who were having low birth weight (<2.5 kgs) i.e.115 (38%), 62 (37%) were normal and 53 (40%) were malnourished. Results came out to be highly statistically significant.

Discussion

Protein-energy malnutrition and micronutrient deficiency leading to early growth failure often can be traced to poor maternal nutritional and health care before and during pregnancy, resulting in intrauterine growth retardation and children born with low birth weight. While significant progress has been achieved over the past 30 years in reducing the proportion of malnourished children in developing countries, nonetheless, malnutrition persists affecting large numbers of children.[4]

In our study, majority (90%) of the children were exclusively breast fed. Out of the total, 96% children were breastfed for more than 6 months. Another study conducted by Egata et al. in Gurage zone showed that about91.7% of mothers gave exclusive breast feeding greater than or equal to eight times per day.[6]

In current study, 49.6% and 45% of the children were breastfed within 1 hour and 1-4 hours after delivery respectively. Almost similar findings has been reported by NFHS 5 survey

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which was conducted during the time period of 2019-21, which concluded that 44.7% children under age 3 years were breastfed within one hour of birth.[7]

In present study, 19.2 % of the children were stunted, 15.66 % were underweight, 43.7% were malnourished according to their BMI, 16.6% had chest circumference less than desired normal range,12.3% had head circumference less than desired normal range, and 88% had mid upper arm circumference less than desired normal range. It was relatively lower when compared with NFHS 5 survey[7] which concluded that 30.1% children were stunted and 27.3% were underweight. According to a study done by Das et al[8] in Karnataka reported that overallprevalenceofunderweight and stunting,werefoundtobewas34.14%,45.52% respectively.However,astudyconductedbyHoughtonetal9intheurbanslumsofDelhifoundthata mongthechildrenresidinginslumsareas,39%werestunted and 31%underweight.AnotherstudyconductedbyLohia Net al[10]intheurbanslumsofMumbaifoundthat amongparticipants,nearly51.3%werestunted,26.7% wereunderweight.Similarly Tine et al[11] in Senegal reported overall prevalence of stunting was 22.3% and of under- weight was 16.3%.

In the current study, it was observed that out of the total malnourished children, 50% belonged to class IV (upper lower) socioeconomic status. Similarly, another study conducted in Assam by Islam et al[12] reported that overall prevalence of malnutrition was found to be higher among the children belonging to lower socioeconomic classes (IV and V).

In present study, malnutrition was found to be associated with birth weight of children, immunization status, and type of feeding (exclusive breast feeding) on Chi square test (p value=<0.05). However, on multivariate logistic regression, only immunization status was found to be statistically significant associated with malnutrition (p value =0.2).

A similar study conducted in northeast India by Meshram et al[13] documented that exclusive breastfeeding was observed to be associated with undernutrition among infants. Similar results were documented in a study done by Islam et al[12] in tribal areas of Assam.Another study done by Das et al[8]in Karnataka concluded that birth weight was associated with malnutrition in under 5 children.

Conclusion

Enhancement of education of mothers and caretakers regarding increased nutritional intake with increasing age, proper child-rearing and feeding practices, and improving hygiene and sanitation forms the basis of child's good health. Health education regarding nutritional requirements should be given to mothers by health workers. With effective control measures in place, these children will have a greater opportunity for a better future in terms of health and educational attainment, which will eventually put them on par socially and economically with other communities. In our study, we found that majority of the mothers used to breastfed their children till 2 years and delayed their complimentary feeding beyond 6 months. So, the risk of malnutrition among the children of urban slums can be addressed by strict adherence to the Infant and young child feeding (IYCF) guidelines and continuous monitoring of the feeding practices by health workers.

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