# **Research Article**

# MID ARM CIRCUMFERENCE AND TRICEPS SKIN FOLD THICKNESS IN UNDER FIVE URBAN SLUM CHILDREN.

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#### Abstract :

**Introduction:** Nutritional status of urban slums is worst amongst all urban groups and even poorer than rural average. Mid arm circumference provides overall information regarding the status of muscle development and protein calorie malnutrition. Triceps skin fold thickness measurement acts as a useful indicator of body fat and hence of calorie reserves. Measuring both parameters is very easy.

**Objectives:** The current study was undertaken to know the nutritional status of under five children of a urban slum using mid arm circumference and triceps skin fold thickness.

**Methodology:** The present study was a cross sectional study. Study included 179 urban slum children of whom 87 were boys and 92 were girls. Anthropometric data in the form of mid arm circumference in cms and triceps skin fold thickness in mm were collected by standard methods as reported by D. B. Jelliffe. Analysis of data was done according to WHO child growth standards.

**Results:** By using mid arm circumference WHO cut offs, 27.17% of girls and 29.88% of boys were found to be malnourished. Triceps skin fold thickness showed 26.08% of girls and 25.28% of boys to be malnourished.

**Conclusion:** There is a high prevalence of malnutrition in under five children of urban slums. Nutritional factor plays a bigger role than genetic factor in influencing growth.

**Implications:** Health education, improving nutrition, improving people and environmental hygiene, improving education level of parents, regular health screening and timely treatment of childhood illnesses are the essential factors.

Key words: Mid arm circumference, Triceps skinfold thickness, children, slum.

#### INTRODUCTION

Malnutrition in children is becoming a major health issue with its drastic consequences. The major cause for child mortality in developing countries in the first five years of life is malnutrition.<sup>1</sup>

The assessment of body composition in childhood can be performed with several sophisticated techniques <sup>2,3,4.</sup> but in many circumstances, it is more desirable to utilize widely available and simple techniques such as anthropometry

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Poor muscle development or muscle wasting are cardinal features of all form of protein calorie malnutrition. Mid arm circumference (MAC) provides overall information regarding the status of muscle development. This region is easily accessible, even with a young child sitting in front of examiner on his mother lap.<sup>5</sup> MAC appears to be a better predictor of childhood mortality than weight for height.<sup>6</sup>

Skin fold thickness (SFT) measurements are a well established means of assessing the thickness of subcutaneous fat at all ages; including infancy and neonatal periods.<sup>7,8</sup> There are different recognized areas for the measurement of SFT, which include triceps SFT (TSFT), biceps, subscapular, suprailiac, abdominal (flank), chest and thigh (quadriceps) skin folds. If only one skin fold is measured, it is usually the triceps SFT.<sup>9,10</sup> This method is used extensively in clinical practice and field studies because of its simplicity, non invasiveness, quickness of use as well as compatability with methods that directly determine body fat mass.<sup>11</sup>

Insufficient calorie intake and protein intake are common in the poor socio economic children.<sup>12</sup> Nutritional status of urban slums is worst amongst all urban groups and even poorer than rural average.<sup>13</sup> Hence the present study was done to assess the nutritional status of children of a urban slum using MAC and TSFT.

## MATERIALS AND METHODS:

Study included 179 urban slum children under five years. Among 179 children 87 were boys and 92 were girls. The guidelines of institutional ethical committee were followed during the study. Ethical clearance was taken from the institutional ethical committee. Consent was taken from the parents / guardians of children who participated in the study.

Age and sex of children was noted. Anthropometric data in the form of MAC in cms and TSFT in mm were collected by standard methods as reported by D.B. Jelliffe.<sup>13</sup> For MAC, the right arm was measured, while hanging freely, at its mid point (i.e. between the tip of acromian process of the scapula and the olecranon process of ulna) with the help of a fibre tape. The tape was applied gently, but firmly, around the limb to avoid the compression of soft tissues. It was measured to the nearest 0.1 cm.

For measuring triceps SFT, right arm, at the mid point between the tip of the acromian process of the scapula and the olecranon process of the ulna was selected. Measurement was made with the arm hanging relaxed at the side. The skin fold over the triceps parallel to long axis was picked between the thumb and forefinger of the left hand, clean away from the underlying muscle and measured at this point with the help of Galaxy – Harpended type skin fold caliper. The reading was taken to the nearest 1 mm.

Assessment of nutritional status was done using WHO child growth standards, age and sex specific Z score values. Z score < - 2 standard deviation was taken as moderate malnutrition and Z score < - 3 standard deviation was taken as severe malnutrition for both MAC and TSFT.<sup>14</sup>

## **RESULTS :**

Table -1, shows the age wise distribution of malnutrition in under five children based on WHO child growth standards MAC cut off values for age and sex. 24.13% and 15.21% of boys and girls respectively were moderately malnourished and 5.74% and 11.95% of boys

and girls respectively were severely malnourished. Total malnourishment was 29.88% and 27.17% among boys and girls respectively. Highest prevalence of malnourishment was seen during 0-12 months age among both boys and girls.

Table -2, shows the age wise distribution of malnourishment in under five children based on WHO children growth standards TSFT cut off values for age and sex. 12.64% and 18.47% of boys and girls respectively were moderately malnourished and 12.64% and 7.6% of boys and girls respectively were severely malnourished. Total malnourishment was 25.28% among boys and 26.08% among girls. Highest prevalence of malnourishment was seen during 0-12 months age group among both boys and girls.

Age	Boys				Girls			
in months	No.	M (%)	SM (%)	Total (%)	No.	M (%)	SM (%)	Total (%)
0 – 12	13	5 (38.46)	1 (7.6)	6 (46.15)	13	4 (30.76)	2 (15.38)	6 (46.15)
13 – 24	18	4 (22.22)	2 (9.09)	6 (33.33)	20	5 (25)	3 (15)	8 (40)
25 - 36	15	3 (20)	0 (0)	3 (20)	25	3 (12)	2 (8)	5 (20)
37 - 48	24	6 (25)	1 (4.16)	7 (29.16)	22	0 (0)	1 (4.54)	1 (4.54)
49 - 60	17	3 (17.64)	1 (5.88)	4 (23.52)	12	2 (16.66)	3 (25)	5 (41.66)
Total	87	21 (24.13)	5 (5.74)	26 (29.88)	92	14 (15.21)	11 (11.95)	25 (27.17)

Table - 1 : Age wise nutritional status based on MAC in under five children of a urban slum

M-Moderate malnutrition, SM-Severe malnutrition.

Table - 2 : Ag	e wise nutritional	status based on	TSFT in under	five children	of a urban slum
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Age	Boys				Girls			
in months	No.	M (%)	SM (%)	Total (%)	No.	M (%)	SM (%)	Total (%)
0-12	13	2 (15.38)	3 (23.07)	5 (38.46)	13	5 (38.46)	2 (15.38)	7 (53.84)
13 – 24	18	3 (16.66)	(25.07) 3 (16.66)	6 (22.22)	20	4 (20)	(10.50)	6
25 - 36	15	(10.00) 2 (12.22)	$\begin{array}{c} (10.00) \\ 1 \\ (6.66) \end{array}$	$\begin{array}{c} (33.33) \\ 3 \\ (20) \end{array}$	25	(20)	(10)	3
37 - 48	24	(13.33) 3 (12.5)	(0.00) 2 (8.33)	(20) 5 (20.83)	22	(0) 3 (13.63)	$\begin{array}{c} (4) \\ 1 \\ (4.54) \end{array}$	(12) 4 (18,18)
49 - 60	17	(12.3) 1 (5.99)	(6.55) 2 (11.76)	(20.03) 3 (17.64)	12	(15.05) 3 (25)	(4.34) 1 (8.22)	(10.10) 4 (22.22)
Total	87	(12.64)	11 (12.64)	(17.04) 22 (25.28)	92	(23) 17 (18.47)	7 (7.60)	24 (26.08)

M-Moderate malnutrition, SM-Severe malnutrition.

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#### **DISCUSSION:**

Nutrition is one of the basic requirements of any living organism to grow and sustain life.<sup>15</sup> Nutritional factor plays a bigger role than genetic factor in influencing growth. Well fed children of different countries grow in a similar pattern inspite of different racial origins.<sup>12</sup> MAC is relatively simple index, but with fixed cut offs, it ignores age related changes. Hence WHO age and sex specific MAC cut offs were used in the present study. Skin fold thickness is a practical and a valuable method used in evaluating both the nutritional status and the body adiposity.<sup>11</sup>

Based on MAC, overall total malnutrition was 29.88% in boys and 27.17% in girls. In the present study, both boys and girls equally suffered from malnutrition. Similar to the present study Mistra B.K. et al<sup>15</sup> have reported 27% malnutrition among urban boys and girls taken together. In agreement with the present study, their study has also revealed that moderate malnutrition is more prevalent (19%) than severe malnutrition (8%) based MAC. Chatterjee and Saha<sup>16</sup> have also reported 28.6% malnutrition among children in their study in Kolkata in 2008. But Kaur et al<sup>17</sup> Mishra and Mishra et al<sup>15</sup> and Mandal G et al<sup>18</sup> have reported a higher prevalence of malnutrition of 38.52%, 58.0% and 64.5% respectively using in MAC in their studies. In the present study highest prevalence of malnutrition was seen in 0-12 months of age group. This could be because of faulty weaning practices.

Prevalence of overall malnutrition using TSFT cut offs were 25.28% in boys and 26.08% in girls. Malnutrition affected both boys and girls equally in the present study. Nabag FO,<sup>19</sup> in their study in Sudan in 2011, have reported a prevalence of 9.4% and 1% thinness in girl children of rural area and urban area respectively using 5<sup>th</sup> percentile TSFT cut off values of 1995 WHO standards. Study done on nutritional status of children admitted to neurology ward has reported that 32.7% children had Z scores of TSFT below -1.<sup>20</sup> Jain V et al<sup>21</sup> in their study in India on nutritional parameters in children with malignancy found TSFT less than 5<sup>th</sup> percentile in 84.1% of children. TSFT mean values were higher in survivors than non survivors. They also reported that MAC and TSFT detected malnutrition better than height and weight anthropometry. This can be explained by the fact that presence of a large tumor mass, ascites or edema can mask the effect of nutritional depletion on body weight and secondly, when faced with nutritional restrictions, the body first utilizes its nutritional reserves stored in the form of skeletal muscle protein and fat reflected by an early decline in MAC and TSF values.<sup>22</sup>

Highest prevalence of malnutrition was seen in age group 0-12 months among both boys and girls in the present study. Again this could be because of faulty weaning practices.

Malnutrition is highly prevalent in urban slum children. Health education, improvement in socio economic status, literacy status of parents, better nutritional supply, proper weaning practices, timely treatment of childhood illnesses, improving environmental hygiene in slum areas, immunization, strengthening of all childhood government schemes are the areas of focus to improve nutritional status of urban slum children.

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