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Original Research Article

Nutritional Assessment of Under Five Children Attending Pediatric Clinic in a Tertiary Care Hospital in the Capital of Nepal

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ABSTRACT:

Introduction: There has been a decreasing trend in malnutrition (stunting, wasting, and under-weight) in Nepal from 2001 till 2016 according to Nepal demographic health survey 2016. We tried to study whether these national survey data equally reflect the nutritional status of children visiting hospitals in the capital city of our country. The objective of the study was to evaluate the nutritional status of children less than five years of age brought to a hospital in Kathmandu. **Methods**: Anthropometric measurements (height/length and weight), other demographic details, and morbidity of all children, six months to five years of age, visiting the hospital over the period of three months were collected from the out-patient register. Height-for-age, weight-for-height, and weight-for-age were calculated and expressed as standard deviation units as compared to the median of reference data taken from WHO Multicentre Growth Reference Study Group (2007). Association between morbidity and various anthropometric values were calculated. **Results**: A total of 424 children were included in the study. There were 2.1% severely stunted, 8% stunted, 2.8% tall, and 1.7% very tall children. Similarly, 6.4% were severely wasted, 14.4% wasted, 4.7% severely under-weight, and 12.3% under-weight. The anthropometric values were significantly associated with morbidity (acute Vs chronic) but not associated with whether they were from within Kathmandu or form outside, and individual morbidity. **Conclusion**: Wasting and severe wasting in under five children from and nearby Kathmandu of Nepal is higher while stunting and severe stunting is lower as compared to previous National reports.

Keywords: children • nutrition • nutritional status • stunting • underweight

INTRODUCTION:

Good nutrition allows children to grow, develop, learn, play, participate, and contribute while malnutrition robs children of their futures and leaves young lives hanging in the balance. The high rate of child under-nutrition in Nepal remains a major problem despite a steady decline in recent years. Based on Nepal demographic health survey 2016, trends of nutritional status of children under five from 2001 to 2016 are: Stunting 57% in 2001 to 36% in 2016, wasting 11% in 2001 to 10% in 2016, and underweight 43% in 2001 to 27% in 2016. Anemic children decreased from 48% in 2006 to 46% in 2011.[1] We would like to study whether these national survey data equally reflect the nutritional status of children visiting hospitals in the capital city of our country, Nepal. The objective of the study was to evaluate the nutritional status of children less than five years of age brought to a hospital in Kathmandu. The secondary objective was to analyze the relationship between nutritional status and several demographic factors.

METHODS:

It was a retrospective, observational, cross-

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sectional, and analytical study done in pediatric clinic of Manmohan Memorial Hospital in Kathmandu, Nepal. Anthropometric measurements (height and weight), other demographic details, and morbidity of all children from six months to five years were collected from the out-patient register. Children with incomplete data were excluded. The study was done over the period of three months from 16th July 2016 to 15th October 2016. The study was approved by the institutional review committee of the hospital.

Weight in kilogram (kg), length (for less than two years) in centimeter (cm), or height (for two years or above) in centimeter were measured in standardized weighing scale (bathroom scale, infant-meter or stadio-meter). The three indices: Height-for-age, weight-for-height, and weight-for-age were expressed as standard deviation units as compared to the median of reference data. The reference data was taken from WHO Multicentre Growth Reference Study Group (2007).[2] Data were entered into Microsoft Excel™ 2010 and then imported into SPSS™-17 (Statistical Package for the Social Sciences, version 17). Data in SPSS were compared to the reference data using WHO Child Growth Standards SPSS Syntax File (igrowup.sps). [3] The syntax file produces sex- and age-specific estimates for the prevalence of under/over nutrition and summary statistics (mean and *SD*) of the z-scores for each indicator.

Children who fell below minus two standard deviations (-2 SD) from the median of the reference population were regarded as malnourished, while those below minus three standard deviations (-3 SD) as severely malnourished. Height-for-age is a measure of linear growth. A child who fell below minus two standard deviations (-2 SD) for height-for-age was considered short for his or her age, or stunted while below three standard deviations (SD) was considered severely stunted. Children above 2 SD were considered tall and above 3 SD very tall. Weight-for-height describes current nutritional status. A child who was below minus two standard deviations for weight-for-height was considered thin for his or her height, or wasted, a condition reflecting acute or recent nutritional deficits. A child who was below minus three standard deviations was considered very thin or severely wasted. Weight-for-age below -2 SD was considered underweight whereas below -3 SD severely underweight. If weight-for-age was more than +1 SD, we followed weight-for-height-for-age chart.[4]

Morbidity was classified as acute and chronic depending on the diagnosis. Acute morbidity included URTI, fever less than two weeks, chest infection less than two weeks, acute gastroenteritis (AGE/dysentery). Chronic morbidity include fever more than two weeks, recurrent cough (RAD/ asthma) among other.

Descriptive statistics were presented in term of frequency and percentage. *Chi-square* test and *Fisher-exact* test were applied as appropriate to estimate the association between various factors with normal or abnormal anthropometric values. *P* value less than 0.05 was consider statistically significant.

RESULTS:

Four hundred twenty four children aged six months to 60 months were included in the study. There were 230 (54.2%) male and 194 (45.8%) female. Abnormal height-for-age was found in 14.6% ($n = 62$), abnormal weight-for-height in 23.6% ($n = 100$) and abnormal weight-for-age in 19.8% ($n = 84$). Relationship between gender and these three anthropometric values were not statistically significant (For height-for-age Vs gender: $X^2[N=424, df=1] = 2.2$, $p = 0.12$; for weight-for-height Vs gender: $X^2[N=424, df=1] = 0.16$, $p = 0.69$; for weight-for-age Vs gender: $X^2[N=424, df=1] = 3.3$, $p = 0.07$). Details of all the anthropometric values for both gender is enlisted in Table 1.

Three hundred sixty-six (86.8%) children were from Kathmandu valley and the rest 58 (13.7%) from various 22 districts outside the valley. Relationship between anthropometric values and whether the children were from Kathmandu valley did not showed a significant difference (For height-for-age Vs from-valley: $X^2[N=424, df=1] = 1.02$, $p = 0.31$; for weight-for-height Vs from-valley: $X^2[N=424, df=1] = 0.01$, p = 0.92; for weight-for-age Vs from-valley: $X^2[N=424, df=1] = 0.03$, $p = 0.86$).

Anthropometric values for acute and chronic morbidity are presented in Table 2. There was a significant association between all anthropometric values and acute and chronic morbidity (For height-for-age Vs morbidity: $X^2[N=424, df=1] = 5.23$, $p = 0.02$; for weight-for-height Vs morbidity: $X^2[N=424, df=1] = 34$, $p < 0.001$; for weight-for-age Vs morbidity: $X^2[N=424, df=1] = 21.65$, $p < 0.001$).

Anthropometric values for several morbidities are presented in Table 3 . We applied Chi-square test (or Fisher Exact) to see the association between them but found all of them to be statistically insignificant (*P* value for each morbidity and each anthropometric value were less than 0.05).

Table 1: *Anthropometric values for both gender. (N = 424)*

Gender	Height-for-age		Weight-for-height		Weight-for-age	
	Female *n* (%)	Male *n* (%)	Female *n* (%)	Male *n* (%)	Female *n* (%)	Male *n* (%)
Very low (<-3 SD)	2 (1)	7 (3)	13 (6.7)	14 (6.1)	6 (3.1)	14 (6.1)
Low (< -2 SD)	8 (4.1)	26 (11.3)	27 (13.9)	34 (14.8)	22 (11.3)	30 (13)
Normal	171 (88.1)	191 (83)	150 (77.3)	174 (75.7)	163 (84)	177 (77)
High (>2 SD)	8 (4.1)	4 (1.7)	3 (1.5)	7 (3)	3 (1.5)	9 (3.9)
Very high (>3 SD)	5 (2.6)	2 (0.9)	1 (0.5)	1 (0.4)	0	0
Total	**194**	**230**	**194**	**230**	**194**	**230**

Table 2: *Anthropometric measurement (normal or abnormal) for acute or chronic morbidity.*

	Height-for-age		Weight-for-Height		Weight-for-age		Total
Morbidity	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	
Acute, *n* (%)	287 (87.5)	41 (12.5)	272 (83)	56 (17)	279 (85)	49 (15)	**328**
Chronic, *n* (%)	75 (78.1)	21 (21.9)	52 (54.2)	44 (45.8)	61 (63.5)	35 (36.5)	**96**

Table 3: *Percentage of children with normal and abnormal anthropometry with morbidities.*

	Height-for-age		Weight-for-Height		Weight-for-age	
Morbidity	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
URTI	85.2	14.vv8	75.4	24.6	81.1	18.9
RAD	84.4	15.2	75.8	24.2	72.7	27.3
Pneumonia	72.2	27.8	94.4	5.6	83.3	16.7
AGE/dysentry	71.4	28.6	64.3	35.7	71.4	28.6
Anemia	92.3	7.7	69.2	30.8	84.6	15.4
Pain abdomen	92.3	7.7	92.3	7.7	84.6	15.4
PUO	76.9	23.1	76.9	23.1	76.9	23.1
Enteric. fever	90	10	100	0	100	0
UTI	100	0	88.9	11.1	100	0
Sepsis	85.7	14.3	85.7	14.3	71.4	28.6
Koch's infection.	100	0	25	75	75	25

RAD = reactive airway disease, AGE = acute gastroenteritis, PUO = pyrexia of unknown origin, UTI = urinary tract infection. URTI = Acute pharyngo-tonsillitis

DISCUSSION:

This study revealed that wasting and severe wasting was higher in children under five as compared to National health survey report, 2016.[1] Africa and Asia bear the greatest share of all forms of malnutrition. More than two thirds of all wasted children under five lived in Asia (69%) in 2016. Thirty-five point nine million (9.9%) children under five in Asia are wasted of which 12.6 million are severely wasted.[5] In our study, 6.37% were severely wasted (male 6.1% and female 6.7%) and 14.39% were wasted (male 14.8% and female 13.9%). These figures were little higher than reported in the Annual report of Nepal 2016.[1] Similarly, these figures are higher than the rate shown in other studies done in Pokhara,[6] Dolakha,[7] Humla,[8] and Ilam[9] but lower than the studies done in Kathmandu and Eastern Terai.[10,11] The 14.39% population with wasting in this study was slightly higher than 11% shown in the national data.[1] This prevalence was comparable to 14.3% in Vietnam,[12] higher

than that of 11.1% in NW Ethiopia,[13] but lower than that of Ethiopia (16%),[14] and North West Tanzania (17.8%).[15] Severely wasted population in this study was 6.36% which is higher than that in Philippines.[16]

The findings revealed that stunting and severe stunting were lower in under five children as compared to National health survey report, 2016. In 2016, more than half of all stunted children under five lived in Asia (56%). Globally, stunting is declining too slowly. Stunted population in 2000 was 198.4 million (32.7%) which decreased to 154 million (22.9%) in 2016. In Asia, stunted children under five have decreased from 133.9 million (38.2%) to 86.5 million (23.9%).[5] This study showed no statistical difference between nutritional status of children living in Kathmandu valley and those from outside the valley. Very stunted population in the study was 2.1% (3% male and 1% female) and stunted population were 8% (11.3% male and 4.1% female). Global estimates of stunted under five population were 22.9% (154.8 million in 2016), 56% of whom resided in Asia.[5 The 8% prevalence of stunting in this study is lower than studies done in other parts of Nepal.[7,8,17,18]. These findings suggest that children in the capital city have a better nutritional status compared to other parts of the country. Stunted under five children in our study was much lower compared to other areas of the world like Ethiopia (57.5),[19] Philippines (34%),[16] North Vietnam (29.8%),[13] NW Ethiopia (24.9%),[12] and Thailand (19.9%).[20] This difference could be due to inclusion of children from the capital, Kathmandu and surrounding districts only.

Overweight children are increasing at an alarming rate globally. Almost half of all overweight children under five lived in Asia (49%) and one quarter lived in Africa (24%). Overweight population was 30.4 million (5%) in 2000, that increased to 40.4 million (6%) in 2016.[5] This study also shows that the number of overweight children are increasing. Overweight and obese children in this study were 2.8% and zero respectively. This was low compared to 6% (40.6 million) overweight children under five globally.[5] A study in Thailand showed 8.3% obesity and another study in NW Ethiopia showed 35.5% overweight children under five.[12,20] A study done in Ilam, Nepal showed 17.5% overweight children in 2015.[18] This suggests that the problem of overweight and obesity is comparatively less in and around Kathmandu compared to other places of Nepal and different other countries.

Underweight under five population in the study was 12.3% and severe underweight were 4.7%. This was much lower compared to underweight under five population in Terai region of Nepal: 27% in Kapilbastu,[17] and 34% in eastern Terai.[11] Underweight under five population were lower in this study compared to studies in other countries like Thailand (27.8%) and Ethiopia Tigray (37.4%).[14,20]. But it was also similar to the prevalence in NW Ethiopia (14.3%),[19] Bangkok (5.74%),[20] and Philippines (21.2%),[16].

Prevalence of anemia in the study was 3.06% while the national data shows 46% for children between 6-59 months and 69% for children between 6-23 months.[1] Anemic children slightly decreased from 48% in 2006 to 46% in 2011. Though the rate of anemia was low in this study, the need of government level iron prophylaxis program for children should not be underestimated.

In this study, there was no statistical significance between various anthropometric values with gender and with individual morbidity studied but there was significant association between acute and chronic conditions with weight-for-height ($p < 0.001$) and height-for-age ($p < 0.001$). Abnormal values tend to be more frequent among children with chronic conditions. This would suggest that common chronic conditions are associated with the nutritional status of children under five and these have to be identified and treated timely to improve quality of life of these children.

CONCLUSION:

Wasting and severe wasting in under five children from and nearby Kathmandu, the capital of Nepal, is higher while stunting and severe stunting is lower as compared to previous National reports. Overweight and obesity are emerging. Anemia is still a common problems in children under five years of age. Chronic morbidities are associated with poor nutritional status of under five children.

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