Protein-Energy Malnutrition in School Children of Boirahmad Rural Areas, Iran

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Abstract

Growth monitoring is very important in nutritional assessment of children up to the age of maturity. Based on studies in Kohgiluyeh-Boirahmad province, many of under five years old children are suffering from protein- energy malnutrition, although the nutritional conditions of school children are unknown. This study was performed to determine the prevalence of protein- energy malnutrition in rural school children of Boirahmad. 544 school children were selected from eleven rural primary schools. Weight and height were measured with 0.1 kg and 0.5-centimeter precision, respectively. Nutritional indices including height for age, weight for age and weight for height were determined using EPI6 software and compared with relative NCHS standards. Based on –2 SD cut of point for indices, 15.7 %(CI=12.6-18.8), 12.5 %(CI=9.9-15.5) and 3.6 %(CI= 2-5.2) of children were suffering from stunting, underweight and wasting respectively. Girls were better than boys in height for age. Parents' education and father job had significant association with height for age. Results suggest that stunting, an important form of protein- energy malnutrition is moderately prevalent in Boirahmadian school children, but to determine the causes, more studies are suggested.

Keywords: *Malnutrition, PEM, Stunting, School children, Boirahmad.*

Introduction

A sign of nutritional deprivation is failure in growth and development (1). To evaluate nutritional status up to the age of maturity, sex and age based assessment of growth and development is necessary. Any nutritional disorder or deficiency leads to mental and growth failure and low activities (1). The Previous investigations have already reported the stunting and underweight in some Iranian pre-school and school children (1- 4). The miserable nutritional status of under five year old children in Kohgiluyeh-Boirahmad has been reported and protein-energy malnutrition is prevalent as moderate to sever (3, 5, 6) but not much information is available about the nutritional status of school children in this area. Therefore, to estimate the prevalence of stunting, wasting and underweight, we assessed anthropometric indices of school children in rural areas of Boirahmad.

Materials and Methods

Sampling Based on 15% predicted prevalence of underweight, 95% confidence interval and ±3% error and using the formula $n = Z^2 \frac{pq}{d^2}$, sample size was estimated 544 cases. Eleven schools were selected randomly and based on population ratio the samples were selected systematically.

Variables children were weighed without shoes and with the least possible clothes. The measure precision was 0.1 kg. Then the mean weight of clothes on bodies that estimated to be 0.3 kg was subtracted from measured weights. A tape measure was put vertically against the wall, the child stood up against the tape directly, without shoes, and height was measured with 0.5-centimeter precision. Ages of the children were determined based on their identity certificates. Parent education

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and job were asked and were written in questionnaire.

Statistics and software The EPINUT program of EPI6 was used to determine nutritional status indices. Some of the gathered data were manually calculated as they were out of range in EPINUT program. Children bellow –2 SD of NCHS median of weight for age, height for age and weight for height were classified as underweight stunted and wasted respectively. Frequency and percent of children bellow –2 SD of NCHS medians for indices with confidence interval limits (CI) were estimated and Chi square test was run as appropriate.

Results

Totally 544 school children in Boirahmad rural areas were assessed (girls: 56.3% and boys: 43.8%). Data of 13 children were omitted due to unsuitable ranges. Results showed that 18.3% of boys (CI= 12- 18.8%) and 12.9% of girls (CI= 8.7- 17%) were stunted. Also, 12.9% of boys (CI= 8.3- 16%) suffered from underweight. In addition 5.6% of boys (CI=2.7-8.5%) and 1.8% of girls (CI=0.24- 3.36%) were wasted. Totally, 15.7% (CI=12.6- 18.8%) of children suffered from moderate to sever stunting, 12.5% (CI= 9.9- 15.5%) from moderate to sever underweight, but 3.6% (CI= 2- 5.2%) were lower than –2SD of NCHS median of weight for height. Fathers education and mothers education (Figures 1&2) were associated with children nutritional status so that illiterate parents had more stunted children (P<0.05). Fathers' Job was associated with height for age significantly (P<0.05) and unemployed father had more stunted children.

Table 1: Height for age, weight for age and weight for height of school children of Boirahmad compared with NCHS standards

Sex	Indices	Height for Age∗		Weight for Age		Weight for Height	
		<-2SD	>= 2SD	<-2SD	>= 2SD	<-2SD	>= 2SD
Boys	N	52	227	32	217	14	235
	%	18.3	81.7	12.9	87.1	5.6	94.4
Girls	N	32	217	34	244	5	273
	%	12.9	87.1	12.2	87.8	1.8	98.2
Total	N	84	444	66	461	19	508
	%	15.7	84.3	12.5	87.5	3.6	96.4

∗ p<0.05

Table 2: Height for age and weight for age of school children in rural areas of Boirahmad in comparison with NCHS standards in different age groups

Age (year)	Indices	Height for Age		Weight for Age	
		< - 2SD	>= -2 SD	< - 2SD	>= -2 SD
6-7	N	3	38	8	33
	%	7.3	92.7	19.5	80.5
7.1-8	N	80	80	14	74
	%	9.1	90.9	15.9	84.1
8.1-9	N	14	99	8	105
	%	12.4	87.6	7.1	92.9
9.1-10	N	19	98	12	105
	%	16.2	83.8	10.3	89.7
10.1-11	N	23	81	13	91
	%	22.1	77.9	12.5	87.5
>11	N	16	46	11	51
	%	25.8	74.2	17.7	82.3
TOTAL	N	83	442	66	459
	%	15.8	84.2	12.6	87.4

Note: The data of weight for height is not indicated.

Table 3: Characteristic of the three anthropometric data reporting system in comparison.

Characteristic	Z- score	Percentile	Percent of median
Adhernce to the reference distribution	Yes	Yes	No
Linear scale permitting summary statistics	Yes	No	Yes
Uniform criteria across indices	Yes	Yes	No
Useful for detecting changes at extremes of distributions	Yes	No	Yes

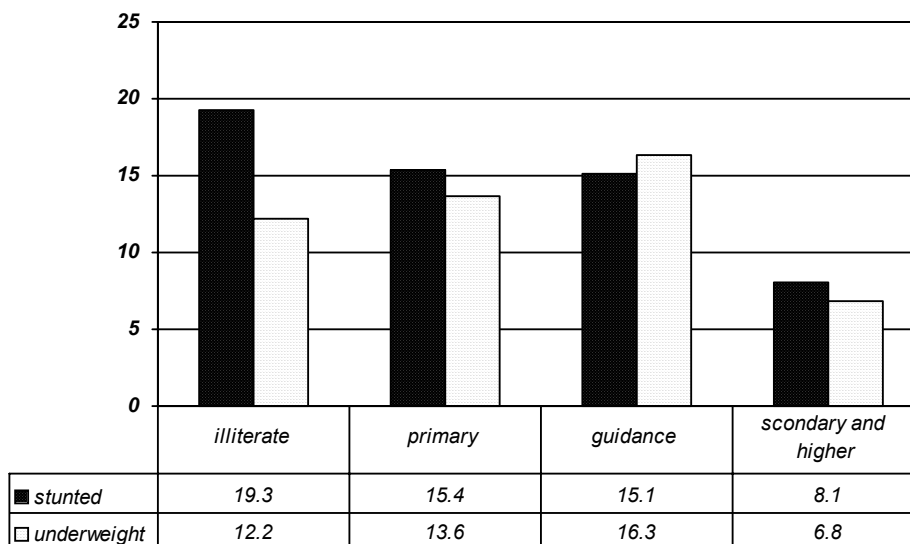|	illiterate	primary	guidance	scondary and higher
■ stunted	19.3	15.4	15.1	8.1
□ underweight	12.2	13.6	16.3	6.8

Fig. 1: Percent of stunted and underweight children in school children of Boirahmad based on father education (p<0.05 for stunting)
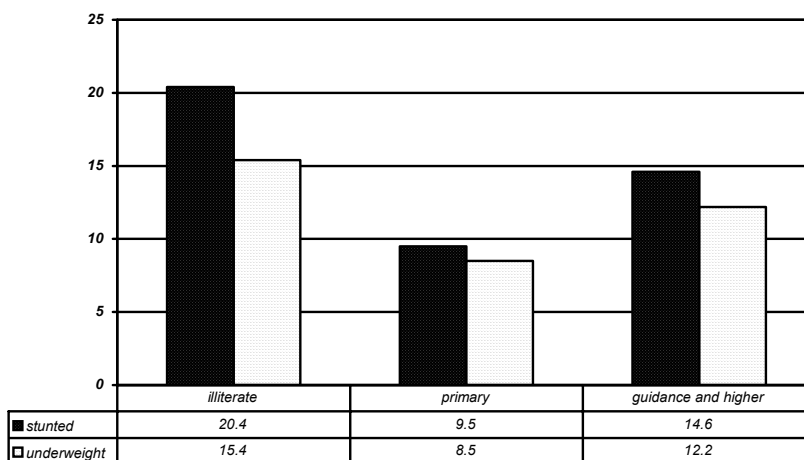

	illiterate	primary	guidance and higher
■ stunted	20.4	9.5	14.6
□ underweight	15.4	8.5	12.2

Fig. 2: Percent of stunted and underweight children in school children of Boirahmad based on mother education (p<0.05 for stunting)

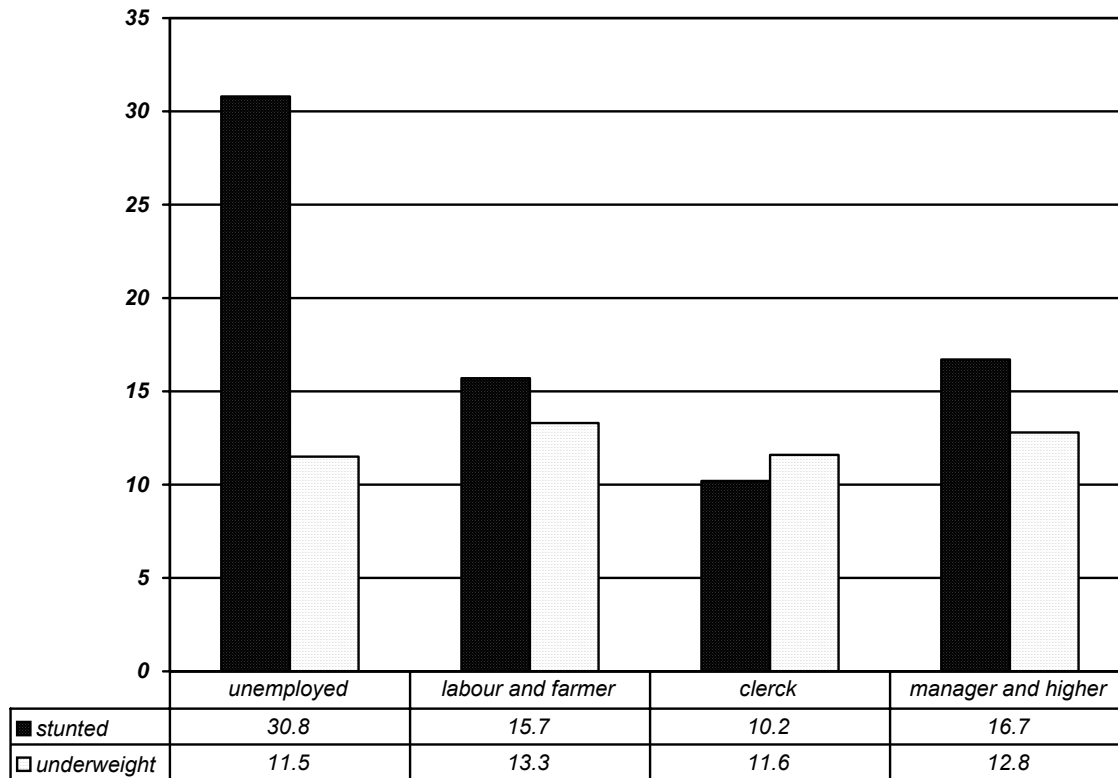|	unemployed	labour and farmer	clerck	manager and higher
■ stunted	30.8	15.7	10.2	16.7
□ underweight	11.5	13.3	11.6	12.8

Fig. 3: Percent of stunted and underweight children in school children of Boirahmad based on father job (p<0.05 for stunting)

Discussion

Low height for age, namely stunting, usually originates from economic and health problems and also is called chronic malnutrition. Low weight for age that is referred to underweight is indicator of low height, low body mass or both, while low weight for height is indicator of low body mass (7, 8). Low weight for height that is called wasting is usually due to acute diseases or food shortage during the same period (7, 8). Results showed that 15.7% of children suffered from stunting, 12.5% from underweight and 3.6% from wasting. Now days there is a trend toward the assessment of nutritional status in different age groups and due to diversity of Persian medical journals, the results of such studies are easily accessible. However the methods that are used in nutritional status assessment of Iranian children are different, including: percentiles, the percent of median, the number

of standard deviations bellow median of NCHS standards (Z Score) and also reporting raw measures of height and weight (1-5,9-13). The Z score method that has more advantageous than other methods is suggested by WHO to be used in nutritional assessment (8). Pourabdollahi et al (13) assessed the growth of school children of Tabriz and reported that stunting is prevalent in 10- 17% of boys and 10-34% of girls in different age groups. Moosavi Jam et al (12) in evaluating height and weight of 7-15 years old children in urban areas of Kurdistan in 1998, Ershadi(10) in assessment of 11-16 years old students of Kashan and Derakhshan (9)in 11-17 year old students of Hamadan city , all have already reported low nutritional and anthropometric indices in comparison with NCHS standards. In this study increase in the age was associated with increase in

stunting rate so that the stunting prevalence in 6-7 year old students was 7.3% with an increasing trend, in over 11 year old children was 25.8%. Stunting is an accumulating process, therefore the percent of stunted children are increased along with increase in the age (7-8, 11). The prevalence of stunting in two sexes was significantly different and more boys were stunted than girls (18.3% against 12.9%). Moosavi Jam et al (12) reported a non-significant difference between boys and girls weight (8.3 ad 7.5 percent lower than 3_{rd} percentile of NCHS). He also reported similar results for stunted children (6.25% against 6.04%). Furthermore, he reported that 15.8 percent of children were lower than standard weight curve (probably bellow 3_{rd} percentile) and 12.3 percent were lower than height curve. Poorabdollahi (13) in comparing stunted girls and boys showed a great difference in 11 year old age group, although he did not report the results in total children. Ghasemi (2) in a review of studies on nutritional status of under five year old Iranian children showed that there is no significant difference between boys and girls. He reported that this low difference might be due to improvement of women social situation in recent years. The reasons of difference between boys and girls nutritional status are far beyond the limits of this study and need more studies to be answered.

The data also showed that an increase in fathers' educational level was associated with decrease in stunting prevalence. The mothers' educational level, however, showed that illiterate mothers had more stunted and underweight children than their literate counterparts. Furthermore unemployed fathers had also more stunted children. Malekzadeh et al (11) in assessment of under five year children in Kohgiluyeh-Boirahmad reported that literacy in comparison with illiteracy had significant role in improving nutritional status of children. This relationship especially was true about mothers' education and showed that the literacy of mothers has important role in improving child nutritional status. It appears that illiteracy and unemployment have an essential effect on children nutritional status. According to the findings of this study, stunting is an important nutritional problem in assessed school children. As this disorder originates from socio-economic problems, it is necessary to pay much attention to these factors and to do more analytical studies to determine the important factors that cause malnutrition.

Acknowledgments

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