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Original Article

The Relationship of Ethnicity, Socio-economic Factors and Malnutrition in Primary School Children in North of Iran: A Cross-sectional Study

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ARTICLE INFORMATION

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ABSTRACT

Background: The main objective of this study was to assess the malnutrition and some socio-economic related factors based on three ethnic groups among primary school children in north of Iran in 2010.

Methods: This cross-sectional study was carried out through multistage cluster random sampling on 5698 subjects (2505 Fars-native, 2154 Turkman, and 1039 Sistani) in 112 schools. Well-trained staffs completed the questionnaire and measured students' weight and height. Malnutrition estimated the Z-score less than -2SD for underweight, stunting and wasting were calculated using the cutoffs from WHO references.

Results: Generally, malnutrition was observed in 3.20%, 4.93% and 5.13% based on underweight, stunting and wasting respectively. It was more common in girls than in boys and in Sistani than in other ethnic groups. The correlation between malnutrition based on underweight and stunting and ethnicity was statistically significant (P=0.001). Results of logistic regression analyses showed that the risk of malnutrition was in rural area 1.34 times more than urban area, in girls 1.17 times more than boys, in Sistani ethnic group 1.82 times more than Fars-native ethnic group, in low economic families 2.01 times more than high economic families.

Conclusion: Underweight, stunting and wasting are the health problems in primary school children in north of Iran with a higher prevalence in girls, in rural areas, and in Sistani ethnic group.

Introduction

Malnutrition in children is the largest contributor to global burden of disease and causing heavy health expenditures in developing countries especially in Asia[1] and is associated with about half of all child deaths in worldwide[2]. In spite of decreasing malnutrition in developing countries over the past decade[3] in Asia, it was common in preschool children from 16.0% in China to 64.0% in Bangladesh[4]. The remarkable progress has been established in East Asia and the Pacific but the high level of malnutrition in South Asia and sub-Saharan Africa pose a major challenge for child survival and development[3].

Anthropometry is a simple tool for assessing nutritional status in individuals and communities and offers the advantages of objective evidence with relatively low technology. The etiology of childhood malnutrition is complex and involves interactions of multiple determinants that include biological, cultural and socioeconomic influences[5]. Accordingly, secular growth differences among ethnic groups have been seen in United States[6]. The role of genetic factors on the secular growth was shown in Sri Lanka Australian children[7]. Rush[8] recommended using free fat mass (FFM) instead of body mass index (BMI) in filed studies. Fredriks[9] believed that separated growth chart is necessary for Moroccan and Turkish children living in Netherland.

The strong relationship between socio-demographic factors and secular growth was shown in some studies[10], but it is different worldwide. Data on children with malnutrition and the possible role of social inequity help to establish a proper preventive program.

Of 1.6 millions populations in Golestan Province (north of Iran), 43.9% and 56.1% are living in urban and

rural area respectively. The main job of rural citizens is agriculture. People with different ethnicity such as Fars-native, Turkman and Sistani are living in this region [11]. The school education in Iran divided into three following stages: (a) primary schools include 6-10 years old children; (b) middle schools include 11-13 years old children; and (c) high schools include 14-17 years old adolescents.

In spite of high prevalence of obesity in north of Iran [12], malnutrition and growth failure are the health problem among children of this region [13,14]. This research was conducted to compare the malnutrition among three ethnic groups (Fars-native, Turkman, and Sistani) among primary school children in north of Iran and attempted to analyze socio-demographic related factors such as economic status, region, parent's education, and studies' gender.

Methods

This cross-sectional study was conducted through a multistage stratified cluster random sampling method on 5698 primary school children (2505 Fars, 2154 Turkman, and 1039 Sistani) in 112 schools of urban and rural regions in north of Iran in 2010. The sample size was stratified based on urban/rural regions, educational level, gender and ethnicity of 14 districts areas. A sample size of 2401 respondents was estimated at 95% confidence level. For each student, a questionnaire was completed by a well-trained staff including questions on the social-demographic status such as region of residence, ethnicity, economic status and parent's educational level. Totally, 34 (0.6%) participants were omitted from study.

Anthropometric measurements of children were performed in light dress and without shoes in the morning. Body weight was measured to the nearest 0.1 kg using a balanced-beam scale, and height was measured to the nearest 0.5 cm with standing up and head, back, and buttock on the vertical land of the height gauge. Age of subjects calculated to the precise day subtracting the date of birth from the date of examination.

Children's anthropometric data were compared with those in new standard of WHO for school-aged children and adolescents [15]. The Z-score of the median anthropometric parameters for each age and sex were used to determine nutritional status for subjects. Underweight, stunting and wasting were defined as weight-for-age, height-for-age and weight-for-height with age and sex specific Z-score below -2SD [16]. Malnutrition was defined Z-score less than -2 SD for three anthropometric indices [17].

The ethnic groups in this study were divided into three groups: (a) Fars: the natural inhabitant of this province, recognized with same name in the society; (b) Turkman: the inter marriage of this ethnic group with other ethnic group were rare therefore this ethnic group can be recognized as pure race; (c) Sistani and Bluch: this ethnic group immigrated from Sisstan and Bluchestan Province from the east of Iran far earlier. Parent's educational level was divided into three groups: Illiterate, school educated, and academic educated. Economic status was categorized based on possession of 10 consumer items considered necessary for modern-day life, such as telephone, running water, gas pipeline, home ownership, color television, computer, video, modern refrigerator , private car and cooler. According to this list, the economic status of the participants was categorized as follows: ≤3 as low, 4-6 as moderate, and 7-10 as high income.

SPSS 16.0 software was used for statistical data analysis. Chi ^{2} test was used for comparing categorical variables and logistic regression analysis was applied to estimate the odds ratio estimates of malnutrition at 95% significant level. *P* value under 0.05 included significations. Unwilling students' parents excluded from the study. The reliability was assessed using Cronbach's alpha coefficient and found to be 0.86.

This study was approved by Ethical Research Committee of Golestan University of Medical Sciences (G-P-35-264). Verbal informed consent was received from all children's parents.

Results

Generally, 48.2% of students were living in urban area and 62.8% were boys. The proportion of Fars, Turkman and Sistani groups was 18.2%, 37.8% and 44.0% respectively. The economic status of 16.6% of the participants was low, that of 61.4% was moderate, and that of 22.0% was high. Illiteracy rate was 12.8% more in mothers than in fathers (Table 1).

Table 1: Distribution of the baseline characteristics of the study population (N=5698)

Variables	Frequency	Percent
Region		
Urban	2748	48.2
Village	2950	51.8
Gender		
Boy	3578	62.8
Girl	2120	37.2
Ethnicity		
Fars	2505	44.0
Turkman	2154	37.8
Sistani	1039	18.2
Economic status		
Low	946	16.6
Moderate	3499	61.5
Good	1253	22.0
Fathers educational level		
Illiterate	684	12.0
School educated	4228	74.2
Academic educated	786	13.8
Mothers educational level		
Illiterate	1413	24.8
School educated	3869	67.9
Academic educated	416	7.3

Generally, malnutrition (Z<-2SD) was observed in 3.20%, 4.93% and 5.13% based on underweight, stunting

and wasting, respectively. The prevalence of malnutrition was more common in girls than in boys and in Sistani more than other ethnic groups. In ethnic groups; the malnutrition was not significant in genders. In Turkman group, wasting criteria was significant (P=0.002) in genders while in other comparing groups it was not significant. Malnutrition was significant in boys among three ethnic groups based on underweight (P=0.047) and stunting (P=0.002). In addition, that respect was shown in girls and in whole subjects (P<0.005). There was no statistical differences between Fars and Turkman groups while between Fars and Sistani (P=0.001) and between Turkman and Sistani (P=0.001) was shown a statistical differences based on underweight and stunting (Table 2).

The estimated OR with 95% CI of malnutrition was obtained from logistic regression. Compared with urban area, the OR was 1.34 in rural area (P=0.001). The risk of malnutrition in Sistani group was 1.82 times more than Fars group (P=0.001). Similarly, the risk of malnutrition in low economic group was 2.01 times greater than in good economic group (P=0.001) and in students whose father were illiterate was 1.98 times more than students whose father were academic educated (P=0.001). The risk of malnutrition in subjects whose mother were academic educated was 28% lower than in subjects whose mother were illiterate (P=0.001). The OR was not significant in Turkaman group compared to Fars group (Table 3).

Table 2: Prevalence of underweight, stunting and wasting (Z-score <-2SD) in relation to ethnicity and gender

Ethnicity	Number	Weight-for-Age (Z-score) (%)			Height-for-Age (Z-score) (%)			Weight-for-Height (Z-score) (%)		
		<-3 SD	-2 to -3 SD	>-2SD	<-3 SD	-2 to -3 SD	>-2 SD	<-3 SD	-2 to -3 SD	>-2 SD
Fars										
Boy	1622	5 (0.3)	36 (2.2)	1581 (97.5)	15 (0.9)	56 (3.5)	1551 (95.6)	11 (0.7)	73 (4.5)	1538 (94.8)
Girl	883	2 (0.2)	24 (2.7)	857 (97.1)	14 (1.6)	31 (3.5)	838 (94.9)	10 (1.1)	37 (4.2)	836 (94.7)
Total	2505	7 (0.3)	60 (2.4)	2438 (97.3)	29 (1.1)	87 (3.5)	2389 (95.4)	21 (0.8)	110 (4.4)	2374 (94.8)
Turkman										
Boy	1267	2 (0.2)	32 (2.5)	1233 (97.3)	10 (0.8)	39 (3.1)	1218 (96.1)	12 (1.0)	36 (2.8)	1219 (96.2)
Girl	887	3 (0.3)	21 (2.4)	863 (97.3)	11 (1.2)	26 (2.9)	850 (95.9)	13 (1.5)	48 (5.4)	826 (93.1)
Total	2154	5 (0.2)	53 (2.5)	2096 (97.3)	21 (1.0)	65 (3.0)	2068 (96.0)	25 (1.1)	84 (3.9)	2045 (95.0)
Sistani										
Boy	689	0 (0.0)	30 (4.4)	659 (95.6)	9 (1.3)	41 (6.0)	639 (92.7)	5 (0.7)	26 (3.8)	658 (95.5)
Girl	350	0 (0.0)	22 (6.3)	328 (93.7)	4 (1.1)	25 (7.1)	321 (91.8)	5 (1.4)	16 (4.6)	329 (94.0)
Total	1039	0 (0.0)	52 (5.0)	987 (95.0)	13 (1.2)	66 (6.4)	960 (62.4)	10 (1.0)	42 (4.0)	987 (95.0)
All										
Boy	3578	7 (0.2)	98 (2.7)	3473 (97.1)	34 (0.9)	136 (3.8)	3408 (95.3)	28 (0.8)	135 (3.8)	3415 (95.4)
Girl	2120	5 (0.2)	67 (3.2)	2048 (96.6)	29 (1.3)	82 (3.9)	2009 (94.8)	28 (1.3)	101 (4.8)	1991 (93.9)
Total	5698	12 (0.2)	165 (2.9)	5521 (96.9)	63 (1.1)	218 (3.8)	5417 (95.1)	56 (1.0)	236 (4.1)	5406 (94.9)

Table 3: Odds ratios (OR) estimates of various factors among normal (N=5417) versus malnourished (N=281) subjects using logistic regression

Variable	Normal	Malnourished	OR	95% CI	*P* value
Region					
Urban	2685	99	1.00	-	-
Village	2768	182	1.34	1.21, 1.49	0.001
Ethnicity					
Fars	2389	116	1.00	-	-
Turkman	2068	86	1.04	0.91, 1.16	0.586
Sistani	960	79	1.82	1.57, 2.11	0.001
Economic status					
Good	1224	29	1.00	-	-
Moderate	3333	166	1.39	1.21, 1.58	0.001
Low	860	86	2.01	1.69, 2.39	0.001
Fathers educational level					
Academic educated	762	24	1.00	-	-
School educated	4024	204	1.98	1.60, 2.45	0.001
Illiterate	631	53	1.32	1.12, 1.55	0.001
Mothers educational level					
Academic educated	401	15	1.00	-	-
School educated	3708	161	1.81	1.54, 2.27	0.001
Illiterate	1308	105	1.28	1.04, 1.59	0.001

Discussion

The prevalence of malnutrition based on underweight, stunting and wasting was estimated 3.20%, 4.93% and 5.13% among school children respectively. It was more common in girls and rural areas. The prevalence of malnutrition was 8.1% in boys and 5.7% in girls in 6-18 years school children according to center for disease control and prevention percentiles in Iran[18]. According to

UNICEF report,[3] 11%, 15%, and 5% of Iranian under five years children suffer from underweight, stunting and wasting up respectively. The prevalence of malnutrition based on underweight, stunting and wasting among school children in Semnan (a province in the center of Iran) was reported 14.7%, 15.3% and 11.6% of primary school children[13]. Prevalence of underweight and stunting among school children was 12% and 13% in Pakistan[19], 3.1% and 2.9% in Turkey[20] and 3.8% and 7.1% in Kowait[21] respectively. In a comparison study [22] the prevalence of malnutrition in 2-18 years old children among Chinese, Indonesian and Vietnam has been shown 0.6%, 10% and 13% in boys and 10%, 13% and 19% in girls, respectively. According to our results, the prevalence of malnutrition in north of Iran was lower than national estimates of malnutrition as well as in some of developing countries such as Pakistan, Indonesia and Vietnam.

We found statistically significant differences between prevalence of malnutrition among three ethnic groups living in north of Iran. Nutrition differences among ethnic groups were reported in Iran [23] and in other countries [24,25]. BMI distribution was different among ethnic populations in US [26]. The association between child weight loss and parent's education, family income and other socio-demographic factors was observed in white, black, Spanish and Asian residence in USA [27]. Non-Hispanic children more than Hispanic children suffer from stunting [28]. Rush [8] recommended using FFM index instead of BMI in field studies. Fredrik [9] found out that separate growth chart is necessary for Moroccan and Turkish children are living in Netherland. The higher prevalence of malnutrition in Sistani ethnic group may be related to biological, cultural and socio-economic influences. It is necessary to assess in future studies. On the other hand, low economic status and parent's illiteracy were found to be as potential risk factors for malnutrition in present study.

Consistence with following studies, we have shown the rural residences, gender (female), poor economic status and parent's illiteracy as risk factors for malnutrition. Cultural status, income level, food behavior and less health care were known as the risk factor for malnutrition [25]. Block [29] believed that low income families are less aware of their food needing. In Iran[30] , socio-demographic factors influence on nutritional education with a improving of health criteria. Thereby, for control of malnutrition in school children, the socio-demographic related factors as an underling causes should be considered.

Conclusion

Underweight, stunting and wasting were the health problem in primary school children in north of Iran with a higher prevalence in girls and rural areas. Sistani ethnic group suffers from malnutrition more than other ethnic groups. Socio-demographics factors such as location area, gender, family economic status, ethnicity and parent's education are the malnutrition related risk factors. Public health programs that aim to reduce malnutrition should primary focus on the low economic and low educated families, especially in Sistani ethnic group and in rural area.

Conflict of interest statement

The author has no conflicts of interest to declare for this study.

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