

Nutritional status and feeding practices in pre-school children aged 1-5 years in rural and urban areas of East Azerbaijan- Iran

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Summary. *Backgrounds and Objectives:* The current study was aimed to investigate the nutritional status of children under five-year of age and its associated factors in East Azerbaijan-Iran. *Methods:* Four hundred fifteen preschool children referring to public health centers in eight health centers in urban and rural areas of East Azerbaijan-Iran were selected. Nutritional status including height for age (HAZ), weight for age (WAZ) and weight for height Z-scores (WHZ) were calculated using the Epi-Info 2000 using the Centers for Disease Control and Prevention (CDC) 2000 standards. *Results:* Totally 17 (5.96%), 20 (7.01%) and 21 (7.36%) children from urban and 8 (6.15%), 11 (8.46%) and 11 (8.46%) children from rural areas were underweight, stunted and wasted respectively. The highest prevalence of underweight and wasting was observed in boys from rural areas (8% and 12% respectively); while the highest prevalence of stunting [6 (10.90%)] was observed in the girls of rural areas. The prevalence of severe wasting, stunting and underweight was 2.89%, 2.40% and 4.33% respectively. Weight for age z-score (WAZ) was non-significantly higher in children with proper complementary feeding practices; while all three indices of nutritional status were significantly higher in formula-fed children compared with exclusively-breast fed children ($P < 0.05$). *Conclusion:* In conclusion, the high prevalence of malnutrition among children under five-years of age and their poor feeding practices in the current study emphasizes the need for nutrition education and improving behavioral change practices in mothers as a target population.

Key words: malnutrition, underweight, stunting, wasting, children under 5, Iran.

Introduction

Malnutrition is a common health problem in Iran especially in children under 5 years of age (1) National surveys have revealed that malnutrition in children under 5 has relatively high prevalence in urban and rural areas; approximately 15% and 5% of children fewer than five years of age are moderately or severely stunted or wasted respectively (2). Malnutrition has considerable negative impacts on physical growth, morbidity, mortality and cognitive development in children (3).

In developing countries malnutrition affects one out of every three preschool child (4). Height and weight measurements are important determinants of growth, development and nutritional status of children (5); height for age and weight for age are indicators of the past and present state of nutrition (6, 7).

Infant feeding practices are major components of child caring programs and are in strong relationship with morbidity and growth in infancy (8) and childhood (9). The major determinants are duration of exclusive breastfeeding and the time of the introduction

of the complementary nutrition (8). The recommended period of exclusive breastfeeding is 6 months (10). Duration of exclusive breastfeeding less and more than recommended time is associated with higher risk of mortality and nutrient deficiencies (11-14).

To address the lack of up-date data on the nutritional status of pre-school children in Tabriz-Iran and their possible relationship with feeding practices in infancy, this study has been conducted in children under five years of age in rural and urban care setting in Tabriz-Iran.

Methods

All data of the present study was collected from the health records of four hundred fifteen pre-school children (234 boys and 181 girls) aged 12 to 72 months referring to public health centers in four health centers in Tabriz city and four health centers in rural areas in East Azerbaijan-Iran between September 2012 and February 2013. The rural sites chosen in this study were as follows: Akhula, Anakhatun, Shadabad – Mashayekh and Shadabad-Olya. In the primary health care system in Iran, a trained health worker interviewed with the mother and records the health information about child in a standard questionnaire and in growth charts. These records include information about age of the child, anthropometric indices, feeding practices, exclusive breastfeeding, complementary feeding and intake of vitamin A+D and iron supplements. Child's weight and height were measured with a portable digital scale and portable stadiometer following standard techniques.

Height for age, weight for age and weight for height Z-scores (HAZ, WAZ, WHZ) were calculated using the Epi-Info 2000 Nutristat program (Centers for Disease Control and Prevention, Atlanta, GA, USA) using the CDC 2000 standards. Malnutrition was assessed by using standard deviation classification as underweight (weight for age), stunting (height for age) and wasting (weight for height) when they were more than two standard deviations below the reference median of these indices (15, 16). Severe malnutrition was also defined as WHZ, WAZ and HAZ scores less than three standard deviations below the reference median (17).

Exclusive breastfeeding was defined as feeding breast milk exclusively for first six months after birth and proper complementary feeding was defined as receiving both breast milk and solid foods in ages 6-9 months (10).

Statistical analysis

Statistical analysis was performed by Statistical Package for Social Sciences (PASW Statistics 18 SPSS for Windows, release 18, 30 July 2009, Chicago, IL, USA). Normality of data was analyzed by Kolmogorov-Smirnov test. Comparison of the quantitative variables between groups was carried out by independent sample t-test. Chi-square test was used to compare the qualitative variables between groups.

Results

In the present study 415 pre-school children (234 boys and 181 girls) with overall mean age of 2.39 ± 1.10 years old were included. Table 1 presents the demographic characteristics of children according to their age group and prevalence of malnutrition. Majority of children in urban (50.87%) and rural areas (44.60%) were in 13-24 months of age group. Total prevalence of malnutrition in rural areas was more than urban areas; the prevalence of underweight, stunting and wasting in children from urban and rural areas were 17 (5.96%), 20 (7.01%), 21 (7.36%) and 8 (6.15%), 11 (8.46%) and 11 (8.46%) respectively. Boys from rural areas have the highest prevalence of underweight and wasting (8% and 12% respectively); while the highest prevalence of stunting was seen in the girls of rural areas (10.90%). The prevalence of severe wasting, stunting and underweight was 2.89%, 2.40% and 4.33% respectively (Table 2).

Table 3 presents the prevalence of malnutrition according to the children's age groups and infant feeding practices. The highest prevalence of underweight and wasting was present in children with 25-36 months of age; while children in 13-24 months of age have highest prevalence of stunting. 88% of underweight children have exclusive breastfeeding and other 12% were

Table 1. Demographic characteristics and the prevalence of malnutrition among children (N = 415)

Area	Urban			Rural		
	Boys (N= 159)	Girls (N= 126)	Total (N= 285)	Boys (N= 75)	Girls (N= 55)	Total (N= 130)
Sex						
N						
Age (years)	2.38 ±1.11	2.25 ±1.01	2.33 ±1.07	2.44±1.14	2.62±1.17	2.52 ±1.15
Age in months						
0-12	27 (16.98)	25 (19.84)	52 (18.24)	12 (16)	8 (14.54)	20 (15.38)
13-24	81 (50.94)	64 (50.79)	145 (50.87)	36 (48)	22 (40)	58 (44.61)
25-36	28 (17.61)	23 (18.25)	51 (17.89)	15 (20)	14 (25.45)	29 (22.30)
37-48	11 (6.91)	10 (7.93)	21 (7.36)	9 (12)	5 (9.09)	14 (10.76)
49-60	10 (6.28)	2 (1.58)	12 (4.21)	0	6 (10.90)	6 (4.61)
61-72	2 (1.25)	2 (1.58)	4 (1.40)	3 (4)	0	3 (2.30)
Proper complementary feeding	115 (72.32)	44 (34.92)	159 (55.78)	49 (65.33)	32 (58.18)	81 (62.30)
Exclusive breast feeding [n(%)]	151 (94.96)	118 (93.65)	269 (94.38)	71 (94.66)	53 (96.36)	124 (95.38)
Underweight [n(%)]	10 (6.28)	7 (5.55)	17 (5.96)	6 (8)	2 (3.63)	8 (6.15)
Stunting [n(%)]	12 (7.54)	8 (6.34)	20 (7.01)	5 (6.66)	6 (10.90)	11 (8.46)
Wasting [n(%)]	11 (6.91)	10 (7.93)	21 (7.36)	9 (12)	2 (3.63)	11 (8.46)

Continuous variables are presented as mean (SD) and categorical variables as number and percent.

Table 2. The prevalence of malnutrition according to the S.D. classification

Indicator	<-3 S.D.	-3 S.D. to -2 S.D.	-2 to -1 S.D.	≥ -1 S.D.
Weight for height	12 (2.89)	20 (4.81)	57 (13.73)	326 (78.55)
Height for age	10 (2.40)	15 (3.61)	78 (18.79)	312 (75.18)
Weight for age	18 (4.33)	13 (3.13)	40 (9.63)	344 (82.89)

S.D. standard deviation; Values are presented as number and percent.

formula fed. The corresponding values for stunting and wasting were 90.32, 9.67% and 90.62, 9.37% respectively. Stunted children had the highest prevalence of improper time of complementary feeding introduction compared with wasted or underweight children (42%).

Figure 1 shows the association between HAZ, WAZ and WHZ scores with feeding practices and complementary feeding status. As shown in figure 1, there was no significant difference between HAZ, WAZ and WHZ scores according to the complementary feeding status; whereas formula-fed children have higher scores of HAZ, WAZ and WHZ compared with exclusively breast fed children ($P < 0.05$).

Discussion

In the current study the total prevalence of wasting, stunting and underweight in children under 5 years of age from northwest of Iran were 7.71%, 7.46% and 6.02% respectively. These values were slightly higher in rural compared with urban areas. The extent of malnutrition in pre-school children has been studied by previous authors in Iran and different other countries. In a study by Emamaian et al (18) in 2011 at Shahrood, prevalence of wasting, underweight and stunting in pre-school children were 4.7%, 5.7% and 10.3% respectively. A national survey in 2005 (19) evaluated

Table 3. Infants feeding practices according to the nutritional status of children

Feeding practice	Underweight [n (%)]	Stunting [n(%)]	Wasting [n(%)]
Age in months			
0-12 (n = 72)	3 (4.16)	5 (6.94)	3 (4.16)
13-24 (n = 203)	14 (6.89)	17 (8.37)	17 (8.37)
25-36 (n = 80)	6 (7.5)	6 (7.5)	9 (11.25)
37-48 (n = 35)	1 (2.85)	1 (2.85)	3 (8.57)
49-72 (n = 25)	1 (4)	2 (8)	0
Exclusive breastfeeding	22 (88)	28 (90.32)	29 (90.62)
Formula-feeding	3 (12)	3 (9.67)	3 (9.37)
Proper complementary feeding	16 (64)	18 (58)	25 (78.12)

Values are presented as number and percent.

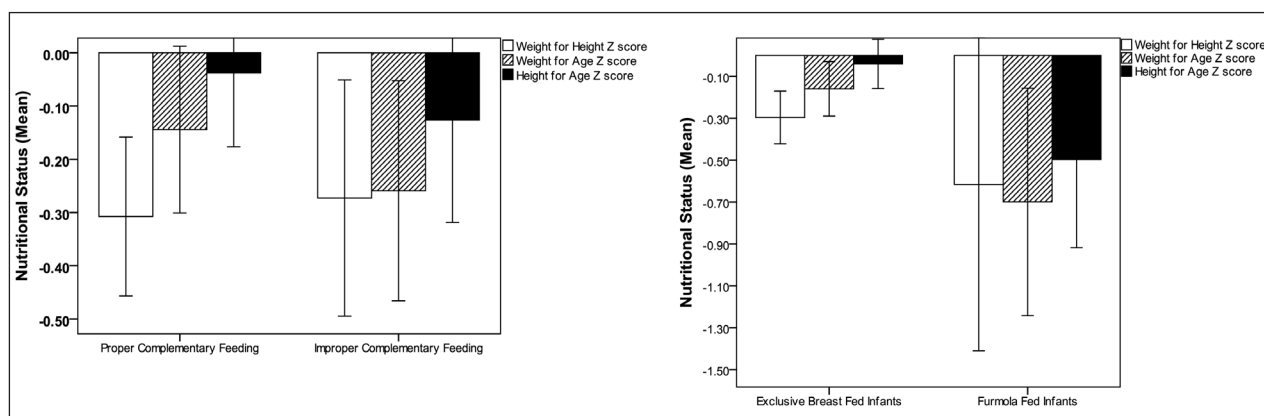
the determinants of malnutrition among 34200 children aged 2-5 years of old in 28 provinces of Iran and reported that the total prevalence of wasting, stunting and underweight was 3.7%, 4.7% and 5.2%; while the prevalence of all three indices of malnutrition in rural areas were more than urban areas (4.3% versus 3.8% for wasting; 3.1% versus 3.5% for stunting and 3.5% versus 3.9% for underweight). Previous national reports in 2001-2003 in Iran showed that the prevalence of wasting, underweight and stunting in pre-school children was 4.5%, 7.6% and 13.1% respectively while the prevalence of malnutrition in rural areas was twice that of urban areas (20).

The prevalence of malnutrition in our study was slightly higher than above-mentioned reports; how-

ever, in comparison with several other reports in South Khorasan-Iran (21) and Maneh-Selmelghan (22) our results exhibited a lower prevalence of malnutrition. Our data showed that boys in urban areas are more likely to be underweight and stunt; but wasting was more common among girls; this image was different in children of rural areas; underweight and wasting in boys and stunting in girls were more prevalent.

This finding did not support the finding of the Kumar et al study (9) reporting higher prevalence of stunting in boys; this difference may stem from the difference between ages of the studied population.

In the present study 57.83% of children had proper complementary feeding; in the previous reports the rate of proper complementary feeding was 49.1% in

**Figure 1.** Nutritional status of children by complementary feeding status and feeding practices.

Ilam (23) 76.3% in Semnan (24) and 16.6% in west of Tehran (25). Improper complementary feeding is one of the known risk factors of growth retardation (26) and malnutrition (9). Higher incidence of respiratory infection, malaria morbidity and eye infection are reported in early introduction of complementary feeding before three months (8).

In the present study no significant difference was observed between child's infancy feeding practices and their current nutritional status; no difference was also between the prevalence of malnutrition in children of proper and improper complementary feeding time; while higher prevalence of malnutrition indices was observed in exclusively breast-fed children versus formula-fed ones; therefore it seems that breast feeding with supplements is more beneficial than exclusive breast feeding even for children at very young ages (9, 27).

Conclusions

Considering the high prevalence of malnutrition and undesirable feeding practices in the current study, nutrition education for mothers, improving health care services and promoting the infant feeding practices are essential elements for improving nutritional status in childhood and reducing the morbidity and mortality in this age group.

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