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The Comparison of Nutritional Status Between Turkman and Non-Turkman Ethnic Groups in North of Iran

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Abstract: Undernutrition and obesity are two most children health problems in world. Several agents can effect on food pattern among ethnic groups. This study was designed to determine nutritional status among rural children by two ethnic groups (Turkman and Non-Turkman) in north of Iran in 2004. We chose 20 villages of 118 by cluster and simple sampling. All of 2-5 years old children in this area were considered in this study. Sample size was 1446 cases (551 = Turkman and 895 = non-Turkman). Height, weight and personal identification were recorded by questioner. BMI percentile and under -1SD, -2SD and -3SD from NCHS were used for comparison. χ^2-test and T-test were used to analyze by software SPSS. Turkman children are about 426 g heavier and 4.9 cm taller than non-Turkman in all of age groups. T-test is significant between two groups by weight and height ($p<0.05$). Stunting and underweight were observed in Turkman group 13.2 and 1.9%, respectively less than in non-Turkman by -2SD criterion. There is a significant difference between two groups by stunting ($p<0.05$). Obesity and overweight exist in Turkman group 24.5 and 2.6%, respectively are less than in non-Turkman. Obesity is statistical significant between two groups ($p<0.05$). Secular growth in two groups is incompatible and in Turkman group, it is better than Non-Turkman. There is severe height deficit in Non-Turkman group and it increases the BMI values. Thereby, malnutrition is the most health problem in rural area in north of Iran and nutritional intervention is necessary for solving these problems. BMI values are not suitable for children with stature failure.

Key words: Height, weight, children, ethnic, Iran

INTRODUCTION

Human health depends on both genetics and ecological factors but second factors is more effective than the first one (Ganz, 2001; Mata, 1980).

World children suffer from Protein Energy Malnutrition (Robbins *et al*., 2007) and UNICEF (WHO, 1995) reported that one-third of children were stunting in development countries in 2000. Obesity is another health problem in world (Maffeis *et al*., 2006). Several studies in different countries (Sanna *et al*., 2006; Valerio *et al*., 2006; Ogden *et al*., 2006; Shields, 2006) showed, that obesity trend increases in world. Some agents effect on obesity, such as metabolic factors, low physical activity, high watching TV, computer playing, high calorie diet and high income (Ng *et al*., 2006; Kang *et al*., 2006; Sanigorski *et al*., 2005; Shields, 2006; Frank *etal*., 2006; Wang and Zhang, 2006; Ntandou *et al*., 2005; WHO, 1998).

Growth monitoring is one of the important ways to detect malnutrition and growth disorders in children (Behrman, 1996; Onis and Habicht, 1996). Antheropometery is universally applicable, inexpensive and non-invasive methods are available to assess of the proportion the size and the composition of the human body. It shows both health and nutrition and it predicts performance, health and survival. Short stature and underweight cause lock of ability. High BMI percentile values in children can assist us in identifying and selecting children at risk and in assigning the children who will probably suffer from overweight or obesity in adulthood. This health information can help those children who are at risk and them need close monitoring or intervention.

Several micronutrients, like as zinc, iron, iodine, selenium, vitamin A, B12 and B9 take part as the ingredient of some enzyme, hormone and their activities. Lack of above nutrients can be effect on the bodies metabolism and physical growth trend (Pinhas-Hamiel *et al*., 2003 and 2006) and Sayari (2001) studies showed high prevalence of malnutrition among Iranian children in 1996 and 1998. He reported that

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Golestan province children were in the first degree on base of weight and in the 13th degree by height among 28 provinces. There is not any concord between trend of height and weight growth. Another study (Veghari *et al*., 2003) showed that children suffer from stunting more than wasting in this region. Obesity in Iranian children is as a health problem, too (Azizi *et al*., 2001). We caried out this study among 2-5 years old children in a rural area of Gorgan (North of Iran) to determine two objectives, under and overnutrition, by ethnicity. Gorgan district located in mountain-side in north of Iran and south east of Caspian Sea. The most of people living in this area are farmer and several ethnic groups living in this region.

MATERIALS AND METHODS

This study is a descriptive-crossectional that carried out in villages of Gorgan (North of Iran) in 2004. Villages were chosen by cluster and simple sampling. We have chosen 20 villages from 118. All of the 2-5 years old children were chosen as a sample. Data was collected by health system staffs in this region. The number of samples was 1446 (Turkman = 551 and Non-Turkman = 895). Height, weight and birth date were recorded . Children's height was measured in a standing posture without shoe and 4 parts of body (heel, scapula, back of the head) attached to the wall. The weight, without clothes and shoes, was measured with scales confirmed by WHO. Weight and Height were measured with 0.1 kg and 0.1 cm accuracy (Rosalind, 1990). The collected data was complied and fed into computer and the Statistical Package for Social Sciences Pakage version 10, was used to analysis. The National Centers for Health Statistical (NCHS) (Ogden *et al*., 2002; WHO, 1983) standard was used for comparison the groups. Under -2 standard deviation (-2 SD) from median of normal community (NCHS) computed as a start point of malnutrition (Sidibe *et al*., 2006; Vonk *et al*., 1993). Anthropometric Indexes in this study defined following scale: Underweight: weight-for-age. Stunting: Height-for-age. BMI:weight-for-height square.

The BMI percentiles (Leonard *et al*., 2004; Krebs and Jacobson, 2003) were used to classify subjects as follows: under weight, <5th BMI percentiles; healthy weight, 5th-84th BMI percentiles; overweight, 85th-94th BMI percentiles; or obese, = 95th BMI percentiles. Gorgan district located in mountain-side in north of Iran and south east of Caspian Sea. The most of people living in this area are farmer and several ethnic groups living in this region.

In this study the ethnicity was defined as follow: Turkman ethnic group: This group does not have family relation with other ethnic groups, therefore it can be considered as a independent race and are residing in a particular rural area. Non-Turkman ethnic group: People who are resided in this region since long time ago and they are considered as the Non-Turkman resident.

χ^2-test and t-test used for comparison the frequency and mean of groups, respectively.

RESULTS

Turkman boys are about 500 g heavier than Non-Turkman in all of age groups (Table 1). There is statistically significant difference ($p<0.05$) between two ethnic groups for boys' weight in agese of 25-30 months, 43-48 months and as well as for all boys ages combined. Turkman girls are about 300 g heavier than Non-Turkman girls in ages combined and there is a statistical differences in age ranges 49-54 months between two ethnic groups. Turkman children (boys and girls) are about 5 cm taller than Non-Turkman children and this difference is significant between all of age groups ($p<0.05$). For height differences, all Non-Turkman children height mean, at each age group and for all ages combined, were significantly lower than comparable mean for Turkman children even though the mean weights for Turkman children were significantly greater in only 4 of the 14 age categories.

Mean of BMI in all of Turkman children is higher than Non-Turkman children. Statistical differences about mean of BMI is significant except in 43-48 months for boys and 49-54 months for girls ($p<0.05$).

Stunting in Turkman boys based on -1SD, -2SD and -3SD is 39.9, 38.6 and 23% less than Non-Turkman boys, respectively and χ^2-test is significant between two groups in all of criteria ($p<0.05$) (Table 2). Underweight in Turkman boys based on -1SD, -2SD and -3SD is 16.5, 0.5 and 1.4% less than Non-Turkman boys, respectively and χ^2-test is significant between two groups only in -2SD criteria ($p<0.05$).

Stunting in Turkman girls based on -1SD, -2SD and -3SD is 38.2, 37.1 and 26% less than Non-Turkman girls, respectively and χ^2-test is significant between two groups in all of criteria ($p<0.05$). Underweight in Turkman girls based on -1SD, -2SD and -3SD is 11.5, 4.5 and 0.9% less than Non-Turkman girls, respectively and χ^2-test is significant between two groups only in -1SD criteria ($p<0.05$). There is insufficient number about -3SD for χ^2-test by underweight.

BMI distribution is shown in Table 3. BMI>95% in Turkman boys is 25.5% less than Non-Turkman but BMI<5%, BMI equal 5-84% and BMI equal 85-94% in Turkman boys is more than in Non-Turkman. Statistical

Table 1: The comparison of (Mean±SD) of children weight, height and BMI by sex, age and ethnicity

	Turkman							
	Male				Female			
Age (month)	No.	WT (kg)	HT (cm) e	BMI (kg m^{-2})	No.	WT (kg)	HT (cm) f	BMI (kg m^{-2})
25-30	45	12.9±1.3c	87.3±4.1	16.9±2.12	39	12.1±1.5	85.6±4.7	16.6±2.2
31-36	53	14.1±1.3	91.6±3.9	16.8±1.8	36	13.5±1.4	90.6±3.4	16.5±1.6
37-42	45	14.4±2.1	94.8±4.8	16.0±2.2	46	13.6±2.6	92.7±7.7	16.8±2.5
43-48	51	15.8±1.2b	96.7±8.0	17.5±5.4g	47	14.9±2.3	96.4±3.6	16.0±2.1
49-54	53	15.9±1.9	99.9±5.1	15.9±1.7	36	16.0±1.8a	100.7±7.1	16.0±3.3h
55-60	47	16.7±1.5	105.3±3.0	15.1±1.1	53	16.4±1.6	103.4±4.2	15.4±1.7
Total	294	15.0±2.03d	96.0±7.6	16.8±2.7	257	14.5±2.4	95.3±8.1	16.3±2.4

Table 1: Continued

	Non-Turkman							
	Male				Female			
Age (month)	No.	WT (kg)	HT (cm) e	BMI (kg m^{-2})	No.	WT (kg)	HT (cm) f	BMI (kg m^{-2})
25-30	74	12.3±1.4c	81.7±4.1	18.6±2.4	67	12.0±1.3	82.1±5.3	18.0±2.7
31-36	64	13.7±2.6	86.9±5.5	18.3±4.5	81	13.7±5.1	84.6±5.8	19.4±7.5
37-42	51	14.1±1.9	90.0±5.8	17.4±2.4	68	13.5±1.4	87.5±5.8	17.7±2.1
43-48	84	14.7±1.5b	91.3±5.9	17.7±2.1g	73	14.6±1.5	92.4±5.6	17.2±2.3
49-54	70	15.5±1.9	95.2±7.7	17.3±2.6	94	14.6±2.1a	94.2±7.5	16.5±2.5h
55-60	76	16.5±1.7	99.3±6.7	16.7±2.2	93	16.2±1.9	98.4±6.5	16.8±1.9
Total	419	14.5±2.3d	90.9±8.6	18.2±3.1	476	14.2±2.9	90.5±8.4	17.8±1.9

WT = weight , HT = Height , BMI = Body Mass Index, a: t-test is significant between two groups ($p<0.001$), b: t-test is significant between two groups ($p<0.0001$), c: t-test is significant between two groups ($p<0.03$), d: t-test is significant between two groups ($p<0.002$), e: t-test is significant between two groups in all of ages ($p<0.00001$), f: t-test is significant between two groups in all of ages ($p<0.00001$), Criteria's BMI except g and h are statistical significant between two ethnic groups in all of ages groups ($p<0.03$)

Table 2: The comparison of physical growth by Stunting and Underweight among 2-5 years old children in villages of Gorgan based on deviation from NCHS

	Male							Female						
	Stunting			Underweight				Stunting			Underweight			
Ethnic groups	-1SD	-2SD	-3SD	-1SD	-2SD*	-3SD**	No.	-1SD	-2SD	-3SD	-1SD	-2SD	-3SD**	No.
Turkman	92 (31.2)	38 (13.0)	12 (4.2)	58 (19.8)	12 (4.0)	1 (0.3)	294	84 (32.6)	31 (11.7)	12 (4.7)	52 (20.5)	11 (4.4)	5 (1.7)	257
Non-Turkman	298 (71.1)	216 (51.6)	114 (27.2)	152 (36.3)	19 (4.5)	7 (1.7)	419	332 (69.7)	234 (49.2)	146 (30.7)	151 (31.7)	42 (8.8)	4 (0.8)	476
Total	395 (50.4)	258 (36.2)	127 (17.8)	212 (29.7)	30 (4.2)	8 (1.1)	713	416 (56.7)	265 (36.2)	158 (21.6)	203 (27.7)	53 (7.2)	9 (1.2)	733

χ^2-test shows a significant difference between two ethnic groups in all of criteria for male and female ($p<0.05$), *χ^2-test isn't shows a significant differences between two groups, **Insufficient number for χ^2-test

Table 3: The comparison of BMI distribution among 2-5 years old children in villages of Gorgan on base of NCHS BMI percentiles

	Male					Female				
Ethnic groups	<5%	5-84%	85-94%	95%<	No	<5%	5-84%	85-94%	95%<	No
Turkman	39 (13.3)	169 (57.4)	45 (15.4)	41 (13.9)	294	22 (8.6)	176 (68.3)	31 (12.2)	28 (10.9)	257
Non-Turkman	22 (5.2)	171 (40.8)	61 (14.6)	165 (39.4)	419	18 (3.9)	206 (44.1)	86 (18.4)	166 (35.6)	476
Total	61 (8.5)	340 (47.7)	106 (14.9)	206 (28.9)	713	40 (5.5)	382 (52.1)	117 (15.9)	194 (26.5)	733

χ^2-test shows a significant difference between two ethnic groups, except 85-94%, in all of BMI percentiles ($p<0.05$), χ^2-test no shows a significant difference between male and female in all of BMI percentiles

difference is significant between two groups ($p<0.05$). Obesity in Turkman girls is 24.7% less than in Non-Turkman but other criteria in Turkman girls is more than in Non-Turkman. Statistical difference is signification between two groups ($p<0.05$).

DISCUSSION

Stunting and underweight are two health problems among Gorgan's children. They suffer from stunting more than underweight. Overweight and obesity are others problems in this area. Other researchers reported under and overnutrition in their studies (Bellamy, 1998; Kwena *et al*., 2003; Menegolla *et al*., 2006; Sanchez-Perez *et al*., 2007). Sayri (2001) study on the under 5 years old children among 28 provinces in Iran showed that Golestan province has the 1st and 13th ranks by weight and height growth, respectively. Sheikholeslam *et al*. (2004) Ronaghy and Halsted (1975), founded trace elements deficiency in some areas of Iran. Prevalence of malnutrition in Turkman group is lower than Non-Turkman group. Other studies (Sanchez-Perez *et al*.,

2007; Larrea and Kawachi 2005; Callaghan *et al*., 2006; Renzaho *et al*., 2006) showed that ethnic groups in a community have nutritional variety together. Several factors, like culture, economy, literacy, food habit and poor health can effect on nutritional situation in an area (Sanchez-Perez *et al*., 2007; Menegolla *et al*., 2006; Renzaho *et al*., 2006).

Mean of weight and height of Turkman children is higher than Non-Turkman but obesity in Turkman group is lower than Non-Turkman. Danubio *et al*. (2005), Freedman (2005 and 2006) and Ogden *et al*. (2006) in United States reported the difference in prevalence of obesity among ethnic groups. Wickramasinghe *et al*. (2005) in his study showed that genetic factors effect on secular growth and we should consider them in antheropometery. Rush *et al*. (2003) recommended using FFM (Free Fat Mass) instead of BMI in field study. Fredriks *et al*. (2003 and 2004) believes that separate Growth Chart for Morroccan and Turkish children that living in Netherland is necessary.

The results of this study showed that Non-Torkman children are overweight despite, high prevalence of stunting. Further studies are necessary for growth monitoring with regard to ethnicity in this region. Several micronutrients, like zinc, iron, iodine, selenium, vitamin A, B12 and B9 take part in structure of some enzymes, hormones and their activities. Lack of mentioned nutrients can change the body metabolism and physical growth trend (Pinhas-Hamiel *et al*., 2003 and 2006; Singh, 2004). Somatic growth in boys is better than girls. Others (Vailay and Rai, 1996; Setswe, 1994) reported that prevalence of malnutrition in girls is higher than boys.

Finally, this study shows that underweight, stunting and obesity are as health problems among children in Gorgan rurral area. Various races have different nutritional problems. Nutritional status in Turkman group is better than Non-Turkman. With regard to high prevalence of undernutrition and high prevalence of obesity among Non-Turkman children, BMI criteria does not have an efficient speciality and specifity to determine obesity in population with height defficity. Although malnutrition resulting from height failure in Non-Turkman children is higher than Turkman children, but high prevalence of obesity among Non-Turkman children is a question that we should answer it. We do not know what causes this problem. We suppose that Non-Turkman children are either genetically shorter in stature, malnourished or some combination of theses factors when compared to the Turkman children. These data show that comparisons of anthropometric measurements to an international standard, like NCHS standard, is only a part of the view that healthcare professionals and nutritionists must take. Local ethnic, genetic and other factors are also at play and need to be emphasized before proper healthcare measures can be under taken.

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