

PJN

ISSN 1680-5194

PAKISTAN JOURNAL OF
NUTRITION

ANSI*net*

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Role of Health Management in Evaluation of Programs Monitoring the Growth of Children Aged 0-5 in Tehran, Iran

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Abstract: This study was conducted to evaluate the children's growth monitoring program in the southern part of Tehran-Iran. This descriptive cross-sectional study was done on 1219 children aged 0-5 in health facilities in the southern part of Tehran. The data was collected through existing data in the children's growth monitoring system, anthropometric indicators and also gathering demographic variables through observation, interview and questionnaire. The data was statistically analyzed using SPSS software and Z and X² tests. Findings indicate that out of 1219 children in the study, 618 (50.7%) were girls and 601 (49.3%) boys. Considering weight, 46.35% of the children 0-12 months old were between the 50th and 97th standard percentile. With the increase of age, the figure increased to 48.49%, 53.85% and 55.41%, at the age of 13-24 months, 25-36 months and 49-60 months respectively. But at the age of 37-48 months it decreased to 52.15%. Statistical analysis based on X² tests indicates that there is a significant statistical relationship between sex and weight (p = 0.000), but no significant relationship is found between sex and height (P = 0/05170). The results indicate low weight in children in the study, considering NCHS standard. With regard to the mean difference of weight and height percentage between the children in the study and their peers in other countries, international standard NCHS can be a suitable indicator for monitoring children's physical growth.

Key words: Evaluation, programs, monitoring growth, children, Health management,

INTRODUCTION

Evaluation of the growth trend of children aged 0-5 is one of the most important functions of health management in offering health services to the community. Measuring the infant's weight at birth, their height and head circumference is the simplest but the most reliable means to evaluate their health and the amount of care provided (Hatami *et al.*, 2004). Using weight and height indicators to find out children's health and nutritional status in the society is getting more and more important (Kaller *et al.*, 1976; WHO, 1986). Growth as one of the health indicators from the beginning of infancy to the end of maturation has always been worthy of attention and it is so important that all who are involved in children's health and hygiene should be familiar with the concept of growth and its natural extent in order that they can recognize unnatural cases and find out the causes and if possible, to restore natural growth through removing obstacles (Kanawati, 1976).

By 1985 using growth curve and recording weight curve seemed impossible and impractical in the third world countries, but now due to an increase growth nutritional information and the importance of nutrition in children's

health and planning in monitoring it is now possible to perform growth monitoring in the third world countries as well (Ayatollahi and Ahmadi, 2001; Ayatollahi, 1993).

Deviation in growth patterns is also an unspecific but very important sign to diagnose severe diseases. This deviation is often the first sign indicating that the child has a problem which sometimes even the parents don't realize. Measuring over and over is much more valuable than measuring once, because in this way deviation, in specific growth patterns, even natural ones, can be recognized (Veghari, 2007).

Measuring growth criteria is one of the best ways to estimate health and nutritional status in children (Amy *et al.*, 2000). The most important indicator of children's growth is gradual increase in their weight which is easily affected by right nutrition, but the growth rate of body length and the skull is lower and changes later. Similarly, malnutrition causes decrease in weight more quickly (Nakhshab and Nasieri, 2003). Malnutrition or failure to thrive is a clinical syndrome indicating that the infant or child has deviated from natural growth pattern and moves downward the growth curve and always ranks below 3% in weight and height curve or below the

mean percentage with more than two standard deviations (Malek and Sharifian 1990; Nakhshab and Nasieri, 2003; Bisai *et al.*, 2008).

Almost 9% of children below 5 in the world suffer wasting, i.e. considering their height; they are low weight and are subject to death or severe disturbance in physical and /or mental growth (Amy *et al.*, 2000). Based on statistics reported by ministry of health and medical education (autumn 1998), 10.9% of children below 5 (24-29 months of age) are moderately or severely under weight and 15.4% encounter severe delay in growth or are not as tall as is naturally expected (Ministry of Health and Medical Education and UNISEF, 1998).

Nutritional disturbances in children below 5 are the greatest health problems in our age. Economic, social and cultural poverty and lack of the families' access to health and treatment services to prevent diseases and also lack of the correct use of a right diet when children are growing play a significant role in causing malnutrition and low weight (Farzianpour *et al.*, 2008). It is obvious that evaluation of the function and effectiveness of programs monitoring children growth is highly important and monitoring children's growth is the best means of promoting their health (Haidary *et al.*, 2006). For this reason the present study tries to determine and control programs monitoring children's growth from birth to 5 years in the southern part of Tehran and then to compare its results with the international NCHS standard.

MATERIALS AND METHODS

The study was a cross-sectional one and was carried out based on the existing data in the children growth monitoring system.

The sample in the study consisted of 1219 children aged 0-5 who had taken based on census. They had referred to the health and treatment centers in southern part of Tehran and who lived in the same area.

The information collected in the study was based on observation, interview and measuring anthropometric indicators as well as questionnaires about demographic variables. The research was done in 2004 and took one year. To show some variables, table of the absolute and relative distribution and to show the relationship between qualitative variables, X^2 test was used. Anthropometric indicators had already been determined by experts based on instructions of ministry of health and medical education.

Growth information related to different ages, from birth to 5 was obtained from the children's files and the situation of children's growth curve at different ages based on standard percentiles of growth card was determined. Statistical analysis of the information was done using SPSS software and the curve of growth percentiles was drawn and then compared with NCHS standard with the help of Z test (Schroeder and Brown, 1994; Nasiri Rineh,

1997; WHO, 1995; Lohman *et al.*, 1988; Hamill *et al.*, 1979).

In this research, the relationship between independent nutritional and no nutritional status variables has been studied. These variables include age, gender, demographic, economic, social and cultural status, mother's occupation, parents' education, the way the child is fed in the first six months of age (exclusive breast feeding or predominant breast feeding), the duration of complement nutrition, if the child has not been predominantly breast fed, the use of multivitamin drops. To show some of the variables and to show the relationship between qualitative variables, absolute and relative frequency distribution table been used, X^2 have used respectively.

RESULTS

Findings indicate that 618 out of 1219 children in the study were girls (50.7%) and the rest were boys (49.3%) and also 13.17% of them had been solely breast fed by the time they were seven month old. Only one mother who had twin children had used complement milk to feed them. 12.3% of mothers had started giving complement milk since their children were three months old. 68.2% of children under one had been only breast fed or given powdered milk or cow's milk.

Tables 2, 3 show children's weight growth status based on standard percentiles. The weight of 46.35% of children 0-12 months of age is between the 50th and 97th percentiles. As age increases this figure reaches 48.49%, 53.85%, 55.41% for 13-24, 25-36 and 49-60 month age group, respectively. It shows a decrease of 52.15% for 37-48 month age group.

When the above figures are compared in boys and girls, the number of girls under the 3rd percentile and from the 3rd to the 5th is more than that of boys but the number of the boys from the 50th to the 97th and above the 97th is more than that of girls.

Table 1: Frequency distribution of 0-5 years of age children's height, weight and sex status in the southern part of Tehran

Types of variables	(P. value)
Height and sex in whole children	0.5170
Weight and sex in whole children	0.000
Height and sex in children above 3	0.0616
Weight and sex in children above 3	0.0687

Furthermore, the weight of 48% of children 0-12 months old ranks from the 3rd to the 50th percentile. Whereas the figures are 44.2, 36.86, 42.59 and 35.13% for 13-24, 25-36, 37-48 and 46-60 age group, respectively. According to the results, as age increases the growth curve of the children above the 50th percentile falls to under the 50th. The application of X^2 test present that there is a significant relationship. Between sex and weight ($p = 0.000$) but there is no such a relationship between sex and height (Table 1). Also in children above 3 there is no

Table 2: Weight growth curve of children of 0-5 years of age based on standard NCHS through monitoring growth considering age and sex in 2004

		Growth curve										
Age (month)	P-value	Sex	Under the third percentile		Between the 3 rd and 50 th percentile		Between the 50 th and 97 th percentile		Above the 97 th percentile		Total	
			N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
0-12	0.2‡	Boy	3	1.07	122	43.8	138	49.6	13	4.67	278	100
		Girl	5	1.76	148	52.2	122	43.1	8	2.82	283	100
13-24	0.000*	Boy	3	1.16	95	36.9	139	54.08	20	7.78	257	100
		Girl	9	3.11	149	51.5	124	42.9	7	2.42	289	100
25-36	0.146‡	Boy	8	3.29	81	33.3	134	55.1	20	8.23	243	100
		Girl	7	3.04	93	40.43	121	52.6	9	3.91	230	100
37-48	0.0168*	Boy	5	2.1	90	37.97	139	58.6	3	1.26	237	100
		Girl	9	3.34	127	47.21	123	45.7	10	3.71	269	100
49-60	0.0063*	Boy	2	0.9	74	36.63	140	63.6	4	1.81	220	100
		Girl	2	0.79	118	46.64	122	48.22	11	4.34	253	100

*Relationship between sex and Growth curve into age group (month), * Significant, ‡ Non Significant.

Table 3: Frequency distribution of 0-5 years of age children's height, Weight in the southern part of Tehran in 2004

Age Month	N	Height Cm	N	Percent	Weight gr	N	Percent
0-12	111	50-69	83	6.8	2000-5999	111	9.1
13-24	428	60-69	190	15.6	6000-9999	428	35.1
25-36	472	70-79	347	28.5	10000-13999	472	38.7
37-48	201	80-89	332	27.2	14000-18999	201	16.5
49-60	7	90 highest	267	21.9	19000-highest	7	0.6
Total	1219	-	1219*	1219	0	1219**	100

*There is a significant relationship between age and height (p = 0.000). **There is a significant relationship between age and weight (p = 0.000).

significant relationship between sex and weight. Using linear regression a significant statistical relationship was observed between weight (X4) and age in terms of month (X2) (p = 0.0687) and regression model was provided as follows:

$$X_4 = 203.9X_2 + 6438.11$$

Also using linear regression, a significant relationship between height (X5) and age in terms of month (X2) was observed (p = 0.000). The regression model is as follows:

$$X_5 = 0.82X_2 + 62.19$$

Tables 4 and 5 show absolute and relative frequency distribution of the nutritional status of the children in the study based on low weight indicator considering age (Table 4) and sex (Table 5). Based on Z score classification, 10.25% of the children suffer malnutrition and are under weight in terms of their age and 2.7% of the children suffer average malnutrition.

The prevalence of malnutrition in girls (10.03%) is less than that in boys (10.4%). Furthermore, malnutrition is prevalent in 0-12 month age groups (36.63%) and it decreases in 37-48 age groups. Demographic variables are shown in Table 6.

24.44% of the mothers have a job outside home, 89.99% of them are literate, the average number of the family members is 5.6 and the youngest parents (15-19) constitute 14.42%. 31.17% of the children are solely

Table 4: Absolute and relative frequency distribution of the nutritional status of the children 0-5 years of age based on low weight indicator considering age in 2004

Age group	Frequency		Malnutrition:mild, moderate and severe	
	N	Percent	N	Percent
0-12	111	9.1	44	36.63
13-24	428	35.1	47	10.98
25-36	472	38.7	19	4.02
37-48	201	16.5	8	3.98
49-60	7	0.6	7	10.25
Total *p = 0.000	1219	100	125	100

*Relationship between age group and malnutrition

breast fed, 86.69% of them are fed with complement foods after the age of 7 months and 83.59% take multivitamin regularly.

DISCUSSION

The findings of the research revealed that weight percentages in two age groups, 13-24 and 0-12 months, were higher in boys than similar percentages in NCHS standard. Weight decrease in girls under twelve months of age indicates malnutrition and growth problems generally occur from under twelve months of age on.

In the present study, mild and moderate malnutrition is seen in age groups 0-12 (36.63%) and 13-24 months (10.98%), which is a noticeable point. These results are similar to those of the research conducted into the trend of growth of children less than two years of age in

Table 5: Absolute and relative frequency distribution of the nutritional status of the children 0-5 years of age based on low weight indicator considering sex in 2004

Nutrition status	Sex				Total	
	Girl		Boy			
	N	Percent	N	Percent	N	Percent
Natural	565	89.97	529	89.51	1094	89.74
Mild malnutrition	44	7	47	7.95	91	7.46
Moderate malnutrition	19	3.03	15	2.54	34	2.8
Sum of malnutrition	63	10.03	62	10.49	125	10.26
Total* P=0.7918	628	100	591	100	1219	100

*Relationship between sex and nutrition status (natural and sum of malnutrition)

Table 6: Characteristics of 1219 children of 0-5 years of age in southern of part of Tehran in 2004

Characteristics	Number	Percent	
Mother's Occupation	Housewife	921	75.55
	Employed	298	24.44
Mother's Education	Literate	1097	89.99
	Illiterate	122	10
Way of the feeding child	PBF & EBF	380	31.17
	Breast feeding	839	68.02
Beginning of	Three months of age	150	12.3
	After 7 months of age	1069	87.69
Multivitamin consumption	Regular	1019	83.59
	Irregular	200	16.4
The number of family members	Fewer than 3 children	305	25.02
	More than 3 children	914	74.97

The average house hold is 5.6 people. The youngest parents of 15-19 years of age, 14.42%.

Tehran (1987) indicating. The onset of malnutrition and growth decrease at six months of age (WBO, 1980). According to the report published by ministry of health and medical education (1988), 7.7% of the children in this age group were moderately or severely low weight (Nasiri Rineh, 1997). The percentage of low weight in Zabol, Kerman, the province of Systan and Beluchestan, Mazandaran, Golestan province were 35.75%, 34.4%, 22.8%, 22.3% and 2.4%, respectively (Nasiri Rineh, 1997). Low weight also has been reported in Ghom, Tehran and East Azarbijan. The results of the studies which have been carried out in other countries reveal that there is a significant relationship between the percentage of the percentage low weight and economic and social development, in that in developed countries (America, Frances, England and Japan) malnutrition prevalence has been reported zero. While the figure was 2.5% in England and Japan in the 80th (Xiao *et al.*, 1998). In South African countries it has been reported 30-40% (Labbafi Qashemi *et al.*, 1997). Weight percentage in age group 25-36 months of age in both girls and boys are above the similar percentiles in NCHS. In this age group there is no low weight. Furthermore, the results of the study on monitoring the growth of the children in the study reveal that in this age group 52.6% and 55.1% of the children rank between the 50th and 97th percentile, respectively. Above 50% shows quite a desired growth. The percentage of low weight in children under 3 years of age in rural areas of Isfahan in 1984 was reported

16.8% in main villages and less important ones, respectively (Minay *et al.*, 1999).

In Bushehr and Natanz 7.8% and 2.2% of children in 25-36 month age group respectively were reported under weight considering their height (Alipour, 1999; Ershadi, 1998) in 37-48 month age group weight percentiles of boys are more than those of girls. 58.6% of boys rank between the 50th and 97th percentile, but the figure is 45.7% for girls. It seems that weight decrease in girls suffering malnutrition in the form of the low weight is more, considering the fact that weight average in girls is lower in proportion to boys. The results of the studies conducted on children aged 6-9 in Kashan and nursery children (children from 2-5 years old) in south of Nigeria revealed that girl's weight and height was lower in proportion to those of boys. This statistical difference was significant (Abidoye and Pearce, 2000; Montazerifard and Mohammad, 2005).

The results of the study on boys aged 4 in southern part of Tehran show an increase of weight at this age. These results are similar to those obtained from studying on children under six years of age, especially, four-year age group in Zahedan, considering NCHS (Montazerifard and Mohammad, 2005). Weight percentiles in 49-60 month age group in both girls and boys are higher than similar percentiles in NCHS standard. In this age group there is no low weight. The results of the study indicate that 48.22% of girls and 63.6% of boys 4-5 years of old rank between the 50th and 97th. While the results also in

the study carried out on children 0-5 years of age from Calvin revealed that the growth percentiles of boys and girls were lower in low percentages than high ones. In the study conducted by Montazerifard and his colleagues in 2004 malnutrition and low weight in 49-60 month age group was reported 13.5% (Mahyar *et al.*, 2009). According to statistics of WHO, the prevalence of malnutrition in children under five years of age is 5.7%, 8.3% and 56.3% in Brazil, Turkey Bangladesh, respectively (Xiao *et al.*, 1998) in Iran the rate of death in children under five years of age was reported 32 out of 1000 (Naghavi, 2003).

In most countries of the world the rate of death in children under five years of age and children aged 1 has decreased considerably, which is due to improvement in family planning programs and children's health care, but this decrease, has been less in babies. Investigating the causes of death in babies in 18 provinces of Iran has shown that the most prevalent cause of death in babies is low weight at birth (Eghbalian, 2007). Fortunately we didn't have any limitation in this study.

Conclusion: The pattern of growth shows low weight in children of 0-12 months of age and mild and moderate malnutrition in children of 25-36 months of age, which is indicative of poor nutrition and also lack of enough nutrition which in turn reflects cultural, economic and social poverty. Finally, the results indicate weight decrease in children in the study based on NCHS standard. Considering the difference between percentile of weight and height in boys and girls and those of children of the same age in other countries, it seems that using the international NCHS standard is a good indicator for monitoring children's physical growth.

ACKNOWLEDGMENT

The authors would like to thank the office of Vice chancellor for research And Research Ethics Committee of School of public Health. Tehran University of Medical Sciences for support of this study. Also we are grateful to respectable managers of health and treatment centers located in southern part of Tehran, specifically experts of mothers and children unit and all mothers who filled our questionnaires.

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