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Relationships Between Anthropometrical Indices and Socio-Economic Differences for Children at 6 Years Old Living in Urban Areas of Ardebil, Iran

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Abstract: The aim of this study was to explore association between economic differences and nutritional status of children living in Ardebil urban areas. In a descriptive cross-sectional study, 698 preschool children (346 males, 352 females) at 6 years old from different regions of Ardebil city (Iran) were selected by a multi stage sampling method. Variables such as age and anthropometric factors (height, weight and BMI) were measured. The results showed that the mean values for height, weight and BMI were less than NCHS standards. There has been no severe malnutrition among the subjects studied. However, mild (31.6%) and moderate underweight (7.9%) were observed. Similarly, no severe stunting cases were observed; however, 17.2 and 1.4% of the cases were suffering from mild and moderate stunting, respectively. Mild and moderate wasting rates were found to be 25.5 and 0.9%, respectively. Based on BMI for age, 2 and 4% of children were overweighed and being at the risk of overweight, respectively. Significant associations were observed between birth weight and BMI and weight. There was a significant difference between height and family's monthly income. Height of the children was significantly higher in objects living in private homes compared to rental homes ($p<0.05$). No significant association was observed between anthropometric factors and birth ranking, mother education and employment status. The lack of severe malnutrition implies that the growth status is acceptable among children at 6 years old, although it was lower than the NCHS standards. However, economic status may affect long term growth of the children.

Key words: Height, weight, socio-economic, children, anthropometric factors, Ardebil

INTRODUCTION

Nutrition is one of the most important factors influencing the children health. It plays a vital role in prevention and control of various diseases. Recent reports show that the world children suffer from protein energy malnutrition (Robbins *et al*., 2007; Cornelio-Nieto, 2007; Agrahar-Murugkar, 2005). The influence of increasing affluence is likely to be seen both in the form of increased obesity among older females and underweight among children (Hakeem, 2001). There is considerable heterogeneity in poverty, morbidity, mortality and nutritional status in urban areas, with often enormous differentials between poor and the middle- to high-income parts of a particular city. Major socio-economic differences in child health and mortality have been reported within the urban sector of Ghana (Rikimaru *et al*., 1988), Guatemala (Engle., 1993), Ethiopia (Getaneh *et al*., 1998), Brazil (Gross and Monteiro, 1989), Nepal (Martorell *et al*., 1984), Malawi (Quinn *et al*., 1995), Bangladesh (Ahmed *et al*., 1991), Saudi Arabia (Serenius and Swailem, 1988), Pakistan (Hakeem, 2001) and Iran (Ayatollahi *et al*., 2006). The possible socio-economic reasons of trend in the BMI and prevalence of overweight and obesity among preschool has been well of defined in a number of studies (Jakimaviciene and Tutkuviene, 2007; York *et al*., 2004). The patterns of within-urban differences vary between countries according to the overall degree of national development and the particular history of urban development. Excess weight appears first among the affluent and then among low-income classes including young children and teenagers (Delpeuch and Maire, 1997). Body mass index (BMI) is positively associated with income and education in Asia but not in Latin

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America (Inclen, 1996). Pattern of association between certain nutritional disorders and income level within a society thus could be an indication of stage of nutrition transition. It appears that, during the process of urbanization and associated nutrition transition, societies pass through a span where both under- and over nutrition-related problems occur simultaneously. The length of this stage is probably determined by the society's adaptation to a new lifestyle through behavioral change and allocation of nutritional resources at the community and the household level. Currently, in many developing countries, urban populations are suffering from the worst of both worlds: the effect of under nutrition with its greatest impact on infants, children and women of child-bearing age and excessive nutrition creating a variety of chronic health conditions in middle-aged and older adults (Posner *et al*., 1994; Popkin, 1994; Popkin *et al*., 1996). The existing evidence suggests that the urban society and the associated nutritional problems are too heterogeneous to allow generalizations. In developing countries where the problem of undernutrition is customarily given attention, the focus of attention now needs to encompass overnutrition- related problems as well. Therefore this study aims at exploring the association between income and nutritional status in urban areas of Ardebil and focuses on the socio-economic differences in anthropometrically assessed nutritional status of children living in urban areas.

MATERIALS AND METHODS

Study design and population: Samples were selected using a multi stage sampling method in 2007. A total number of 698 preschool children (346 males, 352 females, at 6 years old) from different regions of Ardebil city (Iran) were included in the study. Variables such as age and anthropometric parameters (e.g., height, weight and BMI) were measured for all subjects. A validated questionnaire was used to assess socio-economic differences among subjects. Information about the family's monthly income and possession of household assets were obtained using a validated questionnaire. The information was used to develop a Socio-Economic Status (SES) scale and each family was assigned a SES score accordingly. Subjects having any diseases were excluded from the study

Anthropometric measurements: Anthropometric parameters (height, weight and BMI) were measured for all children meeting the study criteria. Height and weight were obtained using a portable digital scale and portable digital Stadiometer. Height and weight were measured without shoes and in light summer school uniform in a private room by trained research assistants. The subjects were asked to stand, without shoes against the wall with heels, buttocks and shoulders touching the wall. The head was kept in the plane and measurement was recorded to the nearest 0.5 cm. Weight was measured to the nearest 0.1 kg using portable Soenle digital scales with a range of 0-200 kg. BMI was calculated using the data recorded for height and weight. BMI values were compared with the reference values -NHANES III- for corresponding ages (CDC, 2000). Children below the 5th percentile were termed underweight and those having BMI above the 95th percentile were termed overweight.

Statistical analysis: SPSS for windows, version 13 was used for data entry and analysis. Results are expressed as mean±SD. The data were analyzed using one sample t-test, Independent Samples t-test, Pearson Correlation and Chi-square tests. Significance was assumed at $p<0.05$.

RESULTS

Percentile of height and weight for both sexes are shown in Fig. 1 and 2, respectively. Height and weight

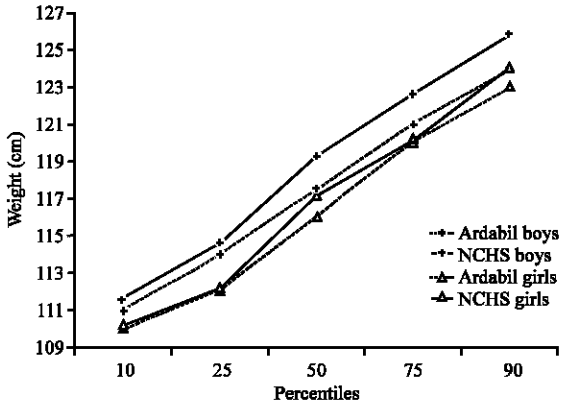

Fig. 1: The compared of height percentile of boys and girls with NCHS

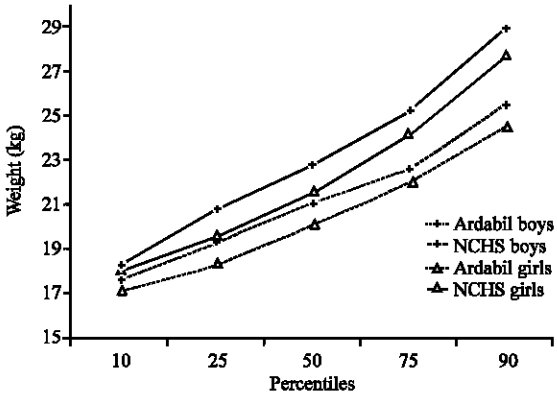

Fig. 2: The compared of weight percentile of boys and girls with NCHS

Table 1: Mean values for height, weight and BMI in different groups

Variable	Boys	N	Girls	N
Height*(cm)	117.5±4.9	346	116.1±5.3	352
Weight* (kg)	21.5±3.7	346	20.6±3.6	352
BMI* (kg m 2)	15.5± 1.9	346	15.2±1.8	352
	Rental	N	Private house	N
	---	---	---	---
Height* (cm)	116.0±5.1	437	117.2±5.1	261
Weight* (kg)	20.5±3.2	437	21.4±3.9	261
BMI (kg m 2)	15.2±1.5	437	15.5±1.9	261

All Values are mean±Standard deviation. *Different is significant at the 0.05 level (2-tailed)

Table 2: The frequency of stunting between two different groups based on Waterloo classification

Stunting	Boys	Girls	Total
Normal (>95)	279 (80.6%)	289 (82.1%)	568 (81.4%)
Mild (90-94.99)	59 (17.1%)	61(17.3%)	120 (17.2%)
Moderate (85-89.99)	8 (2.3%)	2 (0.6%)	10 (1.4%)
Severe (<85)	0	0	0
Total	346 (100%)	352 (100%)	698 (100%)

percentiles for boys and girls were less than corresponding 10th, 25th, 50th, 75th, 90th and 95th NCHS percentile values ($p<0.05$). Table 1 shows the mean of the anthropometric parameters including weight, height and BMI for all children based on living in rental/private houses and gender. Height and weight of the children was significantly higher in objects living in private homes compared to rental homes ($p<0.05$). The mean values of height, weight and BMI of children in this study were less than the values reported by NCHS. Comparing two other important variables, i.e., the situations of weight (as the ratio of weight to standard weight for age) and height (as the ratio of height to standard height for age), our data and NCHS values also showed statistically significant differences ($p<0.05$). Based on Waterloo classification, height for age values were within the normal range in majority of cases (Table 2). As indicated in Table 3, weight for height values were also in normal ranges. According to Gomez classification for nutritional status of children by sex, it was found that the prevalence of normal, mild and moderate underweight were, 60.5, 31.6 and 7.9%, respectively. There has been no severe malnutrition among the subjects studied. Similarly, no severe stunting cases were observed; however, 17.2 and 1.4% of the cases indicated mild and moderate stunting, respectively. Mild and moderate wasting were 26.5 and 0.9%, respectively. Based on BMI for age, only 2% of children had overweighted and 4% being at the risk of overweight. Significant associations were observed between birth weight and anthropometric parameters (i.e., BMI and weight). There was a significant difference between height and family's monthly income; the children of family's with high income were higher than lower income levels. No significant associations were observed

Table 3: The frequency of wasting between two different Groups based on Waterloo classification

Wasting	Boys	Girls	Total
Normal (>90)	257 (74.3%)	256 (72.7%)	513 (73.5%)
Mild (80-90)	86 (24.9%)	92 (26.1%)	178 (26.5%)
Moderate (70-80)	3 (0.9%)	3 (0.9%)	6 (0.9%)
Severe (<70)	0	0	0
Total	346(100%)	352(100%)	698(100%)

between anthropometric factors and birth ranking, mother education and employment status. However, the values for both weight and BMI showed significant difference when compared to health care availability ($p<0.05$).

DISCUSSION

Present study indicates children have experienced mild and moderate under nutrition. The higher prevalence of mild under nutrition along with less moderate and no severe malnutrition may indicate appropriate health care given by health workers leading to good information of parents on health care as well as the better socio-economic status of household. Based on BMI for age 2 and 4% of children had overweighed and being at the risk of overweight, respectively. We found significant association between birth weight and weight and BMI in children at six years old. The height-for-age, on the basis of Waterloo classification, was normal for 81.4% with the rest being stunted. Similarly, based on weight-for-age, we found 73.5 and 26.5% of children to be normal and wasting, respectively. According to Gomez classification for nutritional status of children by sex, it was found that the prevalence of normal and underweight were, 60.5%, 39.5, respectively. Present data show significant relationship between total family income and anthropometric parameters, which is similar to study of Ayatollahi *et al.* (2006). A positive association between linear growth of children and income level of families has been reported from a number of studies (Quinn *et al.*, 1995; Miller and Korenman, 1994; Gross *et al.*, 1996). Maximum height was related to high level income. These positive relationships might be as a result of economic development and improvement of social and health indicators in children at six years old. Deficit in height has also been found to be more profoundly associated with low income level than the differences in bodyweight in Bangladesh (Bairagi and Chowdhury, 1994) and Brazil (Cedraz and Carvalho, 1990). Present results supports Peña Reyes *et al.* (2002) report on a clear reduction in the gap in height of children between well-off and a lower socioeconomic status in different regions of Mexico. However, there has been an increase in the prevalence of mild and moderate malnutrition. Chronic undernutrition - as indicated by deficit in height- decreased with increasing income level. Socio-economic status was

related to height among various sex groups. The influence of increasing affluence is likely to be seen in the form of increased underweight among children. Differing patterns of association between income and weight status among male and female children need further research with more accurate birth records. We observed no significant association between anthropometric parameters and mother education; which is inconsistent with the study of Maddah *et al.* (2007) in Rasht City of Iran. They reported that the relative risk for under nutrition was higher in the children of both less and highly educated mothers compared with children of mothers with an intermediate level of education. The mean values of height, weight and BMI of children in our study were less than the values reported by NCHS that is similar to the repot of Nasirian and Tervij-Eslami (2006). Food assistance programs have the potential to modify the effects of food insecurity on a child's weight and health status.

CONCLUSION

Severe malnutrition not observed in this study. The growth status in children at 6 years old was marginally acceptable, although it was a little bit lower than NCHS standard. As result we concluded that economic status may affect the height growth of the children while possession of household has impact on birth weight, height and weight.

REFERENCES

Agrahar-Murugkar, D., 2005. Nutritional status of Khasi schoolgirls in Meghalaya. Nutrition, 21(4): 425-431.

Ahmed, F., M.A. Bhuyan, N. Shaheen, S. Barua, B.M. Margetts and A.A. Jackson, 1991. Effect of socio-demographic conditions on growth of urban school children of Bangladesh. Eur. J. Clin. Nutr., 45 (6): 327-330.

Ayatollahi, S.M., S. Pourahmad and Z. Shayan, 2006. Trend in physical growth among children in Southern Iran, 1988-2003. Ann. Hum. Biol. Jul-Aug, 33 (4): 510-514.

Bairagi, R. and M.K. Chowdhury, 1994. Socioeconomic and anthropometric status and mortality of young children in rural Bangladesh. Int. J. Epidemiol., 23 (6): 1179 - 1184.

CDC, (National Center for Chronic Disease Prevention and Health Promotion), 2000. Anhtro; Software for Calculating Pediatric Anthropometry, v. 1.02, 1999. [CDC Website: http://www.cdc.gov/nccdphp/dnpa/anthro.htm].

Cedraz, L.M. and F.M. Carvalho, 1990. Family income and child malnutrition in the coast of Camacari Brazil. Arch. Latinoam. Nutr., 40 (3): 323- 332.

Cornelio-Nieto, J.O., 2007. The effects of protein-energy malnutrition on the central nervous system in children. Rev Neurol., 2 44 : S71-4

Delpeuch, F. and B. Maire , 1997. Obesity and developing countries of the South. Med. Trop. (Mars), 57 (4): 380-388.

Engle, P.L., 1993. Influences of mothers and fathers income on children's nutritional status in Guatemala. Soc. Sci. Med., 37 (11): 1303-1312.

Getaneh, T., A. Assefa and Z. Tadesse, 1998. Protein-energy malnutrition in urban children prevalence and determinants. Ethiop. Med. J., 36 (3): 153-166.

Gross, R. and C.A. Monteiro, 1989. Urban nutrition in developing countries some lessons to learn. Food Nutr. Bull. WHO., 11, [http://www.unu.edu/unupress/food/8F112e/8F112E03.htm#Urban nutrition in developing countries: Some lessons to learn].

Gross, R., W. Schultink and S. Sastroamidjojo, 1996. Stunting as an indicator for health and wealth: An Indonesian application. Nutr. Res., 16 (11-12): 1829-1837.

Hakeem, R., 2001. Socio-economic differences in height and body mass index of children and adults living in urban areas of Karachi, Pakistan. Eur. J. Clin. Nutr., 55(5): 400-406.

Inclen, 1996. Body mass index and cardiovascular disease risk factors in seven Asian and five Latin American centers data from the International Clinical Epidemiology Network (INCLEN). Obes. Res., 4 (3): 221-228.

Jakimaviciene, E.M. and J. Tutkuviene, 2007. Trends in body mass index, prevalence of overweight and obesity in preschool Lithuanian children, 1986-2006. Coll. Antropol., 31 (1): 79-88.

Maddah, M., Z. Mohtasham-Amiri, A. Rashidi and M. Karandish, 2007. Height and weight of urban preschool children in relation to their mothers educational levels and employment status in Rasht City, Northern Iran. Maternal Child Nutr., 3 (1): 52-57.

Martorell, R., J. Leslie and P.R. Moock, 1984. Characteristics and determinants of child nutritional status in Nepal. Am. J. Clin. Nutr., 39 (1): 74-86.

Miller, J.E. and S. Korenman, 1994. Poverty and children's nutritional status in the United States. Am. J. Epidemiol., 140 (3): 233-243.

Nasirian, H. and S. Tarvij-Eslami, 2006. Physical growth standards in six to twelve-year-old children in Mashhad, Iran. Arch. Iran Med., 9 (1): 58-60.

Peña Reyes, M.E., E.E. Cárdenas Barahona, M.B. Cahuich, A. Barragán and R.M. Malina, 2002. Growth status of children 6-12 years from two different geographic regions of Mexico. Ann. Hum. Biol., 29 (1): 11-25.

Popkin, B.M., 1994. The nutrition transition in low-income countries an emerging crisis. Nutr. Rev., 52 (9): 285-298.

Popkin, B.M., M.K. Richards and C.A. Montiero, 1996. Stunting is associated with overweight in children of four nations that are undergoing the nutrition transition. J. Nutr., 126 (12): 3009-3016.

Posner, B.M., M. Franz, P. Quatromoni and The Interhealth Steering Committee, 1994. Nutrition and the global risk for chronic diseases the Interhealth nutrition initiative. Nutr. Rev., 52 (6): 201-207.

Quinn, V.J., M.O. Chiligo-Mpoma, K. Simler and J. Milner, 1995. The growth of Malawian preschool children from different socioeconomic groups. Eur. J. Clin. Nutr., 49: (1) 66-72.

Rikimaru, T., J.E. Yartey, K. Taniguchi, D.O. Kennedy and F.K. Nkrumah, 1988. Risk factors for the prevalence of malnutrition among urban children in Ghana. J. Nutr. Sci. Vitaminol. (Tokyo), 44 (3): 391-407.

Robbins, J.M., K.S. Khan, L.M. Lisi, S.W. Robbins, S.H.Michel and B.R. Torcato, 2007. Overweight among young children in the Philadelphia health care centers: Incidence and prevalence. Arch. Pediatr. Adolesc. Med., 161 (1): 17-20.

Serenius, F. and A.R. Swailem, 1988. Growth and nutritional status of less privileged urban children in Saudi Arabia. Acta Paediatr., 77 (346): 93 -103.

Significant associations were observed between birth weight and anthropometric parameters (i.e., BMI and weight).

York, D.A., C.S. Rössner, C.I. Caterson, C.M. Chen, W.P.T. James, S. Kumanyika, R. Martorell and H.H. Vorster, 2004. Obesity, a Worldwide Epidemic Related to Heart Disease and Stroke: Group I: Worldwide Demographics of Obesity. Circulation; 110:e463-e470.) © 2004 American Heart Association, Inc.