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Anthropometric assessment of nutritional status of adolescents girls of Porbandar city of Gujarat state

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ABSTRACT

Anthropometric assessment of the nutritional status and growth of 100 randomly selected adolescent girls between the ages of 15-18 years was carried out by cross-sectional method in Porbandar City of Gujarat state. Anthropometrical indices considered were weight, height and body mass index. Percentile values (5th, 50th, and 85th) which represent the growth standards of AG were established from this study. Comparisons were made by comparing the 50th percentile curves for height and weight of AG obtained from this study with those of the WHO, NCHS and ICMR standards. It was observed that about 24.10% of MAG was underweight. The Extent of underweight was considerably more in OAG accounting for about 57.80%. Further a little slowing down of growth was observed in the present study in both communities (in terms of weight, height and BMI) after 16 and 17 years of age. At the age of 15 years in both communities the parameters were normal than those of ICMR, WHO and NCHS. At the age of 18 years the extent of stunting (<50th percentile) was more among MAG girls accounting for about 89.2% than 85.7% of OAG. In terms of data under appropriate BMI appeared to be greater among OAG girls than MAG. According to BMI at the age of 17 years MAG have 63.15% (<50th percentile) when compared to OAG accounting for 73.3%.

Key Words : Nutritional status, Adolescent girls, Mer, Porbandar

INTRODUCTION

Anthropometrics can be sensitive indicators of health, growth and development in infants and children. In particular anthropometry has been used during adolescence in many contexts related to nutritional status (WHO, 1985 and 2002; Bose and Mukhopadhyay, 2004). According to World Health Organization, the ultimate intention of nutritional assessment is to improve human health (Beghin *et al*., 1988). Malnutrition (under nutrition or over nutrition) which refers to an impairment of health either from a deficiency or excess or imbalance of nutrients is of public health significance among adolescents all over the world. It creates lasting effect on the growth, development and physical fitness of a person. It is well recognized worldwide that anthropometric measurements are indispensable in diagnosing under nutrition. It has now been well established that the body mass index (BMI) is the most appropriate variable for determining nutritional status among adolescents (WHO, 1995; Himes and Bouchard 1989; Must *et al*., 1991; Rolland-Cachera, 1993). Several studies have investigated nutritional status of adolescents from different parts of India (Kanade *et al*., 1999; Singh and Mishra, 2001; Venkaiah *et al*., 2002; Rao, *et al*., 2006; Rajni Dhingra, 2011). The present investigation was

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attempted to evaluate the overall prevalence of under nutrition among 15-18 years old girls living in Porbandar district of Gujarat state.

METHODOLOGY

Selection of the area :

The data utilized for this study were collected by visiting various colleges from Porbandar city of Gujarat state. This was necessary to obtain authentic records of students as well as their management without suspicion or refusal as the teacher were very helpful including enlightening parents who may be apprehensive.

Selection of the samples:

The study sample consisted of randomly selected 62 from mer community (MAG-Mer Adolescent Girls) and 38 from other community (OAG-Other community Adolescent Girl), consisting 100 adolescent girls. The study (cross-sectional method) was designed in such a way that subjects from all socio-economic classes were represented. Since time and resources made it obligatory to study the subjects from educational institutions rather than from the community, it was necessary to choose particular college that consisted of subjects from all socio-economic groups as reflected in Porbandar city to reduce bias.

Collection of data and conduct of study :

Specially designed questionnaires were used to elicit information from the participating subjects about their age, sex, date of birth, family/personal background, medical history, socio-economic and nutritional status, family size, parent's occupation and educational status. The questionnaires were kept anonymous as well as confidential in order to encourage good response. The ages of the subjects were from the schools register. It is worthy of note to here that it was only those subjects whose birth were ±3 months from the date of observation were included in this study. When any discrepancy suspected or noted from the information supplied on the questionnaire by any subject, such subject was excluded from the study.

Demographic profile:

The information of the student for name, age, and sex, and family income, occupational status of the parents, birth order, poverty and type of family were collected using the interview schedule.

Anthropometric measurements :

Since the body measurements are an indicator of nutritional status, the fallowing parameters were assessed for the selected adolescent girls using standard techniques. Two basic variables (height and weight) and a single derived variable (body mass index) have been used in the present stydy. All the anthropometric measurements were taken following the standard techniques recommended by Lohman *et al*. (1988) and body mass index (BMI) was computed using the standard equation: BMI (kg / m^2) = Weight (kg) / Height^2 (m^2). Nutritional status was evaluated using the NCHS, ICMR and World Health Organization (WHO, 1995) recommended age and sex specific cut-off points of BMI based on the National Health and Nutrition Examination Survey (NHANES I) percentile values (WHO, 1985). Under nutrition (Thinness) was defined as BMI < 5th percentile values of NHANES I. This cut-off point has been utilized by several recent studies worldwide on under nutrition among adolescents (Venkaiah *et al*., 2002; Woodruff and Duffield, 2002). Technical errors of measurements (TEM) were calculated and the results were found to be within reference values cited by Ulijaszek and Kerr (1999). Therefore, TEM was not incorporated in statistical analyses. All statistical analyses were

performed using the Statistical Package for Social Sciences

RESULTS AND DISCUSSION

Anthropometric measurements:

Height for age:

The present study covered 62 and 38 adolescents belonging to MAG (Mer Adolescent Girl) and OAG (Other Adolescent Girl) in the age group of 15-18 years.

MAG:

Mean height has not increased significantly with age. The Overall prevalence of stunting was 85%. Higher prevalence of stunting 40% was observed in the girls older than 18 years.

Table 1 : Age wise mean height of OAG and MAG

Age	MAG H4A	OAG H4A	WHO Ref H4A	NCHS Ref H4A	ICMR Ref H4A
15	157	146	162	160	159
16	162	157	162	160	160
17	154	156	163	161	160
18	156	155	163	161	161

When compared to NCHS standard for girls at 15, 17, 18 years the 50th percentile values for height of present study is lesser, the maximum difference being at age 17 years. At the age 16 years the 50th percentile for the girls in the present study is higher than NCHS reference values. They are taller by 2 cm.

Compared to WHO reference the 50th percentile for the girls in the present study at the age 15, 17, 18 years the values are lower by 5cm, 9cm and 7cm, respectively.

When compared to ICMR standards for girls at 15, 17, 18 years the 50th percentile values for height of present study is lesser, the maximum difference being at the age of 17 years and the values are lower by 1.8 cm, 6.2 cm, and 5.1 cm for 15, 17, 18 years, respectively. At the age of 16 years the 50th percentile for the girls in the present study is higher. They are taller by 2.3cm.

OAG:

Mean height has not increased significantly with age except for 18 years. The Overall Prevalence of stunting was 84%. Higher prevalence of stunting 32% was observed at the age 17 and 18, respectively.

When compared to NCHS standard for girls at all ages the 50th percentile values for height of present study are lesser, the maximum difference being at age 15 years. The reference values of NCHS are lower by 14cm, 3cm, 5cm, and 6cm for 15, 16, 17, 18 years, respectively.

Compared to WHO reference the 50th percentile for the girls in the present study at all ages the values are lower by 16 cm, 5 cm, 7 cm, 8 cm for 15, 16, 17, 18 years, respectively. Higher prevalence of stunting was observed in the age group of 15 years

When compared to ICMR standards for girls at 15, 16, 17, 18 years the 50th percentile values for height of present study is lesser, the maximum difference being at the age of 15 years and the values are lower by 12.8 cm 2.7 cm, 4.2 cm, 6.1 cm for 15,16,17,18 years, respectively. Similarly higher prevalence of stunting was observed in 15 years of age.

Comparison:

Comparing the values of height for age between the two communities it can conclude that severe

stunting was observed in MAG 85% out of which 40% stunting was seen among 18 years old girls. Similarly in OAG 84% of stunting was observed out of which 32% was contributed by 17 and 18 years old, respectively.

Weight for age:

This is the commonly used indicator of body size and it reflects the level of food intake. Therefore, weight for age is a very sensitive measure of short duration malnutrition.

Table 2 : Age wise mean weight of OAG and MAG

Age	MAG W4A	OAG W4A	WHO Ref W4A	NCHS Ref W4A	ICMR Ref W4A
15	51	48	53	51	49
16	53	49	54	52	51
17	49	46	56	53	53
18	54	48	57	54	54

Mean body weight increased with age 15, 16, 18 except for 17 years. When compared to WHO references the 50th percentile of weight for MAG were consistently lower for all age groups, the maximum difference being at the age of 17 yrs (7kgs) in case of MAG and at 17 years (10kgs) in case of OAG. Thus, the difference was more pronounced in case of girls belonging to OAG.

When compared with NCHS standards, the mean weight of MAG was considerably normal at 15 and 18 years and slightly higher at 16 years but the maximum difference was more pronounced at the age of 17 years (4kgs). On contrary the mean weight of OAG was consistently lower for all age groups. The differences being at 15 years (3kgs), 16 years (3kgs), 17(7kgs) and 18(6kgs) observed, respectively and the maximum difference was more pronounced at the age of 17 years (7kgs).

When compared to ICMR standards for MAG at 15, 16, 17, 18 years the 50th percentile values for weight of present study is greater, except at the age of 17 years (3.8kgs). On the other side the mean weight of OAG was consistently lower at all age group when compared to the reference values of ICMR. To conclude the weights of MAG are greater than the OAG.

In the present study 46.7%, 37%, 16% of MAG at all ages fall below the $<50^{th}$ percentile, >50<=85percentile and >85 percentile whereas in OAG it was 63%, 26% and 10%, respectively.

BMI for Age:

When compared to WHO standards the BMI of the MAG are higher at all ages except at the age of 16 with the difference of only 0.7kg/m^2. Whereas the BMI of the OAG are lower at all ages with the difference of about 2-2.3kg/m^2 except at the age of 15 years. The BMI of OAG decreases with the increasing age. So we conclude that the BMI of the MAG are higher than the OAG.

Comparing the values of the present study with NCHS the BMI of the MAG are higher at all ages by about 2-2.3kg/m^2 and it is highest at the age of 18 with the increase of value of about 2.4kg/m^2. As

Table 3 : Age wise mean BMI of OAG and MAG

Age	MAG BMI	MAG SD	OAG BMI	OAG SD	WHO Ref BMI	NCHS Ref BMI	ICMR Ref BMI
15	20.68	1.34	22.65	1.75	20.20	19.68	19.60
16	20.18	3.38	19.99	3.14	20.70	19.81	20.10
17	20.97	3.78	19.07	3.85	21.00	19.95	20.60
18	22.40	3.36	19.82	3.62	21.30	20.32	20.70

far as the BMI of the OAG were concerned the BMI increases with age from 15 to 16 and it decreases from 17 to 18 years, maximum difference was more pronounced at the of 18 with the difference of about 2.2kg/m^2.

When compared the BMI values of present study with ICMR standards the values of the MAG were higher than the 50th percentile of ICMR. Highest value of BMI was noticed among the 18 years of age with the increase in value of about 1.7kg/m The BMI value of the OAG decreases with increasing age except at the age 15. The highest difference was being noticed at the age of 17 years with the difference of about 1.53kg/m^2

The risk of obesity was found among the MAG. Nearly 16% of MAG at all ages fall under >85th percentile and the risk is more pronounced at the age 18 years contributing to 16%. In OAG only 10% of subjects were found to have the BMI values >85th percentile. The risk of obesity was commonly distributed among all the age groups.

Nearly 9.6% of MAG at all ages fall under <-2SD (thinness) and 4.8% fall under <-3SD (severe thinness) whereas 21.05% and 18.42% of OAG of all ages falls under<-2SD and <-3SD indicating thinness and severe thinness, respectively. Ultimately we can conclude that the BMI of the MAG are higher than that of the OAG and the severity of thinness was more pronounced among the OAG.

Conclusion :

Present study provided the growth, nutritional assessment and clinical findings for the school – based population (15-18 years) of Porbandar city. Appraisal of nutritional status adjudged by the weight, height and BMI revealed that the median parameters of the population were comparable to NCHS, WHO and ICMR standards. The MAG exhibited better nutritional status in terms of weight for age, height for age and BMI than the OAG.

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