ASSOCIATION OF WEIGHT STATUS OF AFFLUENT ADOLESCENTS WITH THE FAMILY HISTORY OF CHRONIC DISEASES, AGE, GENDER, BIRTH WEIGHT AND SOCIO-ECONOMIC STATUS.

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Abstract

Obesity is increasing among affluent people of the developing world, however underweight may still be present and both the problems needs to be assessed and addressed simultaneously. This study was conducted to assess the prevalence of underweight and overweight in the affluent urban adolescents of Karachi and study its association with family disease history and other factors. Data (socio demographic information, height & weight) was collected from 868 girls and 818 boys aged 10-15 years, studying in secondary section of the selected private schools known to have a high proportion of children from the affluent group. According to CDC standards 63% children had their BMI's within normal ranges, 17% were underweight, 11.5 % were OW and 8% were Obese (BMI for age >95th percentile). Family disease history of chronic disease was associated with higher prevalence of obesity. Prevalence of both under and overweight among affluent adolescents needs to be addressed even among affluent children.

Keywords: Adolescence; Body Weight; Obesity, Fatness; Underweight, Pakistan; Karachi, Children

Introduction

Weight status of children and adolescents has always been a cause of concern for health professionals. However as compared to previous decades, relative focus on overweight has now been increased even among developing countries.

Increasing obesity among children and adolescents is a cause of concern not only because of its negative influences on physical health but also due to its socio- psychological impact on adjustment and personality development (Needham & Crosnoe, 2005; Wardle, Williamson, Johnson, & Edwards, 2006). Pediatric and adolescent obesity is increasing not only in developed but also in developing countries (Popkin & Gordon-Larsen, 2004; Walker & Walker, 1998). In Pakistan and many other developing countries children from relatively higher socioeconomic status are more at risk of obesity and related health problems (Chhatwal, Verma, & Riar, 2004; Delpeuch & Maire, 1997; Hakeem, 2001).

In Pakistan also rates of obesity and related disorders are becoming a cause of concern for health professionals (Afzal & Naveed, 2004; Basit, Hakeem, Hydrie, Ahmedani, & Masood, 2003b; Misra, Vikram, Sharma, & Basit, 2006; Shah, Nanan, Rahbar, Rahim, & Nowshad, 2004; Hakeem, 2001).

Karachi is the most urbanised city of Pakistan and it has been indicated earlier that obesity rates are higher in the affluent group (Hakeem, 2001) and obesity is associated with increased risk for metabolic disorders (Basit, Hakeem, Hydrie, Ahmedani, & Masood, 2003). At the same time malnutrition among adolescent girls is also a cause of concern (Harris, 1989; Mumtaz & Fatima, 1992). Thus there is a need for valid assessment of the situation. Rates of obesity may be higher among children from affluent sections of urban population however even in these affluent groups a number of children may still be underweight. Information about simultaneous presence of the problem of underweight and overweight within the affluent subgroups is lacking..

Health related problems of underweight along with those of overweight have been noticed by many researchers for example rates of hospitalisation and risk of certain mental disorders is higher in both underweight and obese persons (Imai et al., 2008; McLaren, Beck, Patten, Fick, & Adair, 2008; Ringback, Eliasson, & Rosen, 2008). Risk of suicide was found to have positive association with Body

mass index by Kaplan et al (Kaplan, McFarland, & Huguet, 2007). On the other hand there are numerous observations of association of obesity with risk of type 2 diabetes, cancers vascular disorders etc. Thus in regions such as Pakistan where both under and overweight are prevalent (Jafar et al., 2008) a comprehensive approach is needed while assessing weight status of subjects.

It is often assumed that among affluent groups issue of underweight is non existent. In this context this study was planned to assess the prevalence of underweight and overweight among affluent Urban Pakistani adolescents living in Karachi.

Methods

Sampling and Subjects

The purpose of the study was to study the prevalence of overweight and associated factors in the affluent urban adolescents of Karachi. Thus the selection of schools was subjective and purposive. The schools well-established for more than 20 years and well-known to have a majority of children from higher income families were included (details of selection criterion has been given elsewhere (Hakeem, Shaikh, & Asar, 2004). A couple of schools having a high proportion of expatriates were also excluded. The number of schools finally estimated to be suitable was 5 and all of them were contacted to assess the number of children of specified age enrolled. Principals of the identified schools were contacted and letter requesting participation and details of the study was delivered. As the required number of children could be recruited from four schools one school was randomly excluded. The four schools that were willing to participate in the study during the specified period were finally included.

The data collectors revisited those schools that had expressed willingness to participate and discussed the data collection schedule. Finally four schools, from where data could be collected in one season were recruited. All the children studying in secondary section of the school (grade 6-10, typically aged 10-15 years) were invited to participate. Overall, from the recruited schools, 80 to 95% of the eligible

participated in this study. Reason for non-participation was preparation for annual secondary school certificate examination of grade 9 & 10 in certain schools. In other grades participation rate was >95% and only those who were absent on the day of data collection were excluded.

All the parents were informed about the study and children as well as parents were free to have limited or no participation in the study. There was no case of no-participation however response rates to parents' questionnaire and rate of provision of birth certificates was less than that for students' questionnaire.

The protocol of the study was approved by the research committee of Nutrition department of RLAK college of Home economics Karachi that looks after the ethical matters as well.

Sample size was calculated on the basis of data available from a previous study (Hakeem, 2001). Prevalence of overweight using CDC-2000 criteria among boys and girls of that study was 7% & 6% respectively. Prevalence of underweight using the CDC-2000 criteria was 17% and 22% respectively Based on these parameters and 95% CI the largest size of the required sample for a random survey would have been 226 boys and 275 girls. As the research project of which this study is a part, included study of several other factors also data was collected from a much larger number of children. To account for incomplete data a total number of around 2000 children were to be initially contacted. However because of difference in number of children enrolled in various schools and a small proportion of children being above or below the target age the exact number could not be set. Finally the data was collected from 868 girls and 818 boys aged 10-15 years.

Data Collection

A group of ten postgraduate students of the Food and Nutrition department of the Rana Liaqat Ali Khan Government College of Home Economics collected the data. Data was collected during the months of April and May in year 2000. Two members of the data collecting team took anthropometric measurements while others participated in

collecting data through the questionnaires. Details of data related to the topic of this paper are presented here.

All the students answered a questionnaire, which contained SES scale also. This SES scale has been used in another studies conducted in Karachi Pakistan and consists of questions about household assets and other characteristics of children and their families (Hakeem, 2001). A letter was sent to parents to send copies of children's birth certificates. Information about date of birth was retrieved from the copies of birth certificates. Where certificates could not be retrieved this information was retrieved form school admission records. All the participating school collect birth certificates at the time of admission and have the record of child's date of birth.

Family history for chronic diseases:

In the questionnaires that were filled by the parents questions were asked about known presence of selected chronic diseases in parents or grandparents of the subject. For the representation of obesity sketches of body frames representing underweight normal, overweight obese and very obese persons were included.

Anthropometric Measurements

A. Height

For measuring height, a non-stretchable height scale namely, Minimeter by CMS London, UK was used. The student, whose height was to be taken, stood with his/her shoes removed, in an attentive position with his/her back facing the wall and hips touching the wall. Head was in Frankfort plane. The measurements were taken in centimeters.

B. Weight

For weighing, EKS digital weighing machines were used to get accurate results and decrease the chances for error. For this purpose, the scales were placed on a hard and plane surface and the adolescent stood at the center of the scale without his/her shoes or any extra item wearing over the uniform (i.e. sweater, jacket etc). The adolescent stood over the scale in an attentive position, looking straight ahead. The measurements were taken in kilograms.

Data entry and Analysis:

Anthropometric and personal data was entered on SPSS 10.5 for analysis. Using the CDC 2000 reference data BMI percentiles were calculated (CDC National Center for Chronic Disease Prevention and Health Promotion), 2006). Overweight was assessed using two criteria so as to make comparisons possible with other studies. However in order to estimate the associations with relevant factors only CDC classifications are used. According to CDC-USA "At risk of overweight" and "overweight" are the terms preferred to refer to children and adolescents whose excess body weight could pose medical risks. Due to potential negative connotations associated with the term "obesity," "overweight" is preferred. The ranges at which CDC defines at-risk-of OW children are classified as OW according to IOTF criteria (Cole, Bellizzi, Flegal, & Dietz, 2000). Children classified as overweight according to CDC criteria are categorised as Obese according to IOTF guidelines. However in order to avoid confusions only the terms OW and Obese are used in this paper.

Association of various factors i.e. family history of chronic disease, age, sex, birth weight and relative affluences; with Weight status was also assessed. Chi square test was used to assess associations between rates of under or overweight and other factors. Due to poorer response for parents' questionnaires and availability of birth certificates, numbers of cases available for various comparisons were different.

Results

Anthropometric data was collected from 818 boys and 868 girls. Mean age of boys and girls was 12.57 1and 12.75 respectively. Age and sex distribution is given in table 1.

Mean SES score was 25.16 (SD 9.15) and was comparable to higher income group of families living in Karachi (i.e. families living in large houses built on 600 square yards or more) studied earlier (Hakeem, 2001). SES score was used to assess relative affluence of the subjects. Using ranges of SES scores typical of various income levels, reported in an earlier study (Hakeem, 2001) adolescent were grouped into

three SES categories. Very few children (1.8%) had SES scores (<13) comparable to lower middle class (families living in 80 square yard/68 sq. meters); 43.9 % had SES scores (13 to 22) comparable to middle class (families living in 80 square yard /68 sq. meters); families and 54.2 percent had SES scores (>23) comparable to higher income families.

Weight status of children

Weight status of children was assessed by comparing their BMI with CDC 2000 reference data. Mean BMI of boys and girls of various ages is given in table 2.

Overall in comparison with CDC standards, 63% children had their BMI's within normal ranges (>5th to 85th percentile of BMI for age), 17% were underweight, 11.5% were overweight and 8% were obese. Table 3.

Gender and Weight status

The proportion of normal weight was higher among girls (59.2%b, 67.1%g) and the difference was statistically highly significant (P=0.001) (table 3). Proportion of underweight was higher among boys as compared to girls (19.7%b, 14.9%g) and the difference was highly significant (P=0.005). Proportion of OW-including-Obese was also higher among boys as compared to girls (21.1%b, 18.1%g). Proportion of OW only was higher among girls (10.6b 12.3g) but the difference was statistically non significant (P=0.067). The proportion of Obese adolescents was also higher among boys (10.5%b 5.8%g) and the difference was statistically significant (P=0.015). Table 3.

Age and Weight status

As the number of adolescents at age 10 and 15 was relatively less for assessing presence of OW and underweight at various ages three age groups were made by merging two years (10 & 11, 12 &13 14 &15) together. Among girls, none of the differences in the relative proportion of under or OW at three ages was statistically significant. Among boys the only statistically significant differences was that the frequency of underweight increased with age. (fig. 1)

Table 1: Number of boys and girls in various age groups

Age in years	Male	Female
10	60	43
10.6	76	37
11	91	88
11.6	72	82
12	90	109
12.6	108	135
13	77	90
13.6	90	126
14	51	55
14.6	66	72
15	13	18
15.6	24	13
Total	818	868

Table 2: Mean BMI of boys and girls at various ages

AGE years	SEX					
	Male			Female		
	Mean	SD	n	Mean	SD	n
10	17.86	4.01	60	17.86	3.44	43
10.6	17.82	3.61	76	17.88	3.69	37
11	18.24	3.40	91	18.20	3.37	88
11.6	17.65	3.79	72	17.82	3.71	82
12	18.07	3.73	90	19.39	4.04	109
12.6	18.53	3.79	108	18.62	3.92	135
13	18.98	4.80	77	19.39	4.30	90
13.6	18.87	3.97	90	20.01	4.74	126
14	19.31	3.76	51	19.82	3.33	55
14.6	20.25	4.78	66	19.42	3.85	72
15	20.75	5.94	13	20.32	5.65	18
15.6	20.19	2.91	24	20.36	4.43	13

Family History for chronic diseases and weight status:

Proportion of overweight children was higher among the group of children who had relatively stronger family history of chronic diseases (24.4%) or obesity (25%) as compared to those who had weaker or no history of chronic diseases (16.3%) or obesity (12.1%). Rate of obesity was significantly higher even among the group that had strong history of metabolic diseases (hypertension, heart disease, diabetes) but no family history of obesity (21.8%) as compared to those children who had no family history of either (7.6%).

Birth weight and adolescent's weight status:

Mean birth weight of normal weight children was lower as compared to that of underweight or over weight adolescents. Mean birth weight

of obese adolescents was significantly higher (3.57 kg) than that of normal weight adolescents (3.2 kg). (table 4).

Table 3: Weight status of boys and girls

Weight status	Male n=818	Female n=868	Total n=1686
	%	%	%
Underweight **	19.7	14.9	17.2
Normal**	59.2	67.1	63.2
OW	10.6	12.3	11.5
Obese***	10.5	5.8	8.1
OW+Obese	21.1	18.1	19.6
Total	100.0	100.0	100.0

*Significance of gender difference, **P<0.005, *** P<0.001,*

Relative Socioeconomic Status and adolescent's weight status:

The subjects were grouped into three groups on the basis of SES scores to determine relative affluence. Percentage of overweight was significantly higher 22.6 % among the highest income group as compared to the lowest income group 17.2% P=0.021. Percentage of underweight was significantly lower 14.0% among the highest income group as compared to the lowest income group 19.3% (P=0.017). (table 5).

Discussion

Rates of obesity in urban affluent adolescents of Karachi were explored. In terms of CDC suggestions regarding BMI cut offs and definitions, 11.5% were OW and 8% were Obese. These rates are higher than the average rates of obesity observed in many of the developing countries. In a questionnaire based survey of 34 countries of Europe and America, obesity was assessed with IOTF criteria and only four had prevalence of OW including obese more than 20 % (Janssen et al., 2005). Lobstein at al (Lobstein, Baur, & Uauy, 2004) has reviewed earlier global prevalence of adolescent obesity in terms of IOTF criterion. The world average of OW and obesity was reported to be 10% & 3% respectively. Averages for Europe were 15% obese & 5% OW and for middle-east the comparable rates were 16% and 6%. The average rates of OW and obesity in Pakistan may be considerably lower than found in the sample studied by us; however the high rates of obesity among urban affluent children needs to be addressed to

prevent heath problems in later life.

In relation to global averages for various regions ratio of OW to Obese in our sample was similar to most other regions. However in comparison to India proportion of OW and obesity appears to be different. A recent report from India indicates that among affluent adolescent boys from Pune India 19.9% were Obese and 5.7% obese. Thus in our sample though the rates of Obese amongst boys were much lower (15%) the frequency of obesity was similar (5.6%) to that reported from a comparable population in India (Khadilkar & Khadilkar, 2003;
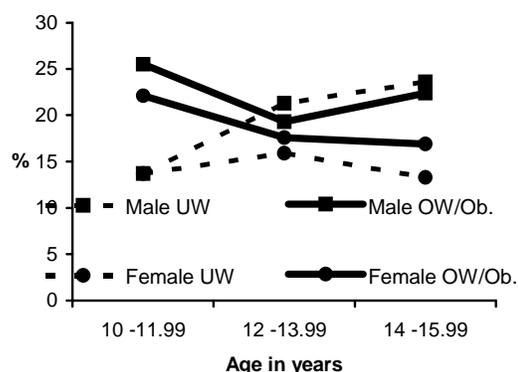

Fig. 1: Frequency of Underweight and overweight according to age among males and female adolescents

Table 4: Mean Birth weight in Kg of adolescents according to current weight status

	N	Mean	Std. Deviation
UW	68	3.35	1.08
NW	233	3.20	.61
OW	42	3.38	.50
Obese	32	3.57	1.00
Total	375	3.28	.75

Table 5: Weight status of boys and girls according to Relative Socioeconomic Status

Weight status	SES		
	Low n=466	Middle n=426	High n=486
	%	%	%
Underweight (<5th p	19.3	19.2	14.0
Normal (>5th p<85)	63.5	61.7	63.4
OW (>85th p<95)	10.3	10.7	14.0
Obese <95th p)	6.9	8.4	8.6

Khadilkar & Khadilkar, 2004). Similar difference in ratio of obesity and overweight among boys of Pakistani and Indian origin was present in a study of obesity in British children.

Among British Pakistani boys obesity rates were higher (9%P vs. 7.9%I) but the rates of Obese were lower (26%P. vs. 29.6%I) as compared to British Indian children. Reasons for this difference are more likely to be ethnic difference in obesity threshold or differences in hyperplasia during early childhood. At younger ages (<5yrs) obesity rates are reported to be much higher among Pakistani children (3.1%) as compared to Indian children (1.6%). It has been evidenced often that obese infants are much more prone to be obese adults. For our adolescents information about childhood weights was not available however mean birth weight of obese adolescents was significantly higher than that of normal weight adolescents.

Most other studies do not give prevalence of underweight along with the prevalence of Obese. Thus it is difficult to assess the peculiarities of these observations. In our sample in spite of affluence nearly 20% of boys and 15% of girls were underweight. This co-occurrence of underweight and obese within relatively affluent groups indicates sensitivity of children's nutritional status and nutritional care provided to them. As indicted by the results that even minor differences in financial status of parents could have significant impact on children's weight status. The situation is probably due to cumulative effect of differences in knowledge attitude and practices and availability of choices. This situation calls for exploring the exclusive impact of various factors and lack of safeguards against continuous escalation of food prices and lack of quality control. Whatever factors responsible it should not be assumed that in among affluent groups all the children are normal or overweight and while taking measures to prevent and control obesity nutrition education needs of underweight children must not be ignored. In terms of assessment of risk presence of chronic disease even in the absence of family history for obesity emerged as an important indicator of relatively higher risk for obesity among children.

Acknowledgements

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Pakistan Home Economics Association (PHEA) History and Developments

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Pakistan Home Economics Association (PHEA) is a non profit educational association which begin its journey in 1953. A constitution was drawn up in the later part of 1954 which clearly expressed its objectives-----namely to study problems connected with Pakistani homes and families, to encourage and promote the teachings of Home Economics , to organize adult education on the subject, to undertake investigation, research and publication, to organize meetings, conferences and to secure better legislation in the fields covered by Home Economics. A General Body meeting was held, Mrs Saeeda Baquer Khan was elected as president. The Executive body worked tremendously and many activities were carried out. Due to some reasons, the association became dormant. And it was revived on 24th March 2007; through the untiring efforts of the Executive Body the Registration of the Association was renewed. The new journey began with the foremost objective being the promotion of education and research in the field of Home Economics and contributes to the betterment of individual families and community. Many activities were carried out including a newsletter and publishing "NURTURE" a Research Journal for Human Civilization.

After the revival of association, the First Annual General body meeting of PHEA was held on 21st May 2008. It was a well attended event, Annual Reports were presented and following the reports PHEA carried out its first General Body Elections. Following are the newly elected members.

President: Mrs. Perveen Saeed
V. President: Dr.Rubina Hakim
G. Secretary: Mrs. Erum Muqeem
Treasurer: Mrs.Ghazal Muzaffar
E.C.Members: Mrs. Kausar Shafiq , Miss Ghazala Naeem, Miss Hina Zubair, Ms Shireen shehzad
Mrs. Khalida Hafeez , Miss Mahlaqa Afreen, Mrs, Mohsina Farooq.

The new Executive committee is energetic and ambitious to work for the betterment of individual and family life, using the plateform of PHEA.

A number of projects planned for the near future. At present, work is underway to develop an association website, as well as to launch the opening of a resource center which will provide teachers with access to a variety of home economics resources including students' handouts, worksheets and reference materials.

It is expected from the Home Economists to come forward and join hands at this platform for the better result and achievement of success in this field at National and International level.