

Prevalence of overweight and obese school children aged between 7 to 16 years amongst the major 3 ethnic groups in Kuala Lumpur, Malaysia

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6239 children aged 7 to 16 years, attending 22 primary and secondary schools in Kuala Lumpur, Malaysia, were screened using a self report questionnaire, with their heights and weights measured using a digital electronic SECA beam balance. The selection was done by a two staged stratified random sampling from a total of 226 schools in Kuala Lumpur. The racial distribution was 56.7% Malays, 33.8% Chinese and 8.1% Indians; 3.6% (n:222) of the children were identified as obese and 6% (n:373) identified as overweight. The definitions of obese and overweight were computed using growth charts of the National Centre for Health Statistics (NCHS) from the median of the reference population.

There were no significant differences amongst the 3 major ethnic groups in the obese group. The differences were significant in the overweight group with the Indians most overweight, followed by the Chinese and the Malays.

Keywords: Epidemiology, prevalence, obese, overweight, school children, Kuala Lumpur, Malaysia, Malay, Chinese, Indian

Introduction

Obesity in childhood has been identified as a problem in many affluent societies, particularly in countries where children consume unhealthy foods, snacks or beverages every day. Obesity is usually defined as an excess of body fat which results in significant impairment of health¹. Although the health risks of obesity in children are poorly established, obesity in childhood predisposes the individual to obesity in adulthood² where the health risks of obesity are clear. The world-wide prevalence of obesity in childhood varies from 2.6-3.6% in Finland³, to 10.8% in United States⁴, 11.2-12.5% in Navajo Indian school children⁵, 7.56% in Indian children⁶, 16.1% in Singapore school children⁷, 14.3% in Thailand⁸, and about 7.8% in a local Malaysian study of school children in a rural area⁹.

Sometimes, the variation in prevalence is due to varying obesity definitions and measurement criteria. These include measurements using the sum of various skinfolds (Canadian Standardised Test of Fitness, CSTF, 1986), body mass index (BMI) and weight for height considered with respect to age and gender of a reference population.

Obesity is related to age, sex, social class and cultural background. In developed countries, obesity is more prevalent in lower than higher income groups. Prevalence rates therefore will vary with methodology, population characteristics and obesity definitions.

This paper reports the prevalence of overweight and obese children amongst the three major ethnic groups in children attending schools in Kuala Lumpur.

Definition of obesity and overweight

In this study, the childrens' standard body weight and, in turn the median weight was calculated by dividing the

actual weight of each child by the reference weight for gender, age and height from the National Centre for Health Statistics (NCHS)¹⁰. The obesity population is defined as those children having weight for gender, age and height at +2 standard deviation or above the median weight of the reference population. Overweight children are those children whose weight lies between +1 standard deviation to less than +2 standard deviation of the median of the same reference population ($\geq 110\%$ and $\leq 120\%$ median weight-for-height).

Materials and methods

Of the total of 226 schools throughout the city of Kuala Lumpur, 22 schools were selected by a two staged stratified random sampling. In the first stage, the city of Kuala Lumpur was stratified into specific zones and the schools were randomly selected proportional to the number of schools in each zone. Each zone was defined based on government districts according to their geographical lay out and not on population size or ethnic population distribution. All schools (primary and secondary) were selected with the exclusion of private schools, schools for the handicapped and schools whose student population was below 200 students.

Of the 22 schools identified, 14 were primary schools and 8 were secondary schools. In the second stage, subjects selected were those attending primary one to secondary three classes. The total number of school children screened was 6239. The children were aged between 7 years and 16

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years old. The child's height and weight was recorded by two research assistants, using an electronic SECA beam balance which measures both height and weight digitally. Measurements were carried out between the months of September 1994 and March 1995 with a break during the school holidays and during the Islamic fasting month.

Ethical approval was obtained from the Universiti Kebangsaan Malaysia Research Committee and from the Ministry of Education, Malaysia. Chi square test was used for statistical analysis.

Results

Of the 6239 school children screened, aged between 7 to 16 years 48.5% (n: 3026) and 51.5% (n: 3213) were females and males respectively. The ethnic breakdown was 56.7% (n: 3540) Malays, 33.8% (n: 2107) Chinese, 8.1% (n: 506) Indians and 1.4% (n: 86) of other ethnicity.

The total number of overweight and obese children combined, was 9.6% (n: 595); obese 3.5% (n: 222) and overweight 6.0% (n: 373). The mean ages and SD of the total sample, the overweight and the obese is as shown in Table 1.

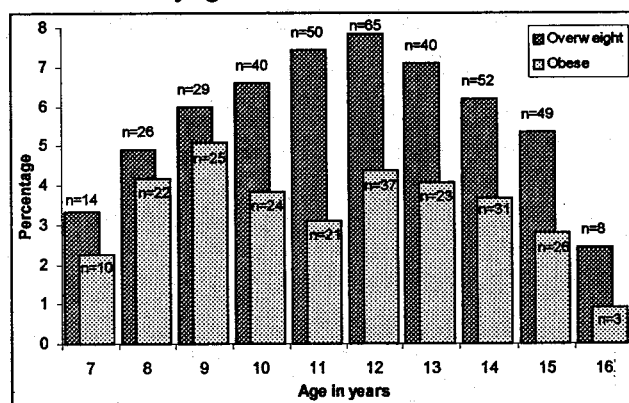
Table 1. Mean age and standard deviation of study sample.

	Mean age	SD	p
Total Sample	11.80	2.65	
Overweight	11.82	2.34	0.02 (1 tailed)
Obese	11.42	2.38	

Overweight versus obese: $t = 1.9234$ ($p < 0.05$)

The prevalence of the overweight and obese children (combined) by age, (Figure 1) was lowest at 3.3% (n: 11) for the 16 year old group and highest at 12.2% (n:102) for the 12 year old group.

Figure 1. Percentage distribution of the overweight and obese children by age.



Gender distribution showed that males were more obese than females at $\chi^2 = 10.04$ ($p < 0.001$) and more overweight than females at $\chi^2 = 13.81$ ($p < 0.0005$). (Table 2). The prevalence of overweight children by age ranges from 2.4% to a 7.9%, whilst the prevalence of obese children by age, ranges from 0.9% to 5.1%. The children gradually become overweight as they reach puberty reaching a maximum at age 12 years, (7.9%) whilst there were more children at age 9 years who were obese (5.1%) Figure 1.

Table 2. Percentage of overweight and obese children according to ethnic groups and sex.

Ethnic groups	Males		Females		Total	
	Over weight	Obese	Over weight	Obese	Over weight	Obese
Malays (3562)	5.0	4.5	5.6	2.6	5.3	3.6
Chinese (2119)	8.9	3.5	4.2	3.2	6.5	3.4
Indians (558)	8.5	5.0	7.9	2.1	8.2	3.8
Total (6239)	6.6	4.3	5.3	2.7	6.0	3.5

Overweight: Malay males cf. Chinese males $\chi^2 = 16.14$ ($p < 0.0005$). Malay males cf. Indian males $\chi^2 = 5.62$ ($p < 0.01$). Indian females cf. Chinese females $\chi^2 = 4.99$ ($p < 0.05$). Chinese males cf. Chinese females $\chi^2 = 18.01$ ($p < 0.00015$). Indians cf. Malays $\chi^2 = 7.2$ ($p < 0.01$). Malays cf. Chinese $\chi^2 = 3.35$ ($p = 0.06$). Others N.S.

Ethnic distribution shows that 8.2% (n: 46) Indians were overweight followed by Chinese 6.5% (n: 138) and Malays 5.3% (n: 189) (Table 2) with the Indians versus Malays at $\chi^2 = 7.2$ ($p < 0.01$). Three point eight percent (n: 21) of the Indians were obese, followed by Malays 3.6% (n: 129) and Chinese 3.4% (n: 72) but their differences were not significant. Generally the males were more overweight and obese than females at all ages (7-16 years) except at age 7 years; female children were more overweight at $\chi^2 = 3.6$ ($p = 0.05$).

The Chinese males were not found to be significantly more overweight, 8.9% (n: 92), than Indian males, 8.5% (n: 27). However there was a significant difference between overweight Chinese males and overweight Malay males at $\chi^2 = 16.14$ ($p < 0.0005$). There was no significant difference between the three ethnic groups amongst the obese males.

Amongst the females, 7.9% of the Indian females were overweight followed by Malays 5.6% and Chinese 4.2%; with the Indian females versus Chinese females at $\chi^2 = 4.99$ ($p < 0.05$). Amongst obese females, 3.2% of the Chinese females were found to be obese, and just as with the obese males, there were no statistical differences between the 3 races for the obese females.

With regard to the gender differences by ethnic group, the only significant difference was amongst the Chinese; the Chinese males were more overweight than the Chinese females at $\chi^2 = 18.01$ ($p < 0.0001$).

Discussion

The prevalence of the obese and overweight school children in Kuala Lumpur was 3.5% and 6.0% respectively, using NCHS median reference data and +2 and +1 SDs respectively for cut-off. This is much lower than the Singapore prevalence rates of child obesity which range from 12.8% to 16.7% for Primary one to Secondary four⁷. The age range of school children studied was comparable. Even when the prevalences of the obese and overweight were combined, the overall overweight prevalence rate, ranging from 3.3% to 12.2%, was still comparatively lower than the 1993 Singapore report for ages 7 to 16 years, but similar to the 1991 study in Singapore¹¹.

However, male school children were found to be more obese and overweight than females with a similar ratio of male: female in Singapore (9:7) and Malaysia (10:7).

With regard to age distribution, most children were found to be overweight and obese around the pubertal period, between 11 to 14 years. The obese children showed a similar distribution. The peak at puberty can be explained by the fact that there is an associated increase in adipose

tissue as well as in the children's overall body weight during puberty.

The percentages of overweight and the obese children were found to be less after puberty (Figure 1) and this may be a cohort effect. However, it may be physiological for most children as they enter the post pubertal age. The other possibility is whether children become weight conscious post pubertal and therefore diet. This raises questions about weight reduction in school children unless prepubertal.

A longitudinal study is required to see whether overfat children have obesity and weight problems in adulthood. Previous works show that the number of fat cells multiplies during periods of rapid growth up to about 16 years of age¹², after which increased fat ordinarily accumulates by increasing the size of cells already present. This, or other mechanisms, might provide a biological explanation for a linkage between adolescent and adult obesity.

Looking at ethnic group, there were more overweight children amongst the Indians, followed by the Chinese and Malays. For gender, Indian males were more obese, Chinese males more overweight, Chinese females more obese and Indian females more overweight. Significant differences in overweight prevalence rates were found between the 3 ethnic groups. Obesity was equally prevalent in all 3 major ethnic groups, irrespective of gender. The difference prevalences

for the overweight group could be due to nutritional or activity pattern differences between each ethnic group. Indians are known for the high fat content of their foods, whilst the Chinese consume much more carbohydrate and oils, and food is eaten more frequently than for the other ethnic groups. This could be related to the greater acceptance of over-eating in the Chinese family where the children are brought up to show filial love by eating more in front of their parents and where obesity and overweight are signs of wealth and success^{13,14}, since even the Chinese gods of luck and wealth are almost always depicted as fat.

Conclusion

Although the prevalences of both overweight and obesity amongst school children in this study were found to be less than 10%, it constitutes an emergent problem. A longitudinal study of Malaysian school children in 5 and 10 years will establish secular trends for body fatness in an urban setting amongst the 3 major ethnic groups.

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馬來西亞吉隆坡市三個民族 7-16 歲學齡兒童 肥胖症和超重的發病率

摘要

作者在馬來西亞吉隆坡市的 226 所中、小學內選擇了 6239 位 7-16 歲的兒童為對象，所有兒童回答了一份問卷，同時測定了他們的身高和體重。從吉隆坡 226 所學校中分兩階段隨機抽樣。被抽樣的兒童中包括馬來人 56.7%，中國人 33.8% 和印度人 8.1%，有 3.6% (222 人) 驗明為肥胖症，6% (373 人) 驗明為超重。肥胖症和超重的標準是從參考人群中數的國家健康統計生長卡製定的。

三個民族的肥胖症沒有明顯差異，但超重方面，印度人最多，中國人次之，馬來人最少。

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