

Body Mass Index Profile in Hong Kong Chinese Adults

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Abstract

Introduction: Obesity has now become an epidemic with increasing prevalence in most parts of the world. However, information on the problem of obesity in Asians is limited. **Subjects and Methods:** From April 1996 to August 1997, 17,121 Chinese adult subjects from the community of Hong Kong presented themselves voluntarily at the United Christian Nethersole Community Health Service Centers for primary health care check-up. Demographic data including height and weight were documented. Their body mass indexes (BMI) were measured. The prevalence rates of overweight and obese subjects were calculated according to the 1995 World Health Organization criteria. **Results:** There were 4781 (27.9%) men and 12340 (72.1%) women. The mean age ($\pm$ SD) was 51.3 ± 16.0 years (range 20 to 96 years, median 49.8 years). Of the 17,121 subjects, 4939 (28.85%) were overweight and 656 (3.83%) were obese. Based on the 1997 Hong Kong Census statistics of the overall Hong Kong population data, the age-standardised prevalence rates of overweight and obese subjects were 30.52% and 3.19% in men and 22.14% and 3.35% in women, respectively. Of the 10,937 subjects of working age (20 to 65 years), the prevalence rates of overweight and obese subjects were 28.98% and 3.55%, respectively. Of the 6648 subjects aged ≥ 60 years, the prevalence rates of overweight and obese subjects were 36.31% and 4.81%, respectively. **Conclusions:** In Hong Kong, the age-standardised prevalence rate of overweight and obese subjects were 30.5% and 3.2% in men and 22.1% and 3.4% in women, respectively. This information provides some useful estimations of the extent of an important public health problem, obesity, in Hong Kong.

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Introduction

Obesity is considered a chronic disease and not just a social stigma due to the associated morbidity and early mortality.¹ Obesity has now become an epidemic with increasing prevalence in most parts of the world.²⁻⁴ It is difficult to compare obesity data among different populations when different parameters and definitions are used.⁵ The World Health Organization (WHO) in 1995 defined overweight and obesity as body mass index (BMI) ≥ 25 kg/m² and ≥ 30 kg/m², respectively.⁶ Obesity has also been categorised into 3 classes depending on severity.⁶

In Caucasians, the prevalence rates of overweight and obesity vary markedly in different populations. Comparing Caucasians and Asians, the latter group is often considered as non-obese subjects. However, information on the problem

of obesity in Asians is limited. We examined BMI profiles of 17,121 Hong Kong Chinese recruited from the community. We aimed to study recent figures in the prevalence of overweight and obesity, and compare these data with the limited information reported previously in Hong Kong Chinese.⁷⁻¹⁰

Subjects and Methods

From April 1996 to August 1997, 17,764 subjects from the community of Hong Kong presented themselves voluntarily at the United Christian Nethersole Community Health Service (UCNCHS) Centers for primary health care check-up. Of the 17,764 subjects, 643 had incomplete data and were excluded from the analysis. Hence, the BMI profiles of 17,121 subjects were reported in this paper.

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UCNCHS is a self-funded, non-profit organisation with the objective of health promotion through primary health care and education. The subjects in this study came from different districts from all over Hong Kong. All Hong Kong citizens are entitled to join the health-screening programme. They need to pay an administrative fee of HK\$800 (~US\$100). The programme was publicised through advertisements in magazines and by sending pamphlets to various hospitals, community centres and social organisations in Hong Kong.

An interview-administered questionnaire was delivered by a doctor. A verbal informed consent was obtained during the interview. Smoking and drinking habits were documented. Smokers and drinkers were defined as those who were current and ex-smoking and current and ex-drinking, respectively. Demographic data including height and weight (measured to the nearest 0.1 kg) were documented following a standard protocol with the subject in light clothing without shoes. The body mass index (BMI) was calculated as weight (kg) divided by the square of height (m²). After sitting for at least 5 minutes, blood pressure (BP) was measured in the right arm with a standard mercury sphygmomanometer. The Korotkoff sound V was taken as the diastolic BP.

Classification of BMI was made based on the 1995 WHO criteria. Underweight was defined as BMI <18.5 kg/m², overweight was defined as BMI ≥25 kg/m² and obesity was defined as BMI ≥30 kg/m². Obese subjects were categorised into 3 classes: class 1 had BMI ≥30–35 kg/m², class 2 ≥35–40 kg/m² and class 3 ≥40 kg/m².

Statistical Analysis

Statistical analyses were performed using the SPSS (version 8.0) software on an IBM compatible computer.

All results were expressed as mean ± SD or % (n) where appropriate. Student's *t*-test and chi-square test were used for between group comparisons. A *P* value <0.05 (2-tailed) was considered to be significant.

Age-standardised prevalence rates of overweight and obesity were calculated using direct standardisation with the overall Hong Kong population distribution by age and sex according to the 1997 Hong Kong Census.¹¹ To compare with previous studies involving Hong Kong Chinese,^{7,8} the crude prevalence rates of overweight and obesity in the present study were calculated in those aged ≥20 to 65 years and those aged ≥60 years.

Results

There were 4781 (27.9%) men and 12,340 (72.1%) women. The mean age (±SD) was 51.3 ± 16.0 years (range 20 to 96 years, median 49.8 years). Table I shows their BMI and, prevalence of overweight and obesity. Of the 17,121 subjects, 4939 (28.85%) were overweight and 656 (3.83%) were obese. Women had lower prevalence of overweight but higher prevalence of obesity compared to men (Table II). Based on the 1997 Hong Kong Census statistics of the overall Hong Kong population data, the age-standardised prevalence rates of overweight and obesity were 30.52% and 3.19% in men and 22.14% and 3.35% in women, respectively.

Of the 17,121 subjects, 10,937 were of working age (20 to 65 years). The BMI was 23.28 ± 3.49 kg/m². Among these 10,937 subjects, 3021 were men and 7916 were women. Their BMI were 23.90 ± 3.30 kg/m² and 23.04 ± 3.53 kg/m² for men and women, respectively. The prevalence rates of overweight and obesity were 28.98% and 3.55%, respectively (35.58% and 3.24% in men, and 26.45% and 3.66% in women, respectively). Of the 17,121

TABLE I: CLINICAL CHARACTERISTICS OF 17,121 SUBJECTS

	All subjects (n = 17,121)	Men (n = 4781)	Women (n = 12,340)	<i>P</i> value
Age, years	51.3 ± 16.0	52.0 ± 15.9	51.0 ± 16.0	0.001
BMI, kg/m ²	23.2 ± 3.6	23.6 ± 3.3	23.1 ± 3.7	<0.001
Systolic BP, mmHg	122 ± 24	124 ± 22	121 ± 25	<0.001
Diastolic BP, mmHg	76 ± 11	78 ± 11	75 ± 11	<0.001
Smoker, n (%)	2594 (15.2)	1843 (38.5)	751 (6.1)	<0.001
Drinker, n (%)	2492 (14.6)	1663 (34.8)	829 (6.7)	<0.001
Underweight, n (%)	1351 (7.9)	264 (5.5)	1087 (8.8)	<0.001
Normal BMI, n (%)	10,831 (63.3)	2997 (62.7)	7834 (63.5)	0.331
Overweight, n (%)	4939 (28.9)	1520 (31.8)	3419 (27.7)	<0.001
Obesity, n (%)	656 (3.8)	138 (2.9)	518 (4.2)	<0.001
Class 1 obese, n (%)	593 (3.5)	125 (2.6)	468 (3.8)	<0.001
Class 2 obese, n (%)	55 (0.3)	10 (0.2)	45 (0.4)	0.069
Class 3 obese, n (%)	8 (0.1)	3 (0.1)	5 (0.0)	0.546

BMI: body mass index; BP: blood pressure

Underweight: BMI <18.5 kg/m²; Normal: BMI ≥18.5–25.0 kg/m²; Overweight: BMI ≥25.0 kg/m²; Obesity: BMI ≥30.0 kg/m²

Class 1 obese: BMI ≥30.0–35.0 kg/m²; Class 2 obese: BMI ≥35.0–40.0 kg/m²; Class 3 obese: BMI ≥40.0 kg/m²

TABLE II: BODY MASS INDEX (BMI) PROFILES OF 17,121 CHINESE SUBJECTS

(a) women:									
Age group (y)	n	BMI (kg/m ²)	Underweight n (%)	Normal n (%)	Overweight n (%)	Obesity n (%)	Class 1 obese n (%)	Class 2 obese n (%)	Class 3 obese n (%)
≥20-30	1230	20.2 ± 3.1	353 (28.7)	801 (65.1)	76 (6.2)	18 (1.5)	12 (1.0)	5 (0.4)	1 (0.1)
≥30-40	2700	21.8 ± 3.4	330 (12.2)	1959 (72.6)	411 (15.2)	65 (2.4)	55 (2.0)	8 (0.3)	2 (0.1)
≥40-50	2311	23.1 ± 3.4	122 (5.3)	1605 (69.5)	584 (25.3)	82 (3.6)	70 (3.0)	10 (0.4)	2 (0.1)
≥50-60	1367	24.1 ± 3.4	50 (3.7)	809 (59.2)	508 (37.2)	71 (5.2)	69 (5.1)	2 (0.2)	0
≥60-70	3100	24.3 ± 3.5	118 (3.8)	1749 (56.4)	1233 (39.8)	184 (5.9)	174 (5.6)	10 (0.3)	0
≥70-80	1468	24.1 ± 3.8	97 (6.6)	811 (55.3)	560 (38.2)	95 (6.5)	85 (5.8)	10 (0.7)	0
≥80	164	23.2 ± 3.6	17 (10.4)	100 (61.0)	47 (28.7)	3 (1.8)	3 (1.8)	0	0
Total	12,340	23.1 ± 3.7	1087 (8.8)	7834 (63.5)	3419 (27.7)	518 (4.2)	468 (3.8)	45 (0.4)	5 (0.0)
(b) men:									
Age group (y)	n	BMI (kg/m ²)	Underweight n (%)	Normal n (%)	Overweight n (%)	Obesity n (%)	Class 1 obese n (%)	Class 2 obese n (%)	Class 3 obese n (%)
≥20-30	385	22.2 ± 3.6	41 (10.7)	282 (73.3)	62 (16.1)	12 (3.1)	10 (2.6)	0	2 (0.5)
≥30-40	1021	23.9 ± 3.5	48 (4.7)	626 (61.3)	347 (34.0)	44 (4.3)	36 (3.5)	7 (0.7)	1 (0.1)
≥40-50	949	24.1 ± 3.2	37 (3.9)	549 (57.9)	363 (38.3)	33 (3.5)	30 (3.2)	3 (0.3)	0
≥50-60	510	23.7 ± 3.1	23 (4.5)	313 (61.4)	174 (34.1)	11 (2.2)	11 (2.2)	0	0
≥60-70	1206	23.6 ± 3.2	71 (5.9)	745 (61.8)	390 (32.3)	26 (2.2)	26 (2.2)	0	0
≥70-80	634	23.2 ± 3.0	31 (4.9)	431 (68.0)	172 (27.1)	11 (1.7)	11 (1.7)	0	0
≥80	76	21.9 ± 3.2	13 (17.1)	51 (67.1)	12 (15.8)	1 (1.3)	1 (1.3)	0	0
Total	4781	23.6 ± 3.3	264 (5.5)	2997 (62.7)	1520 (31.8)	138 (2.9)	125 (2.6)	10 (0.2)	3 (0.1)

Underweight: BMI <18.5 kg/m²; Normal: BMI ≥18.5-25.0 kg/m²; Overweight: BMI ≥25.0 kg/m²; Obesity: BMI ≥30.0 kg/m²; Class 1 obese: BMI ≥30.0-35.0 kg/m²; Class 2 obese: BMI ≥35.0-40.0 kg/m²; Class 3 obese: BMI ≥40.0 kg/m²

subjects, 6648 were 60 years old or above. The BMI was 23.96 ± 3.51 kg/m² (men: 23.38 ± 3.17 kg/m², women: 24.20 ± 3.61 kg/m²), and their prevalence rates of overweight and obesity were 36.31% and 4.81%, respectively (29.96% and 1.98% in men, and 38.88% and 5.96% in women, respectively).

Discussion

Information on the problem of obesity in Asians such as Chinese is scanty. Our present study reports a detailed BMI profile in Hong Kong Chinese. We find the prevalence of overweight and obesity in Hong Kong Chinese to be 28.9% and 3.8%, respectively. The age-standardised prevalence rates of overweight and obesity were 30.5% and 3.2% in men, and 22.1% and 3.4% in women, respectively. Recent data in the West showed a marked difference in the prevalence of obesity among different populations. The prevalence of obesity (BMI ≥30 kg/m²) was 7% in France,² 8.9% in Spain,¹² 18% in Finland³ and 22.4% in the US.⁴ All these data suggest a higher prevalence of obesity in the West as compared to that in Hong Kong. The mean BMI of Hong Kong Chinese in the present study was 23.2 kg/m². Compared to Western data,¹³ our figure is relatively low.

One serious limitation of the present study is the voluntary basis of the studied subjects. They attend our primary health care centre voluntarily for check-up and may be

more aware of some of the health risk factors such as obesity, and consequently were healthier than the general population. This may be one reason accounting for the low prevalence of obesity in the study. However, this relatively low prevalence of obesity (<5%) is in accord to data collected in previous smaller scale, local community-based studies.^{7,9,10} We previously reported in a population-based survey done in 1990 involving 1513 Chinese aged 20 to 65 years that the prevalence rate of obesity in Hong Kong was 3.2%.⁷ Another population-based survey in 1995 on 7730 Chinese residents aged 25 to 74 years showed the prevalence rates of obesity in Hong Kong were 5% in men and 7% in women.⁹ On the other hand, our prevalence of overweight, despite being low as compared to western societies, is not too far from that as in the prevalence of obesity. This may be related to the voluntary sample of the study, but ethnic differences will be a more sensible explanation.

Obesity is regarded by some as not a major problem in Hong Kong due to the comparatively lower prevalence of obesity compared to Caucasians.¹⁰ However, we have previously documented that as BMI increases in Hong Kong Chinese, cardiovascular risk factors such as blood pressure, lipid profiles and plasma glucose concentrations deteriorate significantly.⁷ In addition, we have shown that "normal" cut off values of obesity in Western countries

when applied to the Chinese population still pose a significant association with diabetes or hypertension.¹⁴ In a cohort involving 1513 subjects, we have demonstrated that Hong Kong Chinese subjects with a BMI of 25 kg/m² carry a two-fold increased likelihood of having diabetes or hypertension.¹⁴ In other words, Hong Kong Chinese may be subjected to the harmful effects of obesity at a lower threshold. A much lower BMI cut off to define obesity may need to be considered in Chinese as compared to Caucasians.¹⁰ Large scale, prospective studies comparing different ethnic populations are needed in this aspect.

A dramatic increase in the prevalence of obesity has recently been reported in the US.⁴ The prevalence of obesity was 14.1% according to NHANES I (1971 to 1974), which raised to 22.5% according to NHANES III (1985 to 1994). Our data showed that among Hong Kong Chinese of working age, there was a slight increase in the prevalence rates of overweight or obesity from 28% and 3% in 1990⁷ to 29% and 3.6% in 1997. However, a marked increase in the prevalence of overweight was found in the elderly subjects (aged ≥ 60 years) from 20.6% in 1987⁸ to 36.3% in 1997. The mean BMI was 21.9 kg/m² in 1987,⁸ which now raised to 24.0 kg/m². The deterioration was more predominant in the female elderly subjects. Although the two studies are not directly comparable, the information provided is alarming. Since obese children often become obese adults and given the fact that the prevalence of childhood obesity in Hong Kong has increased significantly recently,^{15,16} obesity in Hong Kong is predicted to become a big problem in all age groups in the future.

Obesity has now become a major health hazard in most parts of the world. In this study, we observed an increase in the mean BMI and the prevalence of obesity in Hong Kong Chinese especially among elderly women aged ≥ 60 years. With previously reported evidence that Hong Kong Chinese may be prone to obesity-associated harmful effects at a lower threshold, this change in BMI profile in Hong Kong may pose a potential detrimental effect on our health situation. Measures such as educational programmes for lifestyle modification to improve the problem of obesity are urgently needed.

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