

## Childhood Obesity in Hong Kong

S.S.F. LEUNG

The Chinese University of Hong Kong

### Introduction

Infant mortality rate is an important indicator of the general health of infants in a population. In 1990, the infant mortality rate of Hong Kong was 8 per 1000, much lower than that of the developing countries (e.g. Malawi, 144 per 1000) and close to that with the lowest in the world (Japan, 5 per 1000). The rapid acquisition of affluence in Hong Kong has brought about an emergence of childhood obesity, as reflected in the findings of the following four studies performed by the Chinese University of Hong Kong in the last decade:

- Ongoing longitudinal study on a cohort of babies born in 1984 for the relationship between growth and dietary intake.
- Comparative study between the Hong Kong and the Mainland Chinese children of seven-year-old of the same ethnic origin for their body fatness, diet and serum lipids.
- A dietary review and biochemical study of obese children presented to the growth

clinic at the Prince of Wales Hospital, Shatin, Hong Kong.

- A territory wide growth survey in 1993 for the prevalence of obesity in children and adolescents of 3 - 18 years.

### Infants Well Nourished

The longitudinal study was performed at a background where Hong Kong infants were still suspected to be inadequately nourished because of their smaller size compared to the Caucasians and the nutrients intake e.g. energy, iron and vitamin D were below the recommended dietary allowances.<sup>1-5</sup> 174 normal newborn babies were followed up bimonthly in the first six months, trimonthly till the end of the second year and then yearly thereafter for their growth and nutrients intake. These babies had a median birth weight of 3.3 kg for boys and 3.2 kg for girls. Their median weight showed a distinct fall away from the NCHS median from six months onwards and their median length run just beneath the NCHS median. For the first two years, none of these deviations were more than one standard devi-

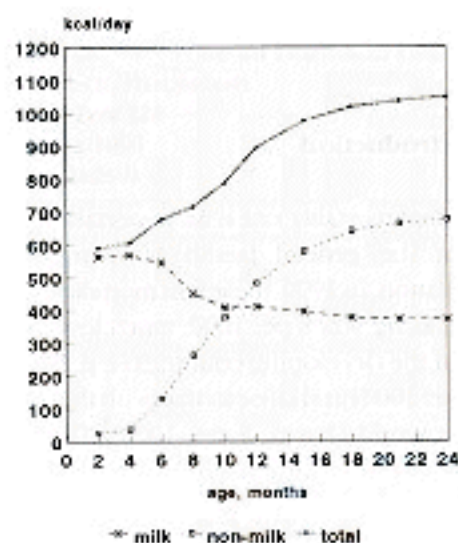
ations. At 2 years, 18% of the group had a weight less than 80% NCHS median weight for height. Yet their energy and protein intake were adequate, even higher than the median value of the whole group.<sup>65</sup> In spite of an iron and Vit D intake lower than those of RDA, none suffered iron deficiency anaemia nor rickets.<sup>67</sup> While the NCHS reference was prepared in 1920s - 1960s, the Canadian and Australian references were prepared in the late 1970s and they showed a higher mean birth weight of 3.6 kg in boys and 3.5 kg in girls. Chinese babies at birth and at 18 months, together with their parents were all at about -1 S.D. below those of the Australians while the energy intake from 12 to 18 months was no different between the Chinese and the Canadians or Australians, signifying a genetic difference in growth starting from intrauterine life.<sup>8</sup>

Hong Kong infants were perhaps deprived of the immunological benefits of breast milk, but they should not be deprived of any nutritional needs from bottle feeding. The percentage of breast feeding fell from 30% at birth to 8% at two months, 4% at 4 months and 2% at 6 months. Energy intake of the bottle fed babies in the first year of life was no different from healthy babies in the developed countries.<sup>9</sup> Mean protein intake in the weaning period was four times that of the recommended safe level.<sup>10,11</sup> The dietary source of energy

and protein in the first two years of life are shown in Table I and Fig. 1-2.

### Signs of Excessive Intake of Protein and Fat

The pattern of high protein intake persisted through the childhood years. At age seven dietary source of protein were 38% from meat and poultry, 19% from cereals, 13% from fish, 10% from milk and 6% from egg. Such dietary



1984-1986

Fig. 1 Total daily energy intake of Hong Kong Chinese infants from birth to 2 years (—■—) and its breakdown to that from milk (---○---) and from nonmilk (....△....).

Table I Percentage of Bottle Fed Babies (n = 145-155) Given Various Food Groups Apart from Milk at Various Age

	Age in months							
	2	4	6	8	10	12	18	24
Iron fortified cereals	0	24	28	24	5	4	9	3
Congee, soft rice or rice + no meat	0	4	9	13	16	0.6	4	1
fish or meat	0	3	48	81	83	97	97	94
Fruit & fruit juice	0	8	27	81	80	95	99	99
Vitamin & Mineral supplement	3	3	10	10	10	21	35	52

practices was contrary to the traditional diet where cereals and vegetables would be the main source of protein. An increase consumption of animal products, as in any affluent society, is associated with problems of overnutrition. At age seven, the prevalence of obesity in the cohort was 5%, and the mean fasting serum total cholesterol level was 4.59 mmol/L, the second highest in the world literature on the same age group.<sup>12</sup> Children who consumed less rice, more meat and less vegetables were more likely to have high total cholesterol level (Table II). On the other hand, children with greater body fatness were more likely to have higher total triglycerides and lower HDL (Table III). Further evidence for an environmental etiology to the hypercholesterolemia was obtained from a comparative study with the seven year old

children in Guangdong Province, Mainland China. They were of the same ethnicity. Body fatness in the two populations were no different yet the dietary practices were markedly different, being more traditional in the Mainland.

Twenty individuals in each populations were studied in further depth by analysing fatty acid in their duplicate meals collected over two days using chemical methods.<sup>13</sup> Hong

**Table II** Statistically Significant Pearson  $r$  Coefficients of Nutrients Intake in Relation to Serum Lipids.

Lipids	Nutrients	$r$
TC	CHO	-0.23*
	P/S	-0.23*
	PUFA	-0.21*
LDL	P/S	-0.26*
HDL	CHO	-0.22*
	energy	-0.20*

\* =  $p < 0.05$

CHO = carbohydrate intake

P/S = polyunsaturated to saturated fatty acid ratio

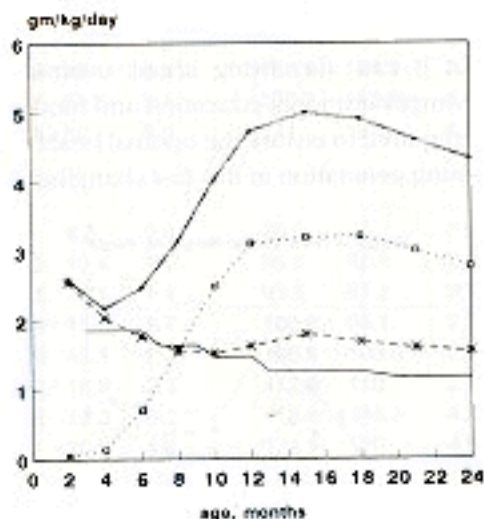
PUFA = polyunsaturated fatty acid

energy = total daily energy intake

**Table III** Statistically Significant Pearson  $r$  Coefficients of Measurement of Body Fatness in Relation to Serum Lipids.

Lipid	Measurements of	
	body fatness	$r$
TG	Weight	0.55*
	BMI	0.51*
	Triceps	0.44*
	Subscapular	0.55*
HDL	Length	0.36*
	Weight	-0.30*
	BMI	-0.30*
	Triceps	-0.23*
	Subscapular	-0.24*

\* =  $p < 0.05$



\* milk \* non-milk — total — Safe level, 1985  
1984-1986

**Fig. 2** Daily protein intake per kg body mass of Hong Kong Chinese infants from birth to 2 years (—) and its breakdown to that from milk (•••) and from non-milk (□□□) compared to the recommended safe level of protein intake by WHO, 1985, (—).

Kong children consumed a larger amount of total fat (48g vs 35g), with a higher myristic acid to linoleic acid ratio. The PS ratio was 0.69 compared to 0.81 in China. Seven years is not the peak age for obesity. At the Growth Clinic in Prince of Wales Hospital, Shatin, Hong Kong, 8% of all referrals were for obesity. These obese children were often in their teens, having the same history of progressive weight gain starting 5 - 6 years of age, not seeking medical advice until adolescence when appearance became a major concern of the parents and the children themselves. These obese children shared similar preferences to animal foods, particularly sausages, chicken wings, sugary foods such as soft drinks, ice-cream, but disliked vegetables and of course, reluctant to do exercise. One third of obese adolescents had an impaired glucose tolerance.<sup>14</sup>

### Obesity on the Rise

A territory wide growth survey in Hong Kong 1993 covering 25,000 individuals from birth to 18 years, enabled local growth standards, including weight for height standards, to be constructed. Children whose weight was above 120% median weight for height were considered obese.<sup>15</sup> The prevalence was very high and is historical in Hong Kong, being 13.4% for boys and 10.5% for girls of 6-18 years (Fig 3).<sup>16</sup> The higher prevalence in boys is compatible with the traditional preference for boys, and the belief of the more you eat, the healthier you are. Variation of the prevalence of obesity with age indicates when is the best time to interfere. Establishing a healthy life style including eating habit in the preschoolers

or early primary school children is essential to prevent childhood obesity.

Since the survey covered the various districts of Hong Kong and families of various professions and educational background, it was possible to identify districts or social class at risk. The risk was slightly higher in boys of the higher social class. They tend to become more obese in the prepubertal years but they did not attain greater adult height. In spite of a definite secular change in growth of children over the last thirty years (Table IV),<sup>17,18</sup> children at 18 years were still about -1 S.D. shorter than the Caucasians,<sup>19</sup> though similar to those of Singapore<sup>20</sup> and Taiwan,<sup>21</sup> signifying a genetic influence in growth. On the other hand, the weight for age, weight for height references were similar in the three Chinese populations, reflecting an environmental influence causing obesity in childhood and adolescents.

Affluence can sweep away undernutrition but it can also bring about overnutrition. Prompt nutritional education and food policy is required to ensure the optimal health of our young generation in this fast changing world.

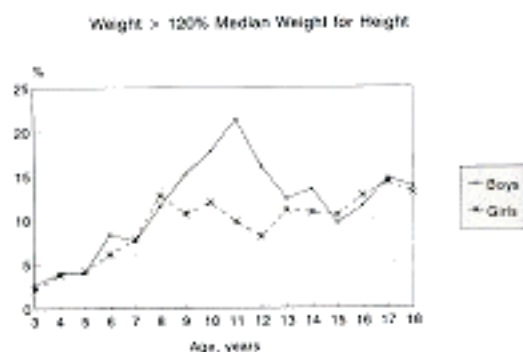


Fig. 3 Prevalence of obese children with weight greater than 120% median weight for height in 3-18 years boys (—) and girls (---).

**Table IV** Secular Change in Mean Weight and Height of Hong Kong Children 1963-1993.

Age, Yrs	Mean Weight, kg			Mean Height, cm		
	1993	1963	Difference	1993	1963	Difference
<b>Boys</b>						
1	9.5	8.9	0.6	75.3	74.3	1.0
2	12.1	11	1.1	86.3	84.5	1.8
3	14	12.8	1.2	95.3	92.8	2.5
4	16	14.3	1.7	102.3	99.5	2.8
5	17.9	15.9	2.0	108.2	105.1	3.1
6	20.2	17.5	2.7	113.5	110.7	2.8
7	22.2	19	3.2	118.7	115.5	3.2
8	25.6	20.6	5.0	124.3	120.5	3.8
9	28.7	22.4	6.3	130.2	125.2	5.0
10	31.7	24.6	7.1	136.5	130	6.5
11	35.7	27.1	8.6	143.1	134.8	8.3
12	39.4	30	9.4	149.6	140	9.6
13	43.6	34.5	9.1	155.8	147	8.8
14	50.6	40.0	10.6	161.2	155.6	5.6
15	53.1	45.6	7.5	165.5	161.5	4.0
16	57.9	49	8.9	168.5	164.9	3.6
17	59.7	51.3	8.4	170.3	165.8	4.5
18	60.5	52	8.5	171	167	4.0
<b>Girls</b>						
1	8.9	8.3	0.6	73.9	73	0.9
2	11.5	10.4	1.1	85.2	82.7	2.5
3	13.5	12.1	1.4	93.5	91.2	2.3
4	15.4	13.7	1.7	100.6	98.1	2.5
5	17.3	15.1	2.2	106.9	103.5	3.4
6	19.2	16.9	2.3	112.9	110	2.9
7	21.5	18.3	3.2	118.8	114.7	4.1
8	25	20.2	4.8	124.9	120	4.9
9	27.2	22.4	4.8	131.2	125.1	6.1
10	30.9	25	5.9	137.4	130.5	6.9
11	36.1	28	8.1	143.3	136.6	6.7
12	39.8	32.7	7.1	148.6	144	4.6
13	43.9	37	6.9	152.8	150	2.8
14	47.8	41.4	6.4	155.8	154	1.8
15	48.5	43.6	4.9	157.4	155.4	2.0
16	48.9	44.5	4.4	157.7	155.6	2.1
17	50	45.1	4.9	157.7	155.6	2.1
18	50.3	45.2	5.1	157.7	155.6	2.1

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Correspondence to:

Dr. S.S.F. LEUNG

Department of Paediatrics

The Chinese University of Hong Kong

6/F Clinical Sciences Building

Shatin

Hong Kong