6. CHILDHOOD OBESITY

The prevalence of child obesity is increasing rapidly worldwide (WHO 1998). It is associated with several risk factors for later heart disease and other chronic diseases including hyperlipidaemia, hyperinsulinaemia, hypertension and early artherosclerosis (Berenson et al. 1998). In view of its public health importance, the trends in child obesity should be closely monitored. Trends are, however, difficult to quantify or to compare locally and internationally, as a wide variety of definitions of child obesity are in use, and no commonly accepted standard has yet emerged (Cole et al. 2000).

Several reports show already high and increasing rates of overweight and obesity among preschool children living in developing countries (de Onis & Blassner 2000). Children become overweight for a variety of reasons. The most common causes are unhealthy eating patterns, lack of physical activity, genetic factors, or a combination of these factors. In rare cases, a medical problem, such as an endocrine disorder, may cause a child to become overweight.

Obesity is associated with significant health problems in childhood and adolescence, and is an important early risk factor for much of adult morbidity and mortality (Freedman et al. 1999). Medical problems are common in obese children and adolescents and can affect cardiovascular health (e.g. hypercholesterolemia, hypertension), the endocrine system (e.g. hyperinsulinaemia, insulin resistance, menstrual irregularity) and mental health (e.g. depression, low self-esteem).

Assessment of obesity in children and adolescents is important to prevent the progression of the condition and its related co morbidities into adulthood. Routine assessments of eating and activity patterns in children and recognition of excessive weight gain relative to linear growth are essential throughout childhood. At any age, an excessive rate of weight gain relative to linear growth should be recognized, and underlying predisposing factors should be addressed with parents and other caregivers (AAP 2003). Several factors to be addressed include:

- Genetic and hormonal causes of obesity warrant consideration, although rare,
- Prevention of psychosocial problems, e.g. low self-esteem,
- Instilling healthy lifestyle in children and their families throughout their life.

Factors determining persistence of obesity into adulthood include onset of obesity after the age of three, degree of obesity, and presence of obesity in at least one parent. The risk of obesity persisting into adulthood is higher among obese adolescents than among younger children (Whitaker et al. 1997).

6.1 Defining Childhood and Adolescent Obesity

Classifying obesity during childhood or adolescence had the added complication that height is still increasing and body composition is continually changing. WHO (1995) recommends that for children aged two to ten years, the NCHS Median +2SD reference weight-for-height may be used to determine overweight in boys and girls. For adolescents aged ten to eighteen years, values greater than 85th percentile BMI-for-age represents at risk of overweight (WHO 1995) (See Tables 16 and 17). These references may still be used for reporting overweight and obesity prevalence among children, along with new available standards.

Although BMI does not directly measure body fat, it provides a reasonable estimate of adiposity which, in turn, also predicts risks for current or future medical complications of obesity (Dietz & Robinson 1998). BMI in children is correlated not only with other measures of body fat but also with blood pressure (Gutin et al. 1990), lipid levels (Zwiauer et al. 1990), and insulin levels (Ronnemaa et al. 1991).

Table 16: BMI-for-age percentiles: adolescent boys, 10 - 18 years

Age	Percentiles				
(years)	5th	15th	50th	85th	95th
10	14.42	15.15	16.72	19.60	22.60
11	14.83	15.59	17.28	20.35	23.73
12	15.24	16.06	17.87	21.12	24.89
13	15.73	16.62	18.53	21.93	25.93
14	16.18	17.20	19.22	22.77	26.93
15	16.59	17.76	19.92	23.63	27.76
16	17.01	18.32	20.63	24.45	28.53
17	17.31	18.68	21.12	25.28	29.32
18	17.54	18.89	21.45	25.92	30.02

Source: WHO (1995)

Table 17: BMI-for-age percentiles: adolescent girls, 10 - 18 years

Age (years)	Percentiles				
	5th	15th	50th	85th	95th
10	14.23	15.09	17.00	20.19	23.20
11	14.60	15.53	17.67	21.18	24.59
12	14.98	15.98	18.35	22.17	25.95
13	15.36	16.43	18.95	23.08	27.07
14	15.67	16.79	19.32	23.88	27.97
15	16.01	17.16	19.69	24.29	28.51
16	16.37	17.54	20.09	24.74	29.10
17	16.59	17.81	20.36	25.23	29.72
18	16.71	17.99	20.57	25.56	30.22

Source: WHO (1995)

The Center for Disease Control and Prevention (CDC), USA released the BMI-for-age growth charts in year 2000 (Kuczmarski et al. 2000). The 85th and 95th percentiles of the body mass index reference had been proposed as cut-off points for "at risk of overweight" and "overweight", respectively (CDC 2000).

In the same year, a new definition of overweight and obesity in childhood had been proposed (Cole et al. 2000). This is based on pooled international data from Brazil, Great Britain, Hong Kong, the Netherlands, Singapore and United States for body mass index and linked to the widely used adult cut-off of >25 kg/m^2 and >30 kg/m^2, for overweight and obesity, respectively. The technical committee recommends adopting this international cut off points as shown in Table 18.

Table 18: BMI cut off points for 2-18 years

Age (yrs)	Overweight BMI		Obesity BMI	
	Males	Females	Males	Females
2.0	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3.0	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4.0	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5.0	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6.0	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7.0	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8.0	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9.0	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10.0	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11.0	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12.0	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13.0	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14.0	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15.0	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16.0	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17.0	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18.0	25	25	30	30

Source : Cole et al. (2000)

6.2 Prevalence of Childhood Obesity

In Malaysia, there is no known national survey carried out with the specific purpose of determining the prevalence of overweight and obesity amongst children and adolescents. However, many smaller scale studies have been reported.

Bong & Safurah (1996) reported a prevalence of 8% overweight among primary schoolchildren in Selangor. Ismail & Tan (1998) reported an obesity prevalence of 6.6% among 7-year-olds while a 13.8% prevalence was reported in 10-year-olds. Fatimah et al. (2001) reported 8.7% obesity in children residing in Kuala Lumpur as compared to 5.7% in Kota Bharu. In a recent survey of 11,500 schoolchildren aged between 6-12 years from four regions in Peninsular Malaysia, revealed a prevalence of 6% obesity in both sexes with small differences between urban and rural children (Ismail et al. 2003).

Tee et al. (2002) studying 5,995 children aged 7 to 10 years in all primary schools in Kuala Lumpur reported a prevalence of overweight of 9.7% among boys and 7.1% among girls (based on >95th percentile of the BMI-for-age), (WHO 1995). In marked contrast, Khor & Tee (1997) reported a prevalence of less than 2% among 3,000 rural children. It should be noted, however, that all the above studies were reported using different cut-offs / criteria for defining overweight. The findings are therefore not strictly comparable.

Two separate studies, in 1990 and 1997, carried out among adolescent boys studying in the same four schools in Klang Valley, reported an increase in prevalence of obesity from 1% in 1990 to 6% in 1997 (Ismail & Zulkifli 1996; Ismail & Vickneswary 1999). A more recent survey carried out among adolescents of both sexes aged 12 to 17 years in four regions of Peninsular Malaysia and the Miri region of Sarawak reported 19% of overweight using the WHO (1995) BMI-for-age cut-off of above 85th percentile (Poh et al. 2004).

6.3 Prevention of Childhood Obesity

Prevention is one of the hallmarks of paediatric practice and includes such diverse activities as newborn screenings, immunizations, and promotion of car safety seats and bicycle helmets (AAP 2003). Likewise, with the increase in prevalence of overweight and inactivity amongst children and adolescents, focus should be centred on preventive efforts in childhood obesity, with its associated co-morbid conditions in childhood and likelihood of persistence into adulthood.

6.3.1 Infants and toddlers

Babies and young children who are confined to strollers, play pens, and infant seats for long periods of time may be delayed in development, such as rolling over, crawling, walking and even cognitive development. Such restrictions may be the beginning of the path to sedentary preferences and childhood obesity. Although there is no data to show strong correlation between obesity in early childhood and adult obesity, promoting

positive behaviours and increasing physical activity in childhood may lead to persistence of these behaviours into adulthood, thus helping to alleviate the problem of obesity (NASPE 2002). The Bright Start Nutrition Advisory Panel also recommends encouraging physical activity for fitness and optimum development (BSN 2000).

Exclusive breastfeeding from birth until six months and continued breastfeeding up to two years should be encouraged (WHO 2003). Multiple studies in various populations have shown a weak but consistent protective effect of breastfeeding on the development of obesity after adjusting for appropriate possible confounders, including race and maternal education. Complementary foods should be started by six months.

Educating parents about how to introduce new foods and overcome the picky eating habits of toddlers can be valuable in encouraging them to eat healthily as they grow older. Involving toddlers in food preparation, for example washing and preparing vegetables; introducing new foods in familiar contexts, such as soups and porridges; and practicing patience and persistence will often help. Minimizing intake of sweet beverages (including 100% fruit juice) is appropriate, because intake of these drinks is often responsible for large amounts of excessive calories and replaces foods with more balanced macronutrient content (Hoppin 2004). Table 19 provides further details on lifestyle targets for obesity prevention.

Table 19 : Universal Anticipatory Guidance for Obesity Prevention

Age group	Lifestyle targets
Pregnancy	• Advocate good nutrition (including sufficient protein intake) and attaining appropriate maternal weight gain. • Advocate good glycaemic control, especially for gestational diabetes. • Encourage plans for breastfeeding.
Infants	• Encourage exclusive breastfeeding up to 6 months, and sustained breastfeeding up to two years. • Discourage early introduction of solid foods; complementary feeding should be started by 6 months. • Goal: moderate rates of weight gain, including in low-birth weight infants (throughout childhood). Rapid catch-up growth may be detrimental.
Toddlers	• Nutritional : - Continue to broaden diet, emphasize vegetables and fruits. - Minimize intake of juice and other sweetened beverages. - To establish regular meal pattern. - Parents should serve appropriate portion size. • Physical activity : - Establish habits of physical activity; encourage more physical playtime.

	- Establish healthy television habits (less than one hour a day; not at meals; minimise the number of television in a household). • Behavioural : - Emphasize family-based meals, avoid cooking special meals for kids. - Do not use food as a reward or punishment. - Do not encourage overeating. - Provide parental modelling of healthy diet, physical activity, and minimal television viewing. - Offer positive reinforcement for healthy choices, avoid criticism.
School-age children	All of the above plus: • Physical activity : - Investigate local opportunities for adding organized sports to lifestyle (community and school programmes). - Offer options, including individual sports if team sports not practical or enjoyed by child (for example: martial arts, dance). - Participate in physical activities with children: recreational sports, outdoor play, walking , or bicycling. • Behavioural : - Support healthy body image, emphasizing strength and health rather than weight and appearance.
Adolescents	Watch out for and discourage: • Nutritional : - Excessive take-out or restaurant meals. - Meal skipping or inadequate meals (which often lead to out-of control eating later in the day). - "Grazing" rather than meal-based eating habits. - Withdrawing from sports or other physical activity.

Modified from: Hoppin (2004)

Moderate rates of weight gain are probably ideal, particularly in infants of low birth weight, because rapid catch-up growth is associated with higher rates of the metabolic syndrome (Vanhala et al. 1998).

To establish an appreciation of physical activity, families are encouraged to spend time together in active play, which is easily accomplished with frequent visits to the playground. Toddlerhood is an important time to establish firm limits on television viewing, before it becomes a habit. Snacking during television watching should also be discouraged as television often distracts from natural signals of hunger and satiety.

Families should be encouraged to establish regular mealtimes and to eat together whenever possible. Mealtimes should also be an enjoyable family experience (BSN 2000).

6.3.2 Children and adolescents

Teaching healthy behaviours at a young age is important since change becomes more difficult with age. Behaviours involving physical activity and nutrition are the cornerstone of preventing obesity in children and adolescents. For school-aged children and adolescents, families and schools are the two most critical links in providing the foundation for those behaviours. Parents are the most important role models for children (Fowler-Brown & Kahwati 2004). Parents should not underestimate the health risk of excess weight to their children, and the difficulty in achieving and maintaining behavioural changes associated with obesity prevention.

Parents should understand the importance of regular physical activity for their children and encourage active outdoor as well as active indoor play. For example, children can be encouraged to enrol in a structured activity such as tennis, gymnastics, martial arts, etc. or to join a sports team at school or in the community. Time spent inactively watching television or playing computer games should be limited.

Besides creating an active environment, parents should also create a healthy eating environment for their children and adolescents. The same healthy diet that is rich in fruits, vegetables and grains should be implemented for the whole family and not just select individuals. Large portion sizes should be avoided.

Outside of the home, children and adolescents spend the majority of their time in school. So, it makes sense that schools provide an environment that promotes healthy nutrition and physical activity habits. Foods served during break time at school should be contain less fats and oils, sugar, and salt; while fruits and vegetables as well as healthy snacks should be promoted. Schools should also provide physical and social environments that encourage and enable young people to engage in safe and enjoyable physical activity. Physical education periods should also not be neglected in favour of more revision or studying time (Hoelscher et al. 2004).

REFERENCES

AAP. (2003). Prevention of pediatric overweight and obesity. Policy Statement of the American Academy of Pediatrics. *Pediatrics*. 112(2):424-430.

Berenson GS, Srinivasan SR, Bao W, Newman WP, Tracy RE & Wattigney WA. (1998). Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. The Bogalusa Heart Study. *New England Journal of Medicine*. 338:1650-1656.

Bong ASL & Safurah J. (1996). Obesity among years 1 and 6 primary school children in Selangor Darul Ehsan. *Malaysian Journal of Nutrition*. 2:21-27.

BSN. (2000). Prime messages of the Bright Start Nutrition toddler and preschooler nutrition education programme. Bright Start Nutrition Advisory Panel. Kuala Lumpur: Bright Start Nutrition. http://www.brightstartnutrition.info

Cole TJ, Bellizzi MC, Flegal KM & Dietz WH. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal*. 320:1240-1243.

de Onis M & Blassner M. (2000). Prevalence and trends of overweight among preschool children in developing countries. *American Journal of Clinical Nutrition*. 72: 1032-1039.

Dietz WH & Robinson TN. (1998). Use of the body mass index (BMI) as a measure of overweight in children and adolescents. *Journal of Pediatrics*. 132:191-193.

Dreon DM, Frey-Hewitt B, Ellsworth N, Williams PT, Terry RB &Wood PD. (1988). Associations of diet and obesity in middle-aged men. *American Journal of Clinical Nutrition*. 47: 995-1000.

Drewnowski A & Popkin BM. (1997). The nutrition transition: trends in the global diet. *Nutrition Reviews*. 55(2): 31-43.

Fatimah A, Wan Asma WI, Md Idris MN, Wan Manan WM, Ruzita AT, Roslee R, Mazlan N, Fuziah MZ, Norizan AM, Noor Afizah I, Hatta S & Fauziah S. (2001). The effectiveness of childhood obesity intervention program and the psychosocial factors involved in maintaining weight changes in urban areas. Prosiding *Persidangan Kebangsaan Penyelidikan dan Pembangunan Institusi Pengajian Tinggi Awam 2001*. Kuala Lumpur, 25 – 26 October 2001: 654-659.

Fowler-Brown A & Kahwati LC. (2004). Prevention and treatment of overweight in children and adolescents. *American Family Physician*. 69(11): 2591-2598.

Freedman DS, Dietz WH, Srinivasan SR & Berenson GW. (1999). The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa heart study. *Pediatrics*. 103:1175-1182.

Gutin B, Basch C, Shea S, Contento I, DeLozier M, Rips J, Irigoyen M & Zybert P. (1990). Blood pressure, fitness, and fatness in 5- and 6-year old children. *Journal of the American Medical Association*. 264:1123-1127.

Hoelscher DM, Feldman HA, Johnson CC, Lytle LA, Osganian SK, Parcel GS, Kelder SH, Stone EJ & Nader PR. (2004). School-based health education programs can be maintained over time: results from the CATCH Institutionalization Study. *Preventive Medicine*. 38(5):594-606.

Hoppin AG. (2004). Assessment and management of childhood and adolescent obesity. http://www.medscape.com/viewarticle/481633

Ismail MN & Tan CL (1998). Prevalence of obesity in Malaysia. Country report at the Regional Advisory Board meeting on obesity, Manila, Phillipines.

Ismail MN & Vickneswary EN. (1999). Prevalence of obesity in Malaysia. Data from three ethnic populations. Country report at the Asian BMI/Obesity Workshop, Milan, Italy.

Ismail MN & Zulkifli MAH. (1996). A study on obesity among male adolescents in National Conference on "Adolescent: Challenges of the 21st Century", Kuala Lumpur.

Ismail MN, Norimah AK, Ruzita AT, Mazlan N, Poh BK, Nik Shanita S, Nur Zakiah MS & Roslee R. (2003). Nutritional status and dietary habits of primary school children in Peninsular Malaysia. Final report for UKM-Nestle Research Project. Kuala Lumpur: Department of Nutrition & Dietetics, Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia.

Khor GL & Tee ES. (1997). Nutritional assessment of rural villages and estates in Peninsular Malaysia. II. Nutritional status of children aged 18 years and below. *Mal J Nutr*, 3:21-47.

Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, Flegal KM, Guo SS, Wei R, Mei Z, Curtin LR, Roche AF & Johnson CF. (2000). *CDC growth charts: United States. Advance data from vital and health statistics; No. 314*. National Center for Health Statistics.

NASPE. (2002). NASPE Early childhood physical activity guidelines. Washington D.C.: National Association for Sport and Physical Education.

Poh BK, Ismail MN, Ong HF, Norimah AK, Safiah MY & Zafrullah S. (2004). *Energy Requirements of Malaysian Adolescents*. Final Report for IRPA 06-02-02-0096 Research Project. Kuala Lumpur: Department of Nutrition & Dietetics, Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia.

Ronnemaa T, Knip M, Lautala P, Viikari J, Uhari M, Leino A, Kaprio EA, Salo MK, Dahl M, Nuutinen EM, Pesonen E, Pietikainen M & Akerblom HK. (1991). Serum insulin and other cardiovascular risk indicators in children, adolescents and young adults. *Ann Intern Med*. 23: 67-72.

Tee ES, Khor SC, Ooi HE, Young SI, Omar Z & Hamzah Z. (2002). Regional study of weight and height of urban primary school children: 3. Kuala Lumpur, Malaysia. *Food and Nutrition Bulletin* 23(1): 41-47.

Vanhala M, Vanhala P, Kumpusalo E, Halonen P & Takal J. (1998). Relation between obesity from childhood and the metabolic syndrome: population-based study. *British Medical Bulletin*. 317:319.

Whitaker RC, Wright JA, Pepe MS, Seidel KD & Dietz WH. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*. 337:869-873.

WHO. (1995). Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. Geneva: World Health Organisation.

WHO. (1998). Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation on Obesity. Geneva: World Health Organisation.

WHO. (2003). Global Strategy for Infant and Young Child Feeding. Geneva: World Health Organisation.

Zwiauer K, Widhalm K & Kerbl B. (1990). Relationship between body fat distribution and blood lipids in obese adolescents. *International Journal of Obesity Related Metabolic Disorders*. 14:271-277.