

**MANAGING OVERWEIGHT AND OBESITY: CHALLENGING ROLE OF HEALTH CARE PROVIDERS.**

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Seventy percent of Malaysian adults suffer from non-communicable diseases (NCDs) like diabetes, hypertension, heart diseases, arthritis, depression and cancer, and these NCDs account for 51 percent of deaths in the country (Ministry of Health [MoH], 2007). Bray (2004) claims that obesity is an important etiologic factor in these NCDs.

The global burden of overweight and obesity is estimated at more than 1.1 billion (James, Chunming & Inoue, 2002). A World Health Organisation [WHO] (1997) report showed that the increasing prevalence of obesity is associated with impaired psychosocial health, type 2 diabetes mellitus (T2DM), cardiovascular disease, osteoarthritis, sleep apnoea, breast and uterine cancer. Another study conducted by Low *et al.* (2006) demonstrates that obesity is a stronger predictor of mortality and morbidity, and it is one of the most important risk factors contributing to the overall disease worldwide (Haslam, 2005).

This paper will look at this global scenario and its possible effects on population health. It is appropriate that this paper tries to explore and review the conceptual and clinical assessment issues related to obesity, and critically examine the role of primary healthcare providers, particularly at community levels, and its implications on their clinical practice. The paper will address the benefits of employing the transtheoretical model [TM] (Seals, 2007) by healthcare providers in the management of overweight and obesity in adults.

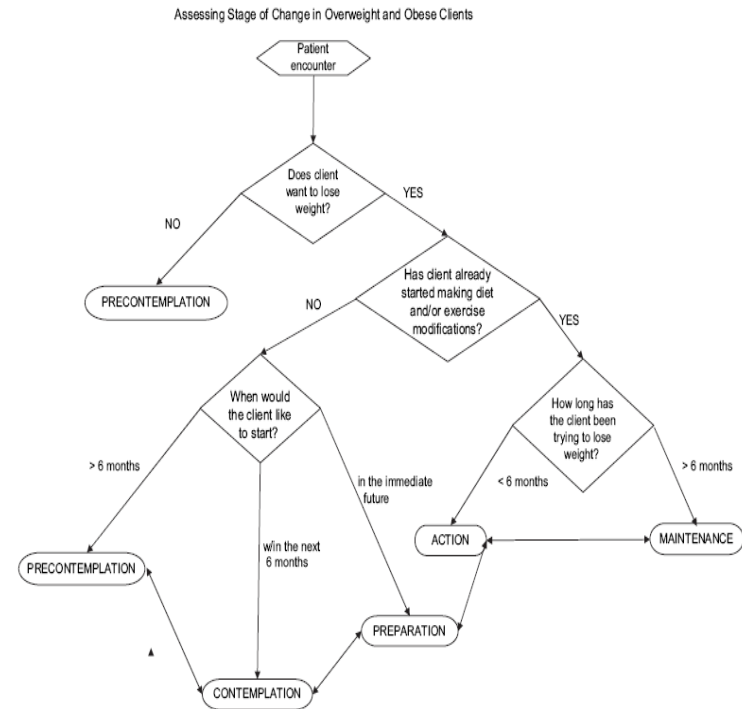


Figure 1: Transtheoretical Model (TM) (Seals, 2007).

The significance of the problems arising from obesity are clear if we review some of the alarming epidemiologic figures and reports from outcome studies done in various parts of the world. Epidemiologic trends show that approximately 300,000 premature deaths per year in the United States are attributed to obesity (Office of the Surgeon General, 2006). Obesity has been shown to decrease life expectancy by 7 years at the age of 40 in USA (Haslam, 2005). In Malaysia, the national Health and Morbidity Survey (1996) reported that in adult populations aged between 26 and 64, 14% were obese, with males 15.1% overweight and 2.9% obese, and females 17.9 % overweight and 5.7% obese. However, the same survey carried out 10 years later, in 2006, found a dramatic rise to 20% (MoH, 2007). It was also reported that there was little difference between rural and urban populations.

National Institutes of Health [NIH] (2002) notes that obesity and overweight are associated with the development of numerous adverse health outcomes, including complications in pregnancy, menstrual irregularities, hirsutism, stress incontinence, increased surgical risk, gallbladder disease, respiratory problems and non-alcoholic steatohepatitis. Moran (2002) also substantiates that obesity and overweight are additionally associated with infertility and reproductive hormone abnormality in women.

Furthermore, overweight and obese persons may suffer from negative psychosocial outcomes, for instance, anxiety, depression, decreased self-esteem, social stigmatisation and discrimination (Blackwell, 2002; NIH, 2002).

The obesity epidemic has in fact increased direct and indirect healthcare costs for employees, government agencies, and consumers (Kottke *et al.*, 2003). The co-morbidities of obesity produce financial costs to the health economy of many developed countries. Similar demands in Malaysia will impose a huge burden on the human and economic resources and are liable to disrupt priorities in the healthcare and other sectors (Ismail, 2002).

### **Concepts and Definitions**

Obesity is a complex, multi-factorial condition characterised by excess body fat. Generally, men with >25% body fat and women with > 35% body fat are considered obese (Malaysian Clinical Practice Guideline [MCPG], 2004). Berry (2004) views that obesity is caused by an interaction between predisposing genetic and metabolic factors coupled with a changing environment.

Basically, obesity can be categorised into two types, i.e. generalised obesity and central obesity. Generalised obesity denotes increased weight in relation to an individual height. Central obesity refers to excess adipose tissue residing primarily in the upper body within the abdominal region, whereas lower body obesity or gynecoid obesity, refers to excess adipose

tissue that resides mainly in the buttocks and thighs. In medical and health assessment, the yardstick for measuring generalised obesity is basic mass index (BMI), and for central obesity, the use of waist circumference (WC) as essential parameter (Appel *et al.*, 2004).

There are several methods for the precise measurement of amount and localisation of fat and lean mass, including skinfold thickness, underwater weighing, dual energy x-ray absorptiometry, magnetic resonance imaging and infrared spectroscopy (WHO, 1997). However, few important clinical measurement tools remain the cornerstone in determining the overweight and obesity threshold. It is still contentious as to which method is more superior to others, and it warrants further debate.

Although BMI does not distinguish between lean and fat mass, it is basically a useful clinical tool that correlates reasonably well with adiposity, describing the relative weight for height, and is significantly correlated with total body fat content (Blackwell, 2002; Moran, 2002).

Blackwell (2002) suggested that BMI should be used as the gold standard in classifying body weight and to monitor changes in body weight. Basically, BMI is calculated as weight (kg)/height (m<sup>2</sup>). According to him, BMI of 25 to 29.9 kg/m<sup>2</sup> is considered overweight, whereas obesity is a BMI equal to or greater than 30 kg/m<sup>2</sup>. However, WHO (1998) classification has stated cut-off points of overweight and obesity as 25 and 30 kg/m<sup>2</sup> respectively.

It has become increasingly clear that there is a high prevalence of Type 2 Diabetes Mellitus (T2DM) and cardiovascular risk factors in parts of Asia below those cut-off points (Malaysian Clinical Practice Guidelines [MCPG], 2004). For instance, evidence from Singapore shows that the risk of co-morbidities begin to rise at lower BMI values, and many Asian populations have a higher body fat percent at similar BMI compared with European populations (Deurenberg, 2000, 2001). Hence, in a recent WHO Consultation Report (2004), no attempt

was made to redefine BMI cut-off points for the Asian population. In the Malaysian context, based on current evidence in adults, overweight is defined as BMI  $\geq 23$  kg/m<sup>2</sup> and obesity as BMI  $>27.5$  kg/m<sup>2</sup> (MCPG, 2004).

WC is a simpler, reliable measure and correlates well with abdominal fat content irrespective of the BMI (MCPG, 2004). Dobbelsteyn (2001) reinforced that WC may be a more accurate determinant of health risk.

WHO (1998)'s recommendation suggests that the WC of 94 cm and 80 cm is associated with an increased risk in men and women respectively. However, it has become increasingly clear that there is a high prevalence of T2DM and cardiovascular risk factors in parts of Asia below those cut-off points. Thus, based on current evidence, the WC Of  $\geq 90$  cm in men and WC of  $\geq 80$  cm for women are associated with an increased risk of co-morbidities (MCPG, 2004).

Waist-Hip ratio (WHR) is another simple measurement tool that has been used epidemiologically but does not provide additional information compared to WC. The values that are associated with increased abdominal fat and increased risk of hypertension, diabetes and ischaemic heart disease are WHR  $> 0.9$  for men, and WHR  $> 0.8$  for women (MCPG, 2004). However, waist circumference is the preferred measure of abdominal obesity compared to WHR (WHO, 1997).

### **Contributing Factors**

Many risk factors are identified that contribute to the development of obesity. The most important factor leading to development of central obesity is a lifestyle in which caloric intake exceeds physical activity, leading to both generalised and central obesity (Marti *et al.*, 2002). Although heavy smokers may have a normal BMI, they may also have larger WC than do non-smokers, placing them at additional risk for metabolic syndrome (den Tonkelaar *et al.*, 1990).

A positive family history for either T2DM or cardiovascular disease coupled with central obesity significantly increases the risk of developing metabolic syndrome (Dwyer, 1998). Stress is another contributing factor; it was believed that stressed patients tend to lose control of their eating patterns and remain sedentary, thinking of their problem emotionally (Wing, 1992). Few studies conducted (for instances, Appel *et al.*, 2002; Benjamin-Garner *et al.*, 2002) have revealed the links between environmental factors and obesity. This particularly refers to low socio-economic status (SES), low educational backgrounds and lack of insurance or poor access to healthcare – risk factors for developing central obesity and the metabolic syndrome because these groups of people tend to consume a diet which is higher in fat and calories, and exercise less than other groups. Carter-Edwards *et al.* (2004) point out that persons without access to preventive healthcare may not be aware of their risk for the development of hypertension, T2DM, or cardiovascular disease.

### **Roles of the Primary Care Providers**

Patients should be assessed on the degree of obesity and distribution of body fat, pattern of hair growth, uneven skin coloration, nutritional status, exercise history, and any signs and symptoms of secondary cause of obesity, such as hypothyroidism and Cushing's syndrome (Appel *et al.*, 2004).

A comprehensive medical evaluation is indicated that includes patient's eating habits, physical habitual activities, family history of obesity and obesity-related diseases, and patient's self-image, mental health, and eating disorder (MCPG, 2004). On top of that, assessment and identification of underlying etiologies of obesity, especially the social and behavioural aspects, are of utmost importance (MCPG, 2004).

Primary-care providers should make their stand clear that both BMI and WC measures should be taken on all adult clients in their initial assessment (MCPG, 2004).

The National Institutes of Health [NIH] (1998) recommends a multifaceted approach to treating obesity. NIH (1998) further stresses the importance of long-term diet and changed eating habits, long-term effective physical activity programmes, behaviour modification, social support, smoking cessation and reduction in alcohol consumption, avoiding short-term weight loss, avoidance of aggressive surgical approaches, adaptation of weight loss programme to meet individual needs, plus long-term observation, monitoring, and encouraging of patients who have successfully lost weight.

Treatment and management includes reducing excess body weight and instituting other measures to control accompanying risk factors (National Heart, Lung and Blood Institute, 2000).

The general goals of weight loss are 1) at a minimum, prevent further weight gain, 2) reduce body weight, and 3) maintain a lower body weight over the long term (National Heart, Lung and Blood Institute, 2000).

The general goals for obesity therapy are to achieve weight loss, maintain lower body weight, prevent further weight gain and treat co-morbidities or underlying causes (MCPG, 2004).

### **Weight Loss, Diet and Exercise**

Weight loss has advantages in reducing cardiovascular risk factors and other obesity-associated diseases (Scottish Intercollegiate Guidelines Network, 1996; WHO, 1997). Undeniably, a small weight loss is sufficient to restore reproductive health in infertile obese women (Moran & Norman, 2002). Goldstein (1992) reiterates that a weight loss of 10% can improve metabolic variables.

All obese clients should be encouraged to participate in a diet and exercise programme that will facilitate weight loss (MCPG, 2004). Short-term energy restriction results in rapid weight

loss and improved reproductive and metabolic health; more than 90% of people who lose weight eventually regain their original weight (Flegal *et al.*, 1998). Therefore dietary treatment of obesity aims for gradual weight loss (1-2 lbs/week) through reduced caloric consumption and increased physical activity, with overall aim of energy expenditure exceeding energy intake (Moran & Norman, 2002).

Moran & Norman (2002) suggest tailoring an intervention to a person's individual weight. Current dietary and exercise patterns increase the chance for sustained weight loss. A low calorie diet, low-fat diet, and very low calorie diet (VLCD) is recommended to achieve weight loss through a decrease in calories consumed and increase in energy expended (MCPG, 2004). An energy deficit of 500-600kcal/day is generally well tolerated and sustainable over an extended period of time (WHO, 1997). However, National Heart, Lung and Blood Institute (2000) suggest a decrease of 300 to 1000kcal/day is appropriate depending on individual metabolic status.

Diets based on healthful eating principles have a better long-term outcomes, which is important because weight loss maintenance requires that changes in eating habits be sustained for life (Moran & Norman, 2002). The weight maintenance program should consist of dietary therapy, physical activity, and behavioural therapy (National Heart, Lung and Blood Institute, 2000).

Diet therapy is the cornerstone of any weight programme and should be individually planned (National Heart, Lung and Blood Institute, 2000). Whereas physical activity contributes weight loss by altering energy balance, changes body composition, decreases risk of disease, and improves quality of life (NIH, 1998).

Thirty minutes of regular moderate intensity physical activity, preferably all days of the week, can limit health risk diseases including coronary heart disease and diabetes. However,

preventing weight regain for formally obese individuals requires 60-90 minutes per day of moderately intensive activity or lesser amounts of vigorous activity (MCPG, 2004).

According to Clinical Practice Guideline Washington (2000), weight loss is recommended to lower blood pressure in overweight and obese persons with high blood pressure, elevated levels of total cholesterol, LDL-cholesterol, and triglycerides, to raise low levels of HDL-cholesterol in overweight and obese persons with dyslipidaemia, and elevated blood glucose levels in overweight and obese persons with T2DM. Skender *et al.* (1996) recommends the combination of reduced calorie diet and increased physical activity since it produces weight loss that may also result in decreases in abdominal fat and increases in cardio-respiratory fitness.

Weight loss drugs may be used as part of a comprehensive weight loss programme, but should not be used without concomitant lifestyle modification. Weight loss surgery is an option for carefully selected patients with clinically severe obesity when less invasive methods of weight loss have failed and the patient is at high risk for obesity-associated morbidity or mortality.

A greater frequency and duration of contacts between the patient and the practitioner should be utilised whenever possible in order to lead to more successful weight loss and weight maintenance. Eventually, the needs of special patient groups must be addressed when considering treatment options for overweight and obesity.

### **Lifestyle and Behaviour Changes**

Cognitive behaviour therapy and reduction of psychosocial stressors can aid in both weight loss and maintenance (Skender *et al.*, 1996; Wing, 1992). Attempting weight loss in a group environment provides psychological support (Galletly *et al.*, 1996).

Lifestyle modification programs are non-invasive, less costly than pharmacologic treatments, and frequently successful in achieving reproductive improvements (Moran & Norman, 2002). Frequency of treatment contacts and longer weight loss maintenance are major determinants of successful weight control (MCPG, 2004).

Key also is to provide supportive environments by education of lifestyle modification, reviewing food and activity, monitoring exercise regimes, monitoring diet structure, and use of portion-controlled foods. If a long-term approach is taken, a successful outcome is more likely (MCPG, 2004).

Behaviour therapy is a useful adjunct when incorporated into the treatment for weight loss and weight maintenance. The goal of behaviour therapy is to alter the eating habits of an obese patient. Weight loss is more likely to be achieved and maintained by behaviour modification techniques that focus on lifestyle and attitude (Wadden & Stunkard, 1993).

Wadden & Stunkard (1993) affirm the use of behaviour therapy which includes counselling to enable patients to evaluate and modify eating practices, habits of physical activity and emotional responses to weight, and self-monitoring to identify and avoid environmental cues associated with unhealthful eating and sedentary lifestyle. They also advocate contingency management, including the use of rewards for positive lifestyle change; stress management, and cognitive-behavioural strategies to change a patient's attitudes and beliefs about unrealistic expectations and body image. They believe that weight loss support groups are useful to reduce uncertainty about self-worth and to sustain weight loss behaviour.

### **Strategies for change**

Care for overweight and obese clients requires a multifaceted approach. The primary care provider can help clients lose weight by providing strategies for reducing calorie intake, maintaining a healthy, balanced diet, exercise more and develop positive behavioural and

attitudinal changes. If care practitioners have suggested a weight reduction programme, this programme needs to be individualised (AWHONN Lifelines, 2004). Clients should be periodically assessed for changes in behaviour, eating patterns and achievement of long-term goals. Success and maintenance in this type of programme requires a lifelong commitment to behavioural and attitudinal changes. The care practitioner should be caring, committed, and able to work and cooperate with other multidisciplinary teams, as well as willing to take the challenge to counsel clients in difficult times throughout the change process.

Seals (2007) in her recent article recommended the use of the transtheoretical model (TM) (see Figure 1) for the initial assessment of a client's readiness to lose weight. As she argued, we can have excellent protocols and guidelines on the medical component of weight management. But the psychosocial aspects that are imperative for successful weight loss is neglected, and ultimately clients are demoralised and lose track of the weight reduction programme. This model can be utilised by primary care providers in assessing the client's stage of readiness (see Figure 2) and in determining which technique or intervention would be most appropriate and effective in promoting dietary changes and exercise.

Seals (2007) wants care practitioners to implement interventions that meet the needs of each client, matching the stage of change. As the stages are dynamic, practitioners should conduct an ongoing evaluation to see what stage the client is in and modify previously unsuccessful intervention to decrease the likelihood of relapse and failure.

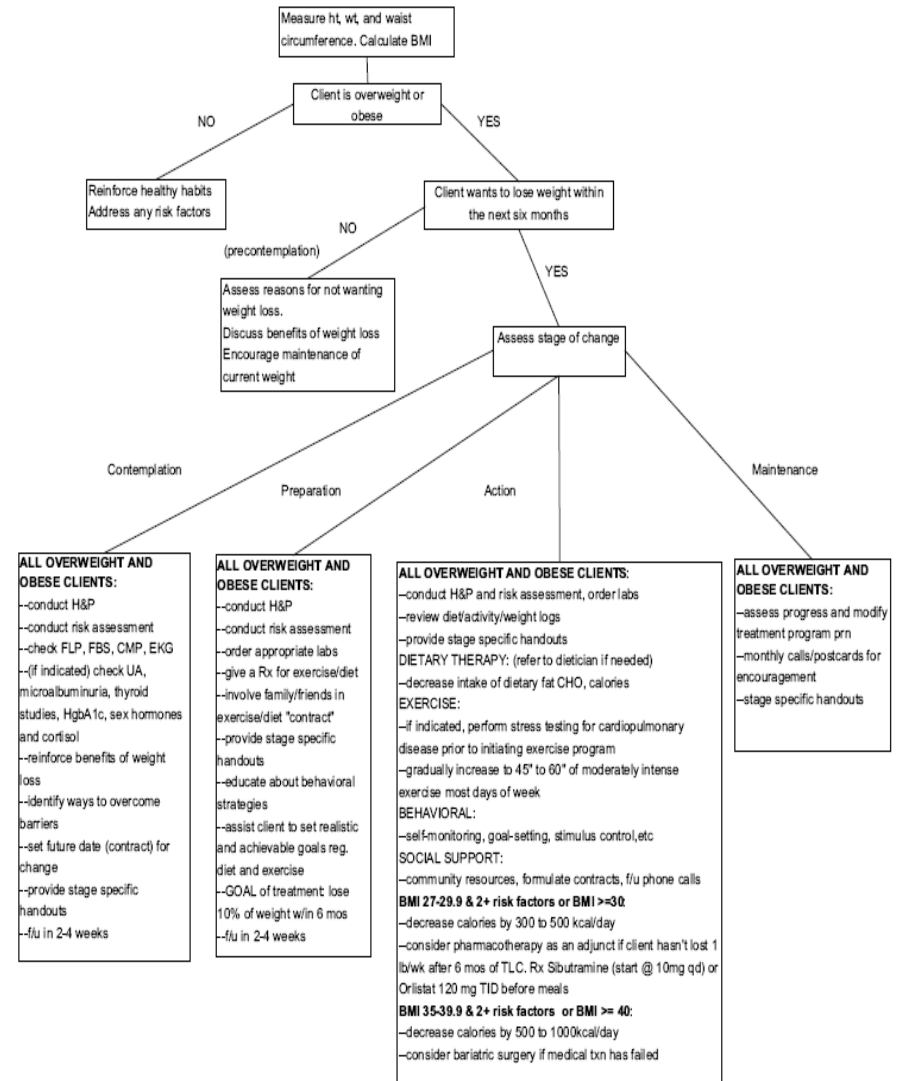


Figure 2. Protocol for managing overweight and obesity in adults (Seals, 2007).

### **Implications for Primary Care Providers' role**

It is essential for primary care providers to remember that they will be the frontliners and the first to see clients at risk for and with the metabolic syndrome. Hence, early interventions related to diet and lifestyles are needed to stop complications and co-morbidities from the epidemic of obesity.

BMI and WC should be taken on all adult clients. Particular attention should be given to clients with central obesity because it has greater risks than generalised obesity (Appel *et al.*, 2004). However, primary care practitioners should also utilise other measurement parameters such as glycemic index, lipid profile and blood pressure to detect for components of metabolic syndrome. Even though it is not feasible to measure either plasma or insulin levels in primary-care facilities, measurements of WC, BMI, blood pressure and fasting glucose as well as a lookout for presence of acanthosis nigrican (AN) are adequate for screening of metabolic syndrome. AN is an important clinical indicator of hyperinsulinemia or Insulin resistance. If these measures are taken into consideration, it is envisaged that primary healthcare providers will be able to formulate an accurate client risk profile that will guide the management of obesity more effectively in their clinical settings.

### **Challenges for primary care providers**

Lifestyle plays a substantial role in the development of overweight and obesity. As our society becomes more and more sedentary, primary care providers and public health practitioners should fervently work towards solutions to the epidemics of lifestyle diseases that we are facing in this new millennium.

### **Conclusion**

Overweight and obesity are complex and chronic conditions that need life-long management. The management is difficult and requires ongoing, long-term multidisciplinary support. However, it is important to stay focused on long-term goals. Behaviour change takes time and

the entire family or support network should be included to improve outcomes. The primary healthcare providers play key roles in the prevention, promotion, assessment and support to prevent morbidity and mortality. Education and reinforcement with family and support group networks can assist in maintaining lifestyle changes which result in successful outcomes. The change in patients can be made possible through a translation of evidence-based care standards into practice.

Weight and diet management, coupled with lifestyle and behaviour modification, remain the mainstay of obesity therapy. The role of primary healthcare providers in primary care facilities underlines the importance of health education towards achieving self-awareness and empowerment of the community at large. The concept focus on preventive, promotional and rehabilitative approaches with the aim to educate the public about the wellness paradigm seems to take its root in the Malaysian healthcare system, which is intensely expanding its primary healthcare services throughout 200 primary care facilities in the nation (MoH, 2006).

We feel that every individual should be responsible for their own health. The issue of secondary health risks from obesity can at least be put on hold if these target groups are made aware of the importance of their own health. On the other hand, primary care practitioners must remain non-judgmental and assess the client's readiness to change at each visit to the care setting. Once the client has decided to lose weight, realistic goals should be instituted and agreed upon. With the adequate support system, appropriate interventions for the client's stage of change, a systematic multidisciplinary team, and a constant monitoring and motivation process, we foresee that these overweight and obese clients can have excellent chances of successful weight reduction.

## References

- Appel, S. J. *et al.* (2004). Central Obesity and the Metabolic Syndrome: Implications for Primary Care Providers. *Journal of the American Academy of Nurse Practitioners*, 16 (8), 335-342.
- AWHONN Lifelines (2004). Combating obesity: the health care providers' roles, 8(4) Sage, August/September, 322-325
- Benjamin-Garner, R. *et al.* (2002). Sociodemographic differences in exposure to health Information. *Ethnicity and Disease*, 12(1), 124-134.
- Blackwell, J. (2002). Identification, Evaluation, and Treatment of Overweight and Obese Adults. *Journal of the American Academy of Nurse Practitioners*, 14(4), 196-198.
- Bray, G. A. (1996). Health hazards of obesity. *Endocrinol. Metab. Clin. North. Am.*, 25(4), 907-919.
- Carter-Edwards, L. *et al.* (2004). They care but don't understand: Family support of African American women with type 2 diabetes. *The Diabetes Educator*, 30, 493-501.
- den Tonkelaar, I. *et al.* (1990). Waist-to-hip ratio in Dutch women and its relationship with self-reported diabetes mellitus, hypertension, and cholecystectomy. *Nederlands Tijdschrift Voor Geneeskunde*, 134(39), 1900-1902.
- Deurenberg, P. (2001). Universal cut-off BMI points for obesity are not appropriate. *British Journal of Nutrition*, 85, 135-136.
- Deurenberg-Yap, M., Schmidt, G., Staveren, W. A. & Deurenberg, P. (2000). The paradox of low body mass index and high body fat percent among Chinese, Malays and Indians in Singapore. *International Journal of Obesity*, 24, 1011-1017.
- Dwyer, J. T., Stone, E. J., Yang, M., Feldman, H., Webber, L. S. & Must, A. (1998) Predictors of overweight and overfatness in a multiethnic pediatric population: Child and Adolescent Trial for Cardiovascular Health Collaborative Research Group. *American Journal of Clinical Nutrition*, 67(4), 602-610.
- Flegal, K. M. *et al.* (1998). Overweight and obesity in the United States: prevalence and trends, 1960-1994. *International Journal of Obesity Related Metabolic Disorder*, 22, 39-47.
- Galletly, C. *et al.* (1996). Improved pregnancy rates for obese, infertile women following a group treatment program: an open pilot study. *General Hospital Psychiatry*, 18, 192-195.
- Goldstein, D. J. (1992). Beneficial health effects of modest weight loss. *International Journal of Obesity Related Metabolic Disorder*, 16, 397-415.
- Haslam, D. W. & James, W. P. T. (2005). Obesity. *Lancet*, 366, 1197-1206.
- Health and Morbidity Survey (1996). *Health and morbidity survey report*, Kuala Lumpur, Ministry of Health Malaysia.
- Ismail, M.N. (2002). The Nutrition and Health Transition in Malaysia. *Public Health Nutrition*, 5(1A), 191-195.
- James, W.P., Chunming, C. & Inoue, S. (2002). Appropriate Asian body mass indices? *Obesity Reviews*, 3(3), 139.
- Low, A. K. *et al.* (2006). A clinician's approach to medical management of obesity. *American Journal of the Medical Sciences*, 331(4), 175-182.
- Malaysian Clinical Practice Guideline [MCPG] (2004). *Clinical practice guideline: management of obesity*, Kuala Lumpur, Ministry of Health.
- Marti, A. *et al.* (2002). TRP64ARG polymorphism of the beta 3-adrenergic receptor gene and obesity risk: Effect modification by a sedentary lifestyle. *Diabetes Obesity and Metabolism*, 4, 428-430.
- Ministry of Health [MoH] (2007). More man with HBP, women with diabetes. *theSun*, 12 September, pg. 7.
- Ministry of Health [MoH] (2006). *Health facts*, Kuala Lumpur, Ministry of Health.
- Moran, L. J. & Norman, R.J. (2002). The Obese Patient with Infertility: A Practical Approach to Diagnosis and Treatment. *Nutritional Clinical Care*, 5(6), 290-297.
- National Heart, Lung, and Blood Institute (2000). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: Executive summary. Washington, <http://www.nhlbi.nih.gov/guideline/s/obesity/obexsum.pdf> [accessed 12 September 2008].
- National Institutes of Health [NIH] (1998). *Clinical Guidelines on the Identification, Evaluation, And Treatment of Overweight and Obesity in Adults -The Evidence Report*. Bethesda: National Institutes of Health, September, 1998. Report No.: 98-4083.
- National Institutes of Health: National Heart, Lung, and Blood Institute (2002). *The practical guide: Identification, evaluation, and treatment of overweight and obesity in adults*, Washington, DC: U.S. Government Printing Office.
- Office of the Surgeon General (2006). Overweight and obesity: The Surgeon General's call to action to prevent and decrease overweight and obesity, <http://www.surgeongeneral.gov/topics/obesity> [Accessed 12 September, 2008].
- Seals, J. G. (2007). Integrating the transtheoretical model into the management of overweight and obese adults. *Journal of the American Academy of Nurse Practitioners*, 19, 63-71.
- Scottish Intercollegiate Guidelines Network (1996). The benefits of weight loss. In: Network SIG, editor. *Obesity in Scotland: Integrating Prevention with Weight Management*, Edinburgh: Scottish Intercollegiate Guidelines Network, p. 12-15.
- Skender M. L. *et al.* (1996). Comparison of 2-year weight loss trends in behavioral treatments of obesity: diet, exercise, and combination interventions. *Journal of American Diet Association*, 96, 342-346.
- Wadden, T. A. (1993). Treatment of obesity by moderate and severe caloric restriction: results of clinical research trials. *Annual International Medicine*, 119, 688-693.
- Wadden, T. A. & Stunkard, A. J. (1993). Psychosocial consequences of obesity and dieting-research and clinical findings. In: A. J. Stunkard & T. A. Wadden, editors. *Obesity Theory and Therapy*, New York: Raven Press, 163-177.
- WHO (1997). *Obesity: Preventing and managing the global epidemic. Report on a WHO Consultation on Obesity*, Geneva: World Health Organization.
- WHO (1998). *Obesity: Preventing and managing the global epidemic. Report on a WHO Consultation on Obesity*, Geneva, 3-5 June 1997, Geneva: World Health Organization.
- WHO expert consultation (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies, *Lancet*, 363, 157-163.
- Wing, R. R. (1992). Behavioral treatment of severe obesity. *American Journal of Clinical Nutrition*, 55(2):545S-551S.