



What Has Been Done to Tackle Overweight and Obesity in Malaysia?: A Literature Review (2005 – 2015)

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Abstract – As reported by the World Health Organisation (2014), Malaysia is the fattest country among the Southeast Asia. Among others, obesity is a leading contributor of non-communicable diseases (e.g., type II diabetes, metabolic syndrome, and cancer). This article aims to review the exiting weight management programmes targeting overweight and obesity in Malaysia from 2005 to 2015. The findings from this review could be useful for future intervention efforts in an attempt to address such issues in Malaysia.

Keywords: overweight, obesity, abdominal obesity, intervention programme, Malaysia

Introduction

Body mass index (BMI) has been used widely and globally to classify a person's nutritional status. Based on the World Health Organization, a person is classified as overweight if his or her BMI is 25.00 – 29.99kg/m², while BMI 30.00kg/m² is considered as obese. Higher BMI is associated with higher risk for co-morbidities [World Health Organization (WHO), 1998]. A waist circumference index of equal or more than 94 cm and 80 cm for male and female, respectively, is associated with an increased risk for abdominal obesity (WHO, 1998). Overweight or obese may lead to self-stigmatization. In a focus group study, individuals with obesity perceived themselves as ugly, shameful with their own body size, irritated as overweight, less effective in working performance (Chang, Chang, Cheah, 2009).

Socio-demographic Correlates of Overweight and Obesity

Risk factors for overweight include ethnicity, age, household, and educational status, while risk factors for obesity include ethnicity, age, household income, history of miscarriage within the last six months, family medical history, smoking status. As far as gender difference is concerned, women had higher prevalence of obesity than men did, while men had higher prevalence of overweight than women did. (Azmi et al., 2009; Dunn, Tan, Nayga, 2012; Jan Mohamed et al., 2015; Mustafa, Salleh, Isa, & Ghazi, 2013; Narayan & Khan, 2007; Rajakumar, Ann, Gill, Xin, & Kalasalingam, 2012; Rampal et al., 2007; Sidik & Rampal, 2009; Tan et al., 2011a). Female Malay students had higher fat percentage as compared to female Chinese students (Khan, 2008). Pon et al. (2006) reported that overweight or obese was mostly premenopausal women. With respect to ethnicity, in one study involving 4,428 adults recruited from Western to Eastern Malaysia, it was reported that prevalence of obesity was highest for Indian, followed by Malay and Chinese (Mohamud et al., 2011). The studies found that the risk factors

of abdominal obesity among Malaysian adults were Indian, women, 50 -59 years old, housewives, primary education and ever married (Kee et al., 2008; Mohamud et al., 2012; Tan et al., 2011b).

Psychological and Genetic Correlates of Overweight and Obesity

Body weight perception, perceived health status, and weight-control goals were correlated to BMI in 367 adults (academic and no-academic staffs) from one Malaysian public university (Cheong, Kandiah, Chinna, Chan, & Saad, 2010). Others psychological factors such as depression and anxiety were associated with obesity. They are significant predictors of suicidality [Institute for Public Health (IPH), 2015; Barry & Petry, 2009; Sherina, Arroll, & Goodyear-Smith, 2012; Sidik, Arroll, & Goodyear-Smith, 2012; Tin, Sidik, Rampal, & Ibrahim, 2015).

Genetic is one of the non-modifiable factors of overweight or obesity. The genotype ADIPOQ rs17366568 was significantly associated with obesity among Malaysian Malays before Bonferroni correction, this association was not significant after the Bonferroni adjustment. It appears that obese Malay had higher frequencies of AA and AG genotypes (and A alleles) than non-obese Malay (Apalamsy et al., 2014). In a study conducted at Kampar Health Clinic, patients with leptin receptor gene (LEPR) K109 and Q223 allele had higher adiposity indices and systolic blood pressure after controlling for ethnicity (Fan & Say, 2014).

Biopsychological Outcomes of Overweight and Obesity

Overweight, obesity, and abdominal obesity can lead to diabetes, cardiovascular disease, coronary heart disease, cancers, hypertension, and premature deaths (Ahmed & Siwar, 2014; Al Sadat et al., 2013; Amiri et al., 2014; Zaki, Robaayah, Chan, Vadivale, & Lim, 2010). As compared to non-obese Chinese adults, obese Chinese adults had higher mean of blood pressure (BP), fasting plasma glucose (FPG) levels and triglyceride (TG), but lower high-density lipoprotein cholesterol (HDL-C) (Chew et al., 2014). It also reported that obese Malaysians, recruited from Kampar Health Clinic, had significantly lower plasma total antioxidant capacity (TAC) than their non-obese counterparts. Body weight, BMI, WC, hip circumference (HC), total body fat (TBF), percentage of subcutaneous fat, and visceral fat were negatively correlated with TAC and serum osteocalcin (Lim, Fan, & Say, 2012; Chin et al., 2014). The status of being overweight or obesity was predictive of metabolic syndrome (MetS) among adults and elderly aged more than 60 years old in Malaysia (Johari & Shahar, 2014; Mohamud et al., 2012). Malay, Indian, higher education level and household income, stayed in urban and married were those predictors of adiposity among Malaysian elderly (60 years old and above) (Suzana et al., 2012).

In a study conducted at two primary care clinics in Negeri Sembilan, overweight and obese pre-diabetes patients reported poor health-related quality of life (HRQOL) especially on physical health domain (Ibrahim, Moy, Awalludin, Ali, & Ismail, 2014).

Adiponectin level—a protective factor for breast cancer—was negatively correlated with WC, BMI, and fasting blood glucose (FBG). In particular, in a case-control study conducted in Klang Valley, there were three times risk increased to have breast cancer among abdominal obesity women (Shahar, Salleh, Ghazali, Koon, & Mohamud, 2010).

Methods

An intensive literature review of articles published between 2005 until February 2015 was performed. These articles were obtained from PubMed, EMBASE and MEDLINE with keyword searches like obesity”, “overweight” and in the context of “Malaysia”, “Malaya”, “Malay”, “Sabah”, “Sarawak”, “North Borneo”, “human”, “normal human”, and “human cell”. Only articles published in English language were reviewed. Literature review only included topics like obesity and/or overweight intervention programme targeting Malaysian adults (18 years old and above). Posters and review articles were excluded.

Results

Obesity/ Overweight Programme

There were limited articles targeting overweight or obesity intervention programmes especially with a design of randomized controlled trials in Malaysia. This review included eight articles (Ismail et al., 2015; Karim et al., 2013; Khairulnizam & Nurliyana, 2013; Md Lazim, Jalil, & Zakaria, 2012; Moy, Sallam & Wong, 2006; Ramli, Henry, Liang, & Beh, 2013; Soon, Saad, Taib, Rahman, & Mun, 2013; Suriani, Shamsuddin, Latif, & Saad, 2015). Sample characteristic and findings of these selected articles are presented in Table 1.

Most of the programmes were conducted in community setting and government (public) sectors.

Spirituality-based Programs

One hundred and forty overweight or obese Malay women ($BMI \geq 25\text{kg/m}^2$) from public sector offices in Putrajaya and Seremban were recruited into group A (a faith-based programme that promoting voluntary fasting besides the standard programme) and group B (a standard programme that promoting food intake control based on the national dietary guideline). Group A consisted of 56 subjects while group B consisted of 84 subjects. For group A, the frequency of weekly vegetables consumption ($p = .03$) and level of HDL-C ($p < .01$) increased significantly. Body mass index decreased significantly among group A ($p < .01$) but not between group ($p = .08$) (Ismail et al., 2015).

A month-long Ramadan fast based on the Malaysian Food Guideline (MFG) was conducted among 84 Malay Muslim women (at any age and $BMI \geq 25\text{kg/m}^2$) from two government offices in Seremban. After the programme, carbohydrate intake, BMI, HDL-C and LDL-C (all at $p < .001$), TG ($p = .005$), and fasting blood sugar, FBS ($p = .002$) were significantly reduced. However, the TC/HDL-C ratio was increased ($p < .001$) (Suriani, et al., 2015).

Dietary-based and Physical Activity Programs

Khairulnizam and Nurliyana (2015) conducted a comprehensive healthy lifestyle programme (nutrition and exercise) among 148 employees with $BMI \geq 25\text{kg/m}^2$ in the Pahang State Health Department Headquarters Malaysia. There were 36 subjects and 112 subjects recruited from the management and professional group, and support group respectively. Results found that body weight loss and changes in WC were significantly difference between management and professional and support group subjects ($p < 0.01$). Within six month of intervention, body weight reduction of 5% among support group was frequently involved in the exercise; while for management and professional group, their body weight reduction of 5% comprised the combination of frequent and non-frequent involvement in exercise.

A non-randomised interventional pilot study was conducted on 28 employees with $BMI \geq 25\text{kg/m}^2$ (18 and 60 years old) from a government sector at the Ministry of Higher Education in Putrajaya Malaysia. It was a six-month obesity health intervention programme that consisted of two weekly unsupervised physical activity sessions and a monthly dietary or health education session. Body fat percentage ($p = .010$), cardiovascular function capacity ($VO_{2\text{max}}$) ($p = .014$), sit and reach distance ($p = .005$) and partial curl up repetition ($p = .001$) showed significant differences. However, body weight ($p = .193$), self-perceived level of physical activity ($p = .145$) or behaviour toward exercise ($p = .393$) showed insignificant difference effects (Ramli, et al., 2013).

A controlled trial with twelve-week intervention programme (combined physical activity and dietary) was conducted on obesity and metabolic risk among 56 employees of Universiti Putra Malaysia aged between 25 to 55 years old. Each group (intervention and control) had 28 subjects equally. The study found that HC and FPG were significantly reduced in the intervention group as compared to the control group at p-value 0.007 and 0.02, respectively. There was no significant group effect observed for other variables like body weight, BMI, %BF, WC, waist-hip-ratio (WHR), systolic blood pressure (SBP), diastolic blood pressure (DBP), TG, total cholesterol (TC), HDL-C, low density lipoprotein-cholesterol (LDL-C), calorie intake, and daily step (Soon et al., 2013).

Diet, Physical Activity and Behavior Modification Oriented Programs

Karim et al. (2015) recruited 30 overweight and obese employees from public sector in Putrajaya for a six-month weight management programme. The programme included healthy diet and lifestyle, physical activity and behaviour modification. There were significantly reduction in terms of mean BMI (31.1 ± 3.8) and WC (85.0 ± 12.6 cm) among women. Women's mean percentage of body weight reduced significantly as compared to men. Findings showed that 71.4% of subjects lose their weight between 1.0kg to 12.2kg. There were two subjects achieved weight loss up to 5% of their initial body weight, 14% and 7% lost between 5 - 10% and more than 10% of their initial body weight, respectively.

Md Lazim et al. (2012) evaluated the effectiveness of behavioural lifestyle modification programme among 34 patients aged between 18 to 62 years old. This is the only study that conducted in Obesity Clinic, Universiti Sains Malaysia based on this review. The findings from these 12 weeks' diet and physical activity modification programme proved that it was effective to improve the activity of antioxidant enzyme where plasma glutathione peroxidase (GPx) activity and plasma hydroxynonenal (4-HNE) level increased significantly, the reduced glutathione (GSH)/oxidized glutathione (GSSG) blood ratio was reduced after the intervention. Plasma GPx activity were inversely associated with TG and VLDL-C.

Moy et al. (2006) conducted a pre-test-post-test quasi-experiment for a duration of two years among 186 Malay male security guards in Kuala Lumpur. Intervention group consisted of 102 subjects from a public university and to compare with 84 subjects from the same university's teaching hospital on the effectiveness of programme in reducing cholesterol and modify lifestyle practices. According to this study, worksite could be an effective setting for this type of intervention as the mean of cholesterol was reduced statistically significant in intervention group as compared to comparison group [-0.38(95% CI = -0.63, -0.14) mmol/l]. They even less smoking after that health programme.

Authors, year	Study population, location, duration	Study design & sampling method	Duration & type of intervention	Age (years)	Exclusion & inclusion criteria	Measures	Findings & conclusions
Ismail et al.,2015	140 Malay Muslim women employees from selected government sectors in Seremban and Putrajaya	Quasi-experimental study Randomised cluster sampling (subjects did not know which group they were allocated)	1 month and 3 months post-Ramadan Voluntary fasting	Group A: 36.65 ± 10.16 Group B: 39.84 ± 10.28	Inclusion Overweight/ obese (BMI: > 25kg/m ²) Exclusion Pregnant On medication (lowering cholesterol) On commercial replacement meal (lose weight) Medical condition (not able to on fasting)	Socio-demographic (baseline only) Age, parity, monthly income, marital status, education level, employment position Physical activity assessment (baseline only) International Physical Activity Questionnaire (IPAQ) Physical examinations Body weight, height, BMI, blood pressure Dietary practices Voluntary fasting practices, frequency of vegetable/ fruits consumption per week, amount of protein/ carbohydrates consumption per day Biochemical assessment	Only group A increased in voluntary fasting ($p < .01$), consumption of vegetable per week ($p = .03$), HDL-C levels ($p < .01$); decreased in the consumption of protein ($p < .01$)/ carbohydrates ($p = .05$) per day, mean diastolic pressure ($p = .02$) and TC:HDL-C ratio ($p < .01$). BMI significantly decreased in group A ($p < .01$) but not significant between group ($p = .08$). Faith-based intervention was proven to control weight gain during post-Ramadan.

						Fasting venous blood, HDL-C, TC, TC:HDL-C ratio	
						Outcome assessment Before Ramadan and after three months of Ramadan end.	
Karim et al., 2013	30 overweight and obese employees from government in Putrajaya, Malaysia	NA	NA	NA	NA	Anthropometric measurements Body weight, height, BMI, WC, %BF	Mean BMI (31.1 + 3.8) and WC (85.0 + 12.6 cm) of women were significantly reduced. Mean percentage of weight loss was significantly higher among women than men. Overall, 71.4% of the adults achieved weight loss, ranging from 1.0 kg to 12.2 kg.
Khairulnizam, & Nurliyana, 2013	148 employees in the Pahang State Health Department Headquarters Malaysia with BMI $\geq 25 \text{ kg/m}^2$ Management and professional	NA	NA	NA	NA	Anthropometric measurements Body weight, height, BMI, WC	There is a significant association between body weight loss and WC changes among obese and overweight in management and professional and support group subjects ($p < .01$).

							l group: 36; support group: 112
Md Lazim, et al, 2012	34 patient adults from Obesity Clinic, Hospital Universiti Sains Malaysia	Voluntarily participation	12 weeks Behavioural lifestyle modification programme (diet and exercise)	18 - 62	Inclusion Obese (BMI: >30kg/m ²) Exclusion Pregnant/ intent to get pregnant On formal weight loss programme/ clinical trial in the past three months Medical condition in past 6 months (uncontrolled hypertension, diabetes, serious illnesses)	Socio-demographic (baseline only) Age, gender, marital status, education level, employment status Biochemical assessment fasting blood: oxidative stress levels/ activities [reduced glutathione (GSH)/ oxidized glutathione (GSSG) blood ratio, plasma glutathione peroxidase (GPx), plasma hydroxynonenal (HNE), Serum superoxide dismutase (SOD), Plasma catalase (CAT)], lipid and lipoprotein (TG, TC, VLDL-C, LDL-C, HDL-C) Outcome assessment Baseline (0 week) and after programme end (week 13).	Plasma GPx activity and 4-HNE level increased significantly, the GSH/ GSSG ratio was reduced after intervention. CAT and SOD were increased, but not significant. Plasma GPx activity were inversely associated with TG and VLDL-C. This programme improved the activity of antioxidant enzyme effectively.
Moy, et al., 2006	102 Malay male security guards from public university,	Pre-test-post-test quasi-experimental	2 years of follow-up Intervention individual	Intervention group: 45.6 ± 7.2	Exclusion Female, non-Malay	Socio-demographic (baseline only) Age, marital status, education level, year of service	Mean of total cholesterol reduced statistically significant in intervention group as compared to comparison group [-0.38(95% CI = -0.63, -0.14) mmol/l]

			Kuala Lumpur (intervention) and 84 from the same university's teaching hospital (comparison group)	& group counselling (diet, physical activity, quite smoking)	Comparison on group: 48.0 ± 4.7		Medical history Lifestyle behaviours dietary practices, physical activity, smoking Physical measurements body weight, height, BMI, HC, WC, blood pressure (SBP, DBP) Biochemical assessment Fasting blood glucose (FBG), full lipid profiles (TC, HDL, LDL, TG) Outcome assessment: Baseline, six months' intervals in two years	Intervention group reduced smoking after the programme. Health promotion can be effective in worksite setting.
Ramli, et al., 2013	28 employees, public sector office at the Ministry of Higher Education, Putrajaya	Non-randomized intervention study (pilot)	6 months	Obesity health programme (two weekly sessions of unsupervised exercise, dietary/health education sessions in monthly basis)	18 - 60	Inclusion Overweight/obese (BMI: ≥25kg/m ²) Age: 18 - 60 Gender: both Exclusion Pregnant/Lactating Chronic medical illnesses/Orthopaedic	Socio-demographic (baseline only) Gender, age, body weight, height, BMI, percentage of body fat (% BF) Physical examinations body weight, % BF (Tanita TBF-300 A, Japan, 2011), gross maximum oxygen uptake, VO _{2max} (cardiovascular function capacity), one-minute partial curl ups (abdominal endurance), one minute of push ups	There is significant differences in % BF ($p = .010$), VO _{2max} ($p = .014$), partial curl up repetition ($p = .001$) and sit and reach distance ($p = .005$). Effect was not significant on body weight ($p = .193$), physical activity's self-perceived level ($p = .145$) and behaviour toward exercise ($p = .393$). This programme improved % BF and physical fitness, but

					problems/ uncontrolled hypertension	(upper body musculature endurance), sit and reach test (lower back and hamstring flexibility), International Physical Activity Questionnaires (IPAQ) and Exercise Benefits and Barrier Scale [(EBBS) self-perceptions and behaviours on physical activity].	not the physical activity self- perception's level.
					Currently with health, slimming or fitness programmes.		
						Outcome assessment: Week one and the end of six months.	
Soon, et al., 2013	56 employees, institutions in Universiti Putra Malaysia	Controlled intervention trial	12 weeks No follow- up Combination of physical activity and dietary intervention on obesity and metabolic parameters	25 - 55	Inclusion Abdominal obesity (waist circumference: men \geq 90cm; women \geq 80cm) Gender: both Physically inactive (exercise \leq 30min/ week, once a week) Voluntary with informed consent	Socio-demographic (baseline only) Age, contact number, ethnicity, monthly income, marital status, education level Physical examinations (take two readings and average) body weight, height, BMI, WC, HC, WHR, % BF, BP Biochemical assessment TG, TC, HDL-C, LDL-C, FPG Physical activity assessment	No significant group effect, except for increment of HC (p = .007) and reduction of FPG (p = .02) among intervention as compared to control. This programme was not effective in physical activity and diet improvement but effective to improve FPG among those with abdominal obesity.

					<p>Pregnant</p> <p>On medication, which may affect body weight, glucose level, lipid and profile of lipoprotein, blood pressure</p> <p>Medical history (hyperthyroidism, cardiovascular disease, cancer)</p> <p>Physical impairment (may affect physical activity intervention)</p>	<p>Average of the step counts on three days to obtain mean step/ day (Lifecorder accelerometer (Suzuken, Japan))</p> <p>Dietary assessment Energy intake (two-day 24-hour dietary recall), basal metabolic rate (TBF-300 Body Composition Analyzer)</p> <p>Outcome assessment Baseline and the end of twelve weeks.</p>	
Suriani, et al., 2015	84 Malay Muslim women employees from two government offices in Seremban	Intervention study Whoever fulfilled the inclusion criteria were invited to join	1 month during Ramadan Dietary	39.8 ± 10.3	<p>Inclusion Overweight/ obese (BMI: ≥25kg/m²)</p> <p>Any age, employment position</p> <p>Exclusion Pregnant</p>	<p>Socio-demographic (baseline only) Age, number of children, monthly income, marital status, education level, employment position</p> <p>Physical examinations Body weight, height, BMI, BP</p> <p>Dietary practices Food group (carbohydrate, vegetables)</p>	<p>During Ramadan, carbohydrate intake ($p < .001$), BMI ($p < .001$), HDL-C ($p < .001$), LDL-C ($p < .000$), TG ($p = .005$), and FBS ($p = .022$) were significantly reduced, but the TC/HDL-C ratio ($p = .000$) was significantly increased.</p> <p>This programme showed positive changes on some of the parameters among the subjects.</p>

On medication (lowering cholesterol)	& fruits, protein, milk & dairy products) servings per day
On commercial replacement meal (lose weight)	Biochemical assessment FBS, TG, HDL-C, LDL- C, TC, TC:HDL-C ratio
Medical condition (not able to on fasting)	Outcome assessment Before Ramadan and 3 rd week of Ramadan (only 7-day dietary record), 4 th week of Ramadan (the rest of parameter).

Table 1: Intervention programme in Malaysia (2005 – February 2015). NA: not available

Discussion and Implication

From the selected studies in this present review, most of the intervention approaches focused on diet and physical activity in promoting healthy and weight management, which are relevant and important.

Malaysian consumed high level of oil, fats, and processed foods (Baker & Friel, 2014). We hardly to control eating especially under social pressure and the availability of food (Chang, 2007). There is a significant correlation between nutritional status and food intake habit in Malaysian adults (Ahmed & Siwar, 2014). Energy intake strongly predicting BMI and WC (Safii & Yuin, 013). In particular, energy intake, carbohydrate, sugar, protein, and fat were positively associated with BMI. In a study involving 212 recruited from Klang Valley, it was documented that these subjects consumed 14 teaspoons of sugar per day in average (Safii & Yuin, 2013). The significant protective factors of obesity among Chinese adults were drinking soy milk and had perception towards a balance diet that containing vegetables (Chew et al., 2014). Low Vitamin D was also significantly correlated with abdominal obesity (Moy et al., 2011). Over 80% of Malaysian adults consumed breakfast, lunch, and dinner but only 54% have their afternoon tea. In particular, the highest percentage of calorie intake was contributed by dinner (32.4%), followed by lunch (30.5%), breakfast (29.9%) and afternoon tea (17.0%) (Zalilah et al., 2008). Nutritional knowledge should be enhanced in weight management but need to take into consideration on the target group's education level and household income (Pon et al., 2006).

Hazizi et al. (2012) surveyed 233 Malay government workers in Federal Government Building Penang found that BF, BMI, and WC were inversely associated with physical activity. The sedentary lifestyle has higher risk to produce overweight or obese individual, at-risk WC and unhealthy percentage of body fat (Hazizi et al., 2012). Environment built to increase physical activity can be good effort in future intervention programme (Hazmi, Lian, & Thon, 2013). Study conducted among the 215 private sector employees in Petaling Jaya, physical activity was significantly associated with perceived barriers, perceived benefits to physical activity but not self-efficacy (Siti Affira, Mohd Nasir, Hazizi, & Kandiah, 2011). Based on Malaysia Non-Communicable Disease Surveillance-I (2005/2006) on 2,366 samples, Indians was found to do less physical activity and eat less fruits and vegetables than other ethnicity (Malays and Chinese). They were prevalent for abdominal obesity and MetS (Tan et al., 2011b).

Besides the diet and physical activity components, public health, and evidence-based practice implementation are highly depended on behavioural change component as well. The behavior change interventions are defined as “coordinated sets of activities designed to change specified behaviour patterns”. Behavior patterns can be measured in terms of the particular behaviours' incidence or prevalence among the specified population. This intervention could be useful in reducing obesity (Michie, van Stralen, & West, 2011). To achieve energy balance, energy intake (calories intake) should balance with energy output (calories expenditure). An individual whether to practice healthy eating and active living is highly dependent on his or her behavioural change as shown in Figure 1 – 3.

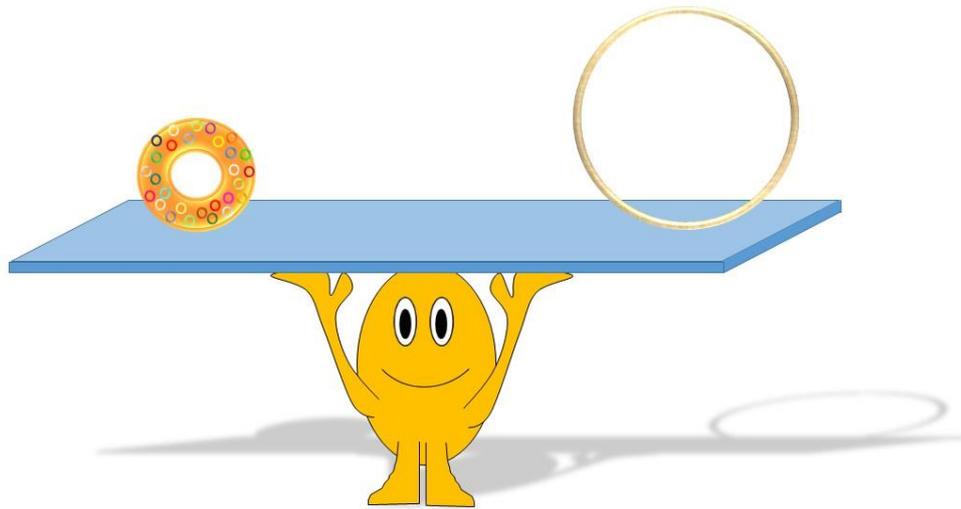


Figure 1: Energy balance that consists of diet (energy intake, represented by doughnut) and physical activity (energy output, represented by hula hoop) which dependent on individual's behavioural change

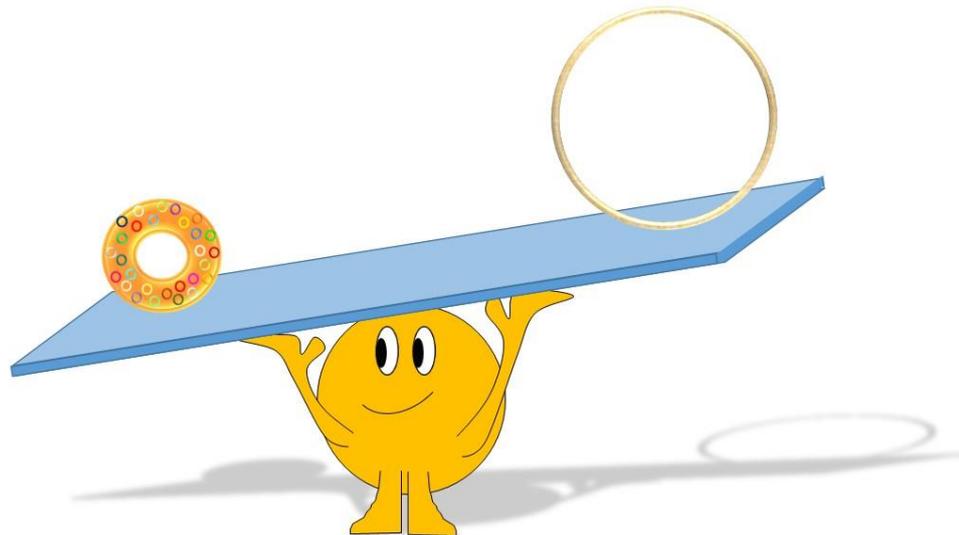


Figure 2: Positive energy balance (weight gains when more energy input than energy output)

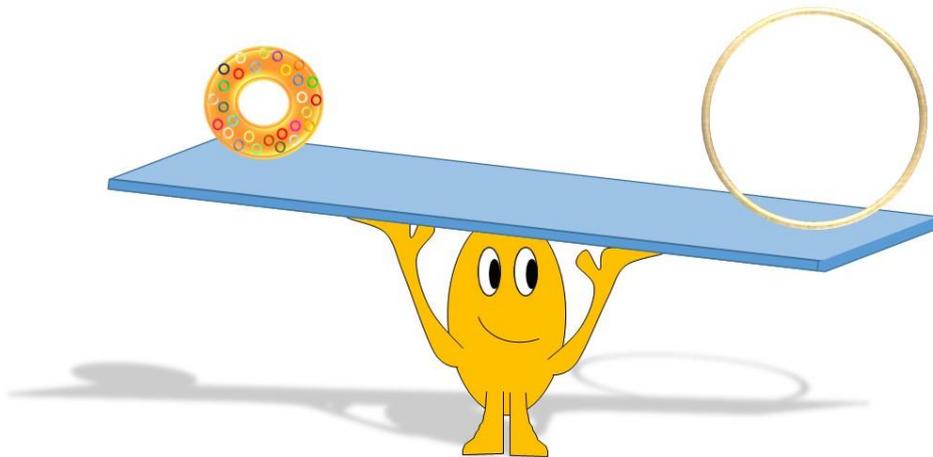


Figure 3: Negative energy balance (weight loss when more energy output than energy input)

The strategies of weight loss usually were consumption of vegetables and fruits (50.8%), followed by food portion (49.2%) and fatty food (42.5%) (Al-Qalah, Ghazi, Isa, & Karim, 2014). More government female employees intent to lose weight as compared to male employee as they dissatisfied with their current weight. Women tend to self-monitor their diet but men tend to self-monitor their physical activity (Aina Mariah, Hazizi, Mohd Nasir, Zaitun, & Hamid Jan, 2012). Self-induced vomiting, frequently on diet, exercise and laxatives used were strategies used by young adults to lose weight, which need to be paid more attention and provide the safe and effective approach in weight management intervention (Kuan, Ho, Shuhaili, Siti, & Gudum, 2011).

The perceived barriers of overweight and obese Malaysian adults in losing weight were not able to resist eating, don't know how to lose weight and failure in previous weight loss's attempt. These barriers caused them stayed at pre-contemplation stage, they will not take action even the weight lost strategies provided to them are effective in losing weight (Chang, et al., 2009). Potential barrier among young adults were no time to concern about healthy lifestyle choices due to stressful lifestyles (Norris et al., 2014). These barriers can be addressed in future interventions.

Conclusion

Future interventions may integrate behavioural change components, dietary advice and physical activity as a holistic programme in tackling obesity and overweight issues, especially among Malaysian government primary care clinic's obese patients as they are high risk group of non-communicable disease such as type II diabetes mellitus and metabolic syndrome.

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Funding

Fundamental Research Grant Scheme (FRGS) with project code 04-01-16-1804FR, Ministry of Higher Education (MOHE) Malaysia.