Original

Factors Influence in Food Choices and Effect on The Body Composition among Staff in Institut Kanser Negara, Malaysia

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ABSTRACT: *Background and purpose.* There are many factors influence individual food choices and intake. Unhealthy diet pattern and food choices may increase risk of obesity, chronic diseases and malnutrition. This study aims to determine the contributable factors influence in food choices and effect on the body composition. *Methods.* An observational pilot study was carried out on 106 participants who were staff of Institut Kanser Negara, Putrajaya, Malaysia; 77 females and 29 males, mean age 37.97 ± 13.17 years old using cross-sectional and convenient sampling method. A structured self-administered questionnaire was used to attain information regarding the factors influence in food choices and the effect on the body composition to assist in weight management. There were 9 influence in factors queried which were health, mood, convenience, sensory, nutrient content, price, weight control, familiarity and ethical concern. Participants' body composition was obtained using calibrated Total Body Composition Analyser (TANITA). *Result.* About 51% of participants were underweight/normal while 49% were overweight/obese. Weight, muscle mass and fat percentage among male participants were statistically significantly higher than female, 72.98 ± 13.54 kg vs 60.65 ± 11.76 kg, 51.99 ± 6.37 kg vs 37.28 ± 5.26 kg and 23.78 ± 7.48 % vs 33.62 ± 6.98 % respectively ($p < 0.01$). No significant differences between gender for all factors. The top factor influence in food choices was health while the least factor was ethical concern (environmental and political issues) for both genders. Overweight/obese group significantly considered health, mood, convenience, nutrient content and weight control more than underweight/normal individuals in food choices. Factors significantly associated with body weight were mood, convenience and nutrient contents while factors significantly associated with fat percentage were health, mood, convenience, sensory appeal, nutrient contents and weight control. *Conclusion.* This study concluded that health, mood, convenience, nutrient contents and weight control were the top influence in factors associated with body weight and fat percentage for healthcare providers. Hence, appropriate measures may be considered in regulating these factors as a potential approach in weight management intervention among healthcare providers.
Keywords: Factors, food choices, body composition

INTRODUCTION

Nutrition is essential to maintain body health. Malnutrition increases the risk of human morbidity and mortality. Nutrition transition, from low availability of calories mainly in the form of plant products to diets high in fats, sugars and energy-dense processed foods contribute to obesity issue. This, in turn, has been the result of rapid economic development which has taken place in Malaysia in the last quarter of the twentieth century. Malaysia has recently been ranked second highest in East and Southeast Asia in terms of being overweight (1,2).

Prevalence of obesity, whereby excessive body adipose tissue, increase in worldwide. World Health Organization (WHO) criteria for Body Mass Index (BMI) classifies a BMI of 25-29.9 kg/m^2 as overweight and >30 kg/m^2 as obese (3). BMI is the most widely used index for obesity. Obesity is shown as a major determinant of non-communicable diseases such as cardiovascular disease, cancers, type 2 diabetes mellitus, respiratory problems, gallbladder diseases, post- operative morbidity and musculoskeletal disorders such as osteoarthritis. There has been a clearly documented dramatic increase in the prevalence of obesity in Malaysia over the last three decades since large scale population data became available. In the global context, alongside development and prosperity, in many countries especially in Asia, obesity has become a leading health issue (1,2).

Obesity is a multifactorial disorder deriving from genetic and metabolic factors as well as environmental factors, socioeconomic and behavioural (4,5). These factors differ in their respective contributions to the obesity epidemic in recent decades6. Behavioural factors, however, have undergone important modifications that might account for the epidemic in obesity (7). Energy intake and energy expenditure are consequences of behaviours (e.g. choosing foods,

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eating foods, watching TV, playing sports) that are influenced by a wide range of internal and external determinants. These eating behaviours include the characteristics of the food supply, the knowledge, attitudes, emotional state and experiences of the individual, and the social and cultural context in which the behaviour occurs (7,8). In this study, investigators would like to determine the factors that influence and associate with food choices and body composition. This study provides a baseline data for further program planning.

MATERIALS AND METHODS

Study design

This was an observational pilot study. Cross sectional and convenient sampling method were used. Body composition screening and eating behaviours assessment via questionnaire was done among Institut Kanser Negara staff. After screening and assessment of eating behaviours, dietitian explained and counselled them based on the result of screening and assessment. This screening and assessment were aimed to increase awareness of staff on their body composition and eating behaviours. All records and questionnaires were well kept and locked in dietitians' office. There were no identifiable data/information on data collection form and questionnaire. Data was collected and extracted for analysis purposes.

Measurement tools

Validated measurement tools were scheduled calibrated TANITA Total Body Composition Analyser model SC 300 which can provide body weight in kg (up to 0.1kg), fat percentage (up to 0.1%) and total muscle mass (up to 0.1kg). Scheduled calibrated SECA height measurement (up to 0.1cm) was used to measure height. Subject was requested to have minimal clothing, empty pocket and stand up-right with bare foot on metal plate of scale. Subject needs to be bare foot, stand up-right and face front while measuring.

Validated questionnaire of food choices were collected (8). The questionnaire contains of 36 questions. Every item was rated in a 4-point scale ranging from not important at all (1) to very important (4). Nine factors influence in food choices were assessed by the questionnaire including health (6 items), mood (6 items), convenience (5 items), sensory appeal (4 items), natural content (3 items), price (3 items), weight control (3 items), familiarity (3 items) and ethical concern (3 items) 8. Participants answered the questionnaire by themselves with minimal assistance from investigators. Investigators explained to subject if there was problem in understanding the questionnaire and stayed in the vicinity to check the answers and to receive the questionnaires personally. The duration of data collection for each participant was approximately 15-20 min. All parameters and variable data were collected and recorded in data collection form. The variables that were being collected in the data collection form included socio-demographic (age, education level), anthropometry and body composition (weight, height, BMI, percentage of body fat and muscle mass).

Statistical analysis

The data analysis was done using the SPSS version 23.0. Categorical data was analysed descriptively and presented as frequency and percentages. Continuous data was presented as mean and standard deviation and analysed by independent t-test which evaluated using two-tailed test of significance level at the $p < 0.05$. Pearson's Correlation was used for analysis since data was normally distributed to study the association between factors influence in food choices. A value of $p < 0.05$ is considered statistically significant.

RESULTS

Study recruited 106 participants whereby 29 were males and 77 were females, with the mean of age 37.97 ± 13.17 years old. Majority of participants (46.3%) received tertiary education (degree holders) and followed by secondary level (27.4%). Using WHO BMI cut off of >24.9kg/m^2 as overweight, 51% were categorized as underweight/normal weight while 49% were overweight/obese. Weight, muscle mass and fat percentage among male participants were statistically significantly higher than female, 72.98 ± 13.54 kg vs 60.65 ± 11.76 kg, 51.99 ± 6.37 kg vs 37.28 ± 5.26 kg and 23.78 ± 7.48 % vs 33.62 ± 6.98 % respectively ($p < 0.01$).

The factors associated with body weight significantly were mood ($r = 0.246$, $p = 0.011$) convenience ($r = 0.218$, $p = 0.025$) and nutrient contents ($r = 0.197$, $p = 0.043$). The factors associated with fat percentage significantly were health ($r = 0.299$, $p = 0.002$), mood ($r = 0.290$, $p = 0.003$) convenience ($r = 0.326$, $p = 0.001$), sensory appeal ($r = 0.232$, $p = 0.017$), nutrient contents ($r = 0.298$, $p = 0.002$) and weight control ($r = 0.212$, $p = 0.029$).

Table 1: Body composition study participants

	Male (n=29) (Mean ± SD)	Female (n=77) (Mean ± SD)	Total (n=106) (Mean ± SD)	p-value
Height (m)	1.67 ± 6.16	1.57 ± 6.10	160.0 ± 7.58	0.000*
Weight (kg)	72.98 ± 13.54	60.65 ± 11.76	64.02 ± 13.39	0.000*
BMI (kg/m^2)	25.99 ± 4.35	37.73 ± 111.20	25.34 ± 6.25	0.358
Muscle mass (kg)	51.99 ± 6.37	37.28 ± 5.26	41.30 ± 8.62	0.000*
Fat percentage (%)	23.78 ± 7.48	33.62 ± 6.98	30.94 ± 8.34	0.000*

Independent t-test
*p-value <0.01

Table 2: Factors influence in food choices among gender and BMI groups (n=106)

Factors	Gender groups			BMI groups		
	Male (n=29) (Mean ± SD)	Female (n=77) (Mean ± SD)	p-value	Underweight/ Normal (n=54) (Mean ± SD)	Overweight/ Obese (n=51) (Mean ± SD)	p-value
Health	3.24 ± 0.74	3.41 ± 0.62	0.215	3.21 ± 0.69	3.55 ± 0.56	0.008*
Mood	3.13 ± 0.68	3.26 ± 0.64	0.353	3.04 ± 0.65	3.43 ± 0.59	0.002*
Convenience	3.08 ± 0.71	3.26 ± 0.61	0.200	3.02 ± 0.70	3.43 ± 0.49	0.001*
Sensory	3.22 ± 0.70	3.33 ± 0.60	0.416	3.19 ± 0.63	3.42 ± 0.62	0.061
Nutrient content	3.18 ± 0.85	3.31 ± 0.68	0.425	3.08 ± 0.72	3.48 ± 0.70	0.004*
Price	3.07 ± 0.81	3.31 ± 0.66	0.116	3.17 ± 0.70	3.32 ± 0.72	0.260
Weight control	3.03 ± 0.87	3.13 ± 0.66	0.547	2.93 ± 0.75	3.30 ± 0.64	0.007*
Familiarity	3.15 ± 0.74	2.96 ± 0.67	0.211	3.05 ± 0.62	2.97 ± 0.76	0.547
Ethical concern	2.92 ± 0.99	2.88 ± 0.81	0.845	2.82 ± 0.81	3.00 ± 0.89	0.268

Independent t-test
*p-value <0.01

Table 3: Factors associated with body weight and fat percentage (n=106)

Factors	Body weight		Fat percentage	
	r-value	p-value	r-value	p-value
Health	0.144	0.142	0.299	0.002**
Mood	0.246	0.011*	0.290	0.003**
Convenience	0.218	0.025*	0.326	0.001**
Sensory appeal	0.188	0.054	0.232	0.017*
Nutrient content	0.197	0.043*	0.298	0.002**
Weight control	0.132	0.178	0.212	0.029*

*Pearson correlation test
*p-value <0.05
**p-value <0.01

DISCUSSION

Besides hunger stimulation, many internal and external cues can trigger the immediate desire to eat or orient eating toward certain foods. A study stated that despite being an important factor of food choice, liking or eating pleasure may make only a modest contribution to overall variation in food choice and eating behaviours (9). Although it is widely believed that females place more emphasis on healthy eating compared to males, there were no significant differences between genders for all factors in this study. For both gender groups in this study, the top factor influence in food choices was health followed by sensory. This did not concur with Wardle et al. (2004) that reported women as more likely than men to report avoiding high-fat foods, eating fruit and fibre, and limiting salt (to a lesser extent), besides more likely to be dieting and attached greater importance to healthy eating (10). The least factor for both genders in this study was ethical concern followed by familiarity for female and weight control for male. As for food choice factors among BMI groups, overweight/obese group significantly considered health, mood, convenience, nutrient content and weight control more than underweight/normal weight individuals. This is contradictory to a study among low income women by Dressler & Smith (2013) where lean/normal weight participants reported that health was influential in food choice, while overweight/obese participants expressed cost as being more of a factor (11). Both BMI groups reported that taste or sensory was of greatest importance in that study. The outcome difference might be contributed by the different setting of participants sampling. As this study focused on staff working in a healthcare setting, the knowledge of obesity-associated health risks may prompt the overweight/obese group to consider health, nutrient content and weight control in their food choices as a means of weight loss compared to their counterpart. Previous studies have shown that higher BMIs women display frequent dieting behaviour (12) and limiting calorie intake induces a counter-regulatory response which then leads to excessive calorie intake (13) and weight gain (14).

The above-mentioned factors together with sensory appeal showed a weak but significant positive association with body fat percentage regardless of BMI groups. Of these six factors, only mood, convenience and nutrient content showed a similar significantly positive but weak association with body

weight. Singh stated that the interaction between mood, emotional state, and feeding behaviours is complex and it is hypothesized that individuals regulate their emotions and mood by changing both food choices and quantities (15). It seems to be a two-way relationship between food intake, mood and obesity. Depressed mood is associated with abdominal obesity and poor diet intake16 as such individuals showed a preference for palatable "comfort foods" which can improve negative feelings on a short-term basis (15, 17). When this behaviour is prolonged, Sharma and colleague state that persistent high-fat feeding unfavourably leads to negative emotional states, increased stress sensitivity and altered basal corticosterone levels (18). At the same time, calorie-dense food promotes higher fat percentage and obesity. The state of being obese in itself increases the vulnerability to depression and anxiety (19). Therefore, the vicious cycle of mood influence in food choices, increasing fat percentage and obesity risk leading to mood disorders should not be underestimated and deserves further exploration.

In a study by Blanck and colleague (2009) that identify four determinants of food choice among working adults, convenience was chosen as the most important of the study population, followed by taste, cost, and health. In the same study, BMI was significantly related to convenience where convenience was a more influential factor for obese person compared to overweight or non-overweight individuals (20). Such finding is similar to our finding that shows convenience as having a significantly positive association with body weight and fat percentage. According to Gordon - Larsen, neighbourhoods or in this case environments that offer access to high-quality foods are theorized to improve individual-level diet and weight outcomes of its population (21). Therefore, it is suggested that a higher availability, accessibility and convenience to healthier food options may play a substantial role in weight control by encouraging healthier food choices especially among those with higher BMI.

The current study provides evidence of influence in factors related to food choices such as health, mood, convenience, nutrient content and weight control among overweight and non-overweight individuals working in a healthcare setting. Certain factors such as mood and convenience were found to be significantly associated with body weight and fat percentage. Healthcare providers might consider measures regulating these factors as a potential approach in weight management intervention.

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