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Mob: +92 300 3008585, Fax: +92 41 8815544
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Do Low Vegetables and Fruits Intake Contribute to Overweight Status of Healthy Reproductive Age of Malay Women in Selangor?

Mohamed Fakhri Abu Baharin, Zaleha Md. Isa, Noor Hassim Ismail,
Mohd Hasni Ja'afar, Azmi Mohd Tamil and Khairul Hazdi Yusof
Department of Community Health, Universiti Kebangsaan Malaysia Medical Centre,
Kuala Lumpur, Malaysia

Abstract: Overweight and obesity posed major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Prevalence of overweight and obesity among adults especially women show an increasing trend. The aim of this study was to determine the prevalence of overweight among healthy reproductive age of Malay women in Selangor and to determine whether low vegetables and fruits intake contribute to overweight among them. A cross-sectional study was conducted among adult women in selected urban and rural areas in Selangor. Simple random sampling was used in selecting participants. Inclusion criteria for the participants are Malay, within reproductive age (15-45 years old) and healthy (without any chronic diseases). Data were collected using a questionnaire-guided interview. A total of 630 respondents were recruited in this study. The respondent's mean age was 39.6±3.697 years old. The prevalence of overweight among the respondents was 61.0%; in which 37.8% were categorized as pre-obese and 23.2% were obese. Prevalence of overweight was higher in those above 40 years old, had lower education level, unemployed, married, having children, ever breast-feed, not using contraceptive and having low intake of vegetables and fruits. There was a significant association between marital status and overweight with OR 2.88 (CI 1.56-5.31; p = 0.001). As a conclusion, the prevalence of overweight in this study was high particularly among married women. Low vegetables and fruits intake did not contribute to the overweight status of healthy reproductive age of Malay women in this study.

Key words: Overweight, Malay women, diet, vegetables, fruits

INTRODUCTION

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divides the square of his or her height (in metres). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight. BMI provides the most useful population-level measure of overweight and obesity as it is the same for both sexes and for all ages of adults, although it may not correspond to the same degree of fatness in different individuals (WHO, 2015).

Overweight and obesity posed major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer. Five out of ten leading causes of death and disability such as cardiovascular diseases, diabetes, cancer, hypertension and stroke are associated with obesity. An estimated 300,000 deaths is recorded each year related to obesity, more than death caused by pneumonia, motor vehicle accidents and airlines disaster combined (Price *et al*., 2000).

According to recent WHO global estimates, in 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of those over 600 million were obese. Overall, about 13% of the world's adult populations (11% of men and 15% of women) were obese in 2014. Due to that, the worldwide prevalence of obesity was more than doubled between 1980 and 2014 (WHO, 2015).

In the U.S, the percentage of obese Americans have increased by 74% since the year 1991 in which more than 21 million of its men and over 23 million women are obese (Moore, 2004). Comprehensive data on the prevalence of worldwide obesity have been collected during the WHO MONICA project. The main output from the project was that the prevalence of worldwide obesity is growing at an alarming rate in both developed and developing countries. Surprisingly, the problem of obesity coexists with under-nutrition in many developing countries and most obesity cases is prevalent in urban than rural African and Asian populations, though still relatively uncommon. In economically advanced developing countries, obesity prevalence can be as high as in developed countries. Another significant finding from the WHO MONICA project is that obesity rates is generally higher among women than men (Organization, 2000).

Corresponding Author: Mohamed Fakhri Abu Baharin, Department of Community Health, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia

Previous studies also showed that the prevalence of overweight and obesity among women was higher than men especially between the aged of 25 to 44 years old where women tend to gain the greatest amount of weight. Among women of reproductive age, one potential pathway for the development of obesity is through the retention of weight from the gestational period (Siega-Riz *et al*., 2004). Another study also showed that the prevalence of obesity has increased dramatically among women of reproductive age in the U.S (Mokdad *et al*., 1999).

There is also a study among the child-bearing age women who are obese before pregnancy or gaining excessive weight during pregnancy are less likely to initiate and maintain breast-feeding than the normal-weight women (Li *et al*., 2003). In addition, other study also reported that overweight and obesity were negatively associated with the duration of exclusive or any breast-feeding (Hilson *et al*., 1997). Other factor that contribute to overweight among women were history of contraception use. A study was done in 2002 among adolescent females, aged 12 to 19 years old who used either oral contraceptive pills (OCPs) or Depo-Provera injection consistently for the first year of use. It was reported that both contraception method promote weight gain over one year, where adolescent females using Depo-Provera injection gained significantly more weight gain than those who used OCPs (Mangan *et al*., 2002).

For the past decades, Malaysia as one of the developing countries in Asia, has grown rapidly in term of socioeconomic advancement and this advancement has significantly changed the community lifestyle. A survey on overweight and obesity among Malaysian adult population older than 18 years old was previously conducted and one of it was a survey conducted by the Ministry of Health in 1996 and 1997. The National Health and Morbidity Survey II found that 4.4 and 16.6% of the population were obese and overweight, respectively. From the report, the prevalence of obesity and overweight for Malaysian adult males reported to be 2.9 and 15.1%, respectively, while 5.7% of Malaysian adult women were obese and 17.9% were overweight (Hussein and Anuar, 1997). A renewed national study on the prevalence of obesity among 16,127 Malaysians aged 15 and above was done in 2004. From that study, the prevalence of obesity has now reached 12.3%, which is 280% higher than that in 1996. The prevalence of obesity in Malaysia in 2004 was higher than in developed countries such as France (7%) and United Kingdom (9%) but lower than in the United States (20.9%) (Zain *et al*., 2007). The survey also concluded that women were 1.3 times more likely to become obese compared to men probably related to diet. Working women tend to eat out in restaurants/stalls and fast food outlets for convenience and time saving reason.

Changing in dietary pattern that leads to obesity includes diet more of refined carbohydrates, higher trans-fat and reduced intake of vegetables and fruits in daily diet. Studies have shown that consumption of five or more servings of vegetables and fruits per day is recommended to reduce the risk of cardiovascular diseases through beneficial mix of micronutrients, antioxidants, phytochemicals and fibre in these foods (Liu *et al*., 2000). According to the Italian Guidelines for a Healthy Diet (IGHD), 5 or more portions of fruits and vegetables daily is recommended to consider one have an optimal intake of those foods (Lazzeri *et al*., 2013). There is also a link between obesity and intake of fruits and vegetables. Studies on dietary patterns indicated that diet rich in fruits and vegetables was associated with smaller gains in body mass index (BMI) (Newby *et al*., 2003). Other study also reported that dietary patterns with high amount of fruits and vegetables are linked to smaller weight gains and to a lower risk of overweight and obesity among adult populations with different cultural backgrounds (Quatromani *et al*., 2002).

Therefore, the aim of this study was to determine the prevalence of overweight among healthy reproductive age women in Selangor and to identify whether vegetables and fruits intake contribute to the overweight status of the women.

MATERIALS AND METHODS

Selangor is one of the thirteen states in Malaysia which is located on the west coast of Peninsular Malaysia, covering an estimated area of about 8,104 square km. Selangor is one of only two Malaysian states with more than one city and has the largest and fastest growing cities due to rapid urbanization and modernization in Klang Valley. The state has the largest population in Malaysia at about 5.4 million, with a high standard of living and the state's poverty rate is the lowest in the country.

This cross sectional study was conducted among adult communities in Selangor in June 2009. Respondents were randomly selected via simple random sampling from households in 50 selected urban areas around Klang Valley, while respondents from rural areas were selected from Felda settlements around Tanjung Karang and Kuala Kubu Bharu area. Respondents were contacted via home visits and briefed regarding the objectives of the study. Respondents who agreed to participate were interviewed face-to-face by trained researcher and data obtained were recorded using a standardized pre-tested questionnaire. Physical measurements such as height and weight were recorded from respondents using calibrated equipments (SECA body measuring scale).

From this study, a total of 4,415 adult women have responded. The inclusion criteria in this study are Malaysian citizens, those without any medical illness, Malay ethnicity and women aged between 15 and 45 years old. A total of 630 respondents who fit in the study criteria were obtained.

The questionnaire were made available in Bahasa Malaysia and structured into two parts. The first part consisted of questions on respondent's socio-demographic background, obstetric and gynaecological history and physical measures such as weight and height. The second part of the questionnaires was food frequency questionnaire (FFQ), which require respondents to provide frequency of intake of 26 selected vegetables and 22 selected fruits. There were nine options of food intake frequency ranging from 'never' to 'more than 6 servings per day'.

Body weight status of the respondents was quantified based on WHO criteria for BMI guidelines (WHO, 2006). BMI is calculated by dividing the weight in kilograms to height in metres square (BMI = kg/m^2). With the BMI obtained, body weight was classified into four categories ranging from underweight (BMI<18.5 kg/m^2), normal (BMI 18.5-24.9 kg/m^2), pre-obese (BMI 25.0-29.9 kg/m^2) and obese (BMI = 30 kg/m^2). Weight status of the respondents was further classified into non-overweight (underweight and normal weight) and overweight (pre-obese and obese) as a dependent variable for analysis.

For data analysis, the independent variables were grouped into two categories. Respondent's age was grouped into less than 40 years old and 40 years old and above. Education level was divided into; (I) low (highest education level only until secondary school), (ii) high (college/university level or higher). For marital status, those who are currently married were grouped into 'married' group, while those who are un-married, divorced, separated, cohabitated and widowed were grouped into 'not married' group. For vegetables and fruits intake, frequency of intake of both food groups were categorized into 'optimal' and 'low'. Reported frequency of 'once/day', 2-3 times/day, 4-5 times/day, >6 times/day were grouped as 'optimal intake', while '5-6 times/week and less' or 'never' were grouped as 'low intake'.

Data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 22. Categorical data were presented as frequency and percentage, while numerical data are presented as mean and standard deviation. Categorical independent variables were tested using Pearson Chi-Square test. To determine the predictors for overweight while adjusting the covariates, multiple logistic regressions test were carried out in the form of adjusted odds ratio. The level of significance is set at 95% confidence interval with p-value <0.05.

RESULTS

Overall, a total of 630 women participated in this study (Table 1). The respondents age ranged from 21-45 years old, in which the mean age was 39.6 (±3.7) years. The prevalence of overweight among the respondents was 61.0%; in which 37.8% were categorized as pre-obese and 23.2% were obese. The distribution of respondents according to locality are comparable, where 47.9% of respondents were from rural area while 52.1% were from urban area. Most respondents have formal education where 63.8% have achieved a secondary school education, while only 1.7% do not have formal education. In term of employment, 56.5% of the respondents were not working, while for occupation, most of the respondents reported being a housewife (56.0%), while other occupations were professionals (6.2%), lecturer (13.3%), clerk (11.7%) and salesman/ freelance (4.9%).

Most of the respondents were married (88.7%), while the rest (11.3%) were either unmarried, cohabitated, divorced or widowed. For the obstetric and gynaecological factors, 86.5% of the respondents reported to have children and mean number of children was 3.9 (±1.691). A total of 59.0% of the respondents reported to have ever breast-fed their children. In term of history of contraceptive use, most women reported to have never used contraception (72.4%).

From dietary perspective, most of the respondents reported to have low intake of vegetables and fruits according to the recommended guidelines (Table 2-3). Only 4.0 and 2.5% of respondents took optimal intake of vegetables and fruits, respectively.

Table 4 shows the association between body weight status of the respondents and their socio-economic background, obstetric and gynaecological history, as well as their vegetables and fruits intake. From all the variables, only respondent's marital status showed a significant association with being overweight (p = 0.001), in which married respondents tend to be overweight as compared to the un-married ones. Marital status also suggest a strong predictor of overweight status, in which married respondents have a higher odd to be overweight by an adjusted odds ratio 2.88 (CI 1.56-5.31; p = 0.001) (Table 5). In term of socio-economic background, there was no association between overweight and age, locality, education level and employment of the respondents. Based on the obstetric and gynaecological factor, there was no significant association of between overweight status and having children, ever breast-fed and having history of contraception use. Meanwhile from the dietary aspect, no significant association was found between overweight status and frequency of fruits and vegetables intake.

Although there were no significant associations between body weight status and majority of the studied variables, there were some trends observed. The prevalence of overweight was some what higher among 40 years old and older age group (32.0%) as compared to those younger than 40 years old (28.0%). The prevalence of overweight was also higher in rural area (63.2%) than in urban area (58.8%), low education level (61.6%) as compared to high education level (58.9%), married

Table 1: Profile of the respondents (n = 630)

Factor	Mean (min, max)	SD	n	%
Age	39.62 (21.45)	3.697	630	
<30 years			6	1.0
31-40 years			345	54.8
>40 years			279	44.3
Weight status (BMI)				
Underweight (<18.50)			13	2.1
Normal (18.50-24.99)			233	37.0
Pre-obese (25.00-29.99)			238	37.8
Obese (≥30.00)			146	23.2
Locality				
Rural			302	47.9
Urban			328	52.1
Education level				
None			11	1.7
Primary			52	8.3
Secondary/high school/higher secondary			402	63.8
Vocational school			14	2.2
College/university			151	24.0
Employment				
Yes			274	43.5
No			356	56.5
Type of occupation				
Commissioner/director/manager			7	1.1
Professional			39	6.2
Lecturer			84	13.3
Clerk			74	11.7
Freelance/salesman			31	4.9
Skilled worker in agriculture/fisheries			8	1.3
Skilled worker in crafts industry			9	1.4
Machine operator/technicians			2	0.3
Labourers			21	3.3
Army/police			1	0.2
Housewife			353	56.0
Unknown			1	0.2
Marital status				
Never married			39	6.2
Married			559	88.7
Common-law marriage/cohabitated			6	1.0
Divorced/separated			14	2.2
Widow			12	1.9
Have children				
Yes	3.906 (1.12)	1.691	545	86.5
No			85	13.5
Ever breast-feeding				
Yes			372	59.0
No			258	41.0
Contraceptive use				
Yes			174	27.6
No			456	72.4
Vegetables intake				
Optimal			25	4.0
Low			605	96.0
Fruits Intake				
Optimal			16	2.5
Low			614	97.5

(63.2%) compared to unmarried (41.5%) and not working (64.0%) as compared to working (56.9%).

From obstetric and gynaecological history, the prevalence of overweight was some what higher in those who have children (61.1%) than those who have no children (60.0%). Those who have never breast-fed reported a higher overweight prevalence (62.8%) as compared to those who have ever breast-fed (59.7%). Those who have history of taking contraceptive also showed a higher overweight prevalence (62.1%) as compared to those who have no history of taking contraceptive (60.5%).

Table 2: Pattern of vegetables intake among the respondents

List of vegetables	Never n(%)	1-3/month n (%)	1/week n (%)	2-4/week n (%)	5-6/week n (%)	1/day n (%)	2-3/day n (%)	4-5/day n (%)	>6/day n (%)
Cabbage, fresh	216 (34.3)	127 (20.2)	171 (27.1)	44 (7.0)	19 (3.0)	15 (2.4)	13 (2.1)	11 (1.7)	14 (2.2)
Cabbage, cooked	38 (6.0)	126 (20.3)	307 (48.7)	60 (9.5)	22 (3.5)	20 (3.2)	24 (3.8)	18 (2.9)	13 (2.1)
Mustard	42 (6.7)	110 (17.5)	305 (48.4)	69 (11.0)	25 (4.0)	19 (3.0)	27 (4.3)	18 (2.9)	15 (2.4)
Spinach	48 (7.3)	118 (18.7)	310 (49.2)	60 (9.5)	26 (4.1)	16 (2.5)	19 (3.0)	20 (3.2)	15 (2.4)
Water spinach (kangkung)	40 (6.3)	125 (19.8)	298 (47.3)	73 (11.6)	23 (3.7)	21 (3.3)	16 (2.5)	20 (3.2)	14 (2.2)
French bean	52 (8.3)	151 (24.0)	280 (44.4)	64 (10.2)	20 (3.2)	15 (2.4)	13 (2.1)	21 (3.3)	14 (2.2)
Winged bean	95 (15.1)	182 (28.9)	222 (35.2)	55 (8.7)	15 (2.4)	14 (2.2)	13 (2.1)	18 (2.9)	16 (2.5)
Okra, cooked	77 (12.2)	193 (30.6)	216 (34.3)	47 (7.5)	31 (4.9)	18 (2.9)	12 (1.9)	19 (3.0)	17 (2.7)
Carrot, fresh	234 (37.1)	105 (16.7)	170 (27.0)	45 (7.1)	20 (3.2)	16 (2.5)	15 (2.4)	9 (1.4)	16 (2.5)
Carrot, cooked	78 (12.4)	171 (27.1)	225 (35.7)	63 (10.0)	27 (4.3)	18 (2.9)	15 (2.4)	15 (2.4)	18 (2.9)
Cucumber	81 (12.9)	175 (27.8)	202 (32.1)	75 (11.9)	29 (4.6)	27 (4.3)	16 (2.5)	11 (1.7)	14 (2.2)
Cauliflower, fresh	251 (39.8)	122 (19.4)	151 (24.0)	45 (7.1)	15 (2.4)	13 (2.1)	14 (2.2)	4 (0.6)	15 (2.4)
Cauliflower, cooked	55 (8.7)	186 (29.5)	244 (38.7)	68 (10.8)	22 (3.5)	14 (2.2)	16 (2.5)	8 (1.3)	17 (2.7)
Bean sprout	50 (7.9)	196 (31.1)	239 (37.9)	68 (10.8)	22 (3.5)	18 (2.9)	13 (2.1)	10 (1.6)	14 (2.2)
Tomato, fresh	209 (33.2)	130 (20.6)	169 (26.8)	53 (8.4)	16 (2.5)	19 (3.0)	13 (2.1)	6 (1.0)	15 (2.4)
Tomato, cooked	66 (10.5)	187 (29.7)	223 (35.4)	72 (11.4)	20 (3.2)	23 (3.7)	11 (1.7)	10 (1.6)	18 (2.9)
Brinjal	88 (14.0)	210 (33.3)	219 (34.8)	45 (7.1)	18 (2.9)	11 (1.7)	14 (2.2)	13 (2.1)	12 (1.9)
Salad	70 (11.1)	186 (29.5)	197 (31.3)	68 (10.8)	29 (4.6)	26 (4.1)	22 (3.5)	17 (2.7)	15 (2.4)
Baby corn	102 (16.2)	194 (30.8)	213 (33.8)	54 (8.6)	26 (4.1)	10 (1.6)	11 (1.7)	7 (1.1)	13 (2.1)
Mushroom, fresh	295 (46.8)	119 (18.9)	139 (22.1)	33 (5.2)	10 (1.6)	7 (1.1)	8 (1.3)	3 (0.5)	16 (2.5)
Mushroom, cooked	128 (20.3)	197 (31.3)	201 (31.9)	52 (8.3)	16 (2.5)	7 (1.1)	7 (1.1)	6 (1.0)	16 (2.5)
Mushroom, dried	236 (37.5)	177 (26.1)	144 (22.9)	31 (4.9)	14 (2.2)	7 (1.1)	7 (1.1)	3 (0.5)	11)1.7)
Soybean curd	76 (12.1)	212 (33.7)	204 (32.4)	65 (10.3)	20 (3.2)	13 (2.1)	15 (2.4)	12 (1.9)	13 (2.1)
Lentils	89 (14.1)	213 (33.8)	197 (31.3)	61 (9.7)	23 (3.7)	9 (1.4)	12 (1.9)	12 (1.9)	14 (2.2)
Squash	200 (31.7)	247 (39.2)	104 (16.5)	37 (5.9)	18 (2.9)	5 (0.8)	9 (1.4)	8 (1.0)	4 (0.5)
Peas	236 (37.5)	254 (40.3)	81 (12.9)	28 (4.4)	12 (1.9)	4 (0.6)	7 (1.1)	3 (0.5)	5 (0.8)

Table 3: Pattern of fruits intake among the respondents

List of fruits	Never (%)	1-3/month (%)	1/week (%)	2-4/week (%)	5-6/week (%)	1/day (%)	2-3/day (%)	4-5/day (%)	>6/day (%)
Banana	45 (7.1)	146 (23.2)	238 (37.8)	114 (18.1)	24 (3.8)	16 (2.5)	14 (2.2)	18 (2.9)	15 (2.4)
Apple	57 (9.0)	170 (27.0)	248 (39.4)	73 (11.6)	28 (4.4)	12 (1.9)	14 (2.2)	15 (2.4)	13 (2.1)
Pear	110 (17.5)	214 (34.0)	211 (33.5)	39 (6.2)	19 (3.0)	11 (1.7)	9 (1.4)	7 (1.1)	10 (1.6)
Oranges	77 (12.2)	179 (28.4)	239 (37.9)	66 (10.5)	18 (2.9)	16 (2.5)	12 (1.9)	12 (1.9)	11 (1.7)
Pineapple	156 (24.8)	217 (34.4)	174 (27.6)	35 (5.6)	20 (3.2)	7 (1.1)	7 (1.1)	3 (0.5)	11 (1.7)
Guava	188 (29.8)	251 (39.8)	92 (14.6)	46 (7.3)	17 (2.7)	9 (1.4)	10 (1.6)	8 (1.3)	9 (1.4)
Rambutan	251 (39.8)	237 (37.6)	69 (11.0)	30 (4.8)	16 (2.5)	9 (1.4)	5 (0.8)	4 (0.6)	9 (1.4)
Starfruit	263 (41.7)	223 (35.4)	69 (11.0)	32 (5.1)	16 (2.5)	7 (1.1)	5 (0.8)	6 (1.0)	9 (1.4)
Longan	305 (48.4)	226 (35.9)	41 (6.5)	24 (3.8)	14 (2.2)	3 (0.5)	5 (0.8)	4 (0.6)	8 (1.3)
Avocado	420 (66.7)	148 (23.5)	30 (4.8)	9 (1.4)	10 (1.6)	3 (0.5)	3 (0.5)	3 (0.5)	4 (0.6)
Papaya	87 (13.8)	207 (32.9)	185 (29.4)	75 (11.9)	18 (2.9)	16 (2.5)	14 (2.2)	17 (2.7)	11 (1.7)
Soursop	275 (43.7)	198 (31.4)	103 (16.3)	19 (3.0)	12 (1.9)	5 (0.8)	3 (0.5)	6 (1.0)	9 (1.4)
Mango	88 (14.0)	236 (37.5)	177 (28.1)	57 (9.0)	20 (3.2)	10 (1.6)	17 (2.7)	13 (2.1)	12 (1.9)
Watermelon	83 (13.2)	225 (35.7)	188 (29.8)	58 (9.2)	24 (3.8)	17 (2.7)	13 (2.1)	11 (1.7)	11 (1.7)
honeydew	149 (23.7)	227 (36.0)	138 (21.9)	56 (8.9)	17 (2.7)	12 (1.9)	9 (1.4)	11 (1.7)	11 (1.7)
Langsat	289 (45.9)	238 (37.8)	40 (6.3)	27 (4.3)	15 (2.4)	3 (0.5)	5 (0.8)	4 (0.6)	9 (1.4)
Durian	290 (46.0)	252 (40.0)	35 (5.6)	17 (2.7)	11 (1.7)	7 (1.1)	6 (1.0)	4 (0.6)	8 (1.3)
Mangosteen	287 (45.6)	242 (38.4)	46 (7.3)	19 (3.0)	7 (1.1)	7 (1.1)	6 (1.0)	8 (1.3)	8 (1.3)
Lemon	179 (28.4)	234 (37.1)	86 (13.7)	58 (9.2)	19 (3.0)	15 (2.4)	8 (1.3)	23 (3.7)	8 (1.3)
Jambu air	231 (36.7)	250 (39.7)	68 (10.8)	35 (5.6)	21 (3.3)	7 (1.1)	8 (1.3)	2 (0.3)	8 (1.3)
Cempedak (artocarpus integer)	284 (45.1)	241 (38.3)	43 (6.8)	25 (4.0)	11 (1.7)	8 (1.3)	3 (0.5)	2 (0.3)	13 (2.1)
Nangka (artocarpus heterophullus)	282 (44.8)	242 (38.4)	43 (6.8)	26 (4.1)	16 (2.5)	7 (1.1)	4 (0.6)	2 (0.3)	8 (1.3)

Table 4: Factors associated with overweight status among the respondents (n = 630)

Profile of the respondents	Non-overweight BMI<25 n (%)	Overweight BMI≥25 n (%)	X^2	p-value
Age				
<40 years	124 (40.8)	180 (59.2)	0.749	0.387
≥40 years	122 (37.4)	204 (62.6)		
Locality				
Rural	111 (36.8)	191 (63.2)	1.281	0.258
Urban	135 (41.2)	193 (58.8)		
Education level				
Low	184 (38.4)	295 (61.6)	0.338	0.561
High	62 (41.1)	89 (58.9)		
Employment				
Yes	118 (43.1)	156 (56.9)	3.289	0.07
No	128 (36.0)	228 (64.0)		
Marital status				
Yes	208 (36.8)	357 (63.2)	11.477	0.001*
No	38 (58.5)	27 (41.5)		
Have children				
Yes	212 (38.9)	333 (61.1)	0.037	0.847
No	34 (40.0)	51 (60.0)		
Ever breast-feeding				
Yes	150 (40.3)	222 (59.7)	0.62	0.431
No	96 (37.2)	162 (62.8)		
Contraceptive use				
Yes	66 (37.9)	108 (62.1)	0.126	0.723
No	180 (39.5)	276 (60.5)		
Vegetables intake				
Optimal	9 (36.0)	16 (64.0)	0.102	0.75
Low	237 (39.2)	368 (60.8)		
Fruit intake				
Optimal	8 (50.0)	8 (50.0)	0.827	0.363
Low	238 (38.8)	376 (61.2)		

Table 5: Factors to predict overweight status among the respondents

	---- Multiple logistic regression ----			
Factor	Wald test	p-value	Adj. OR	95% CI
Age				
≥40 years	0.125	0.723	1.06	(0.76-1.48)
Locality				
Urban	1.992	0.158	0.74	(0.49-1.12)
Education level				
Low	0.543	0.461	1.2	(0.74-1.94)
Employment				
No	1.72	0.19	0.76	(0.51-1.14)
Marital status				
Yes	11.459	0.001	2.88	(1.56-5.31)
Have children				
Yes	0.974	0.324	0.73	(0.38-1.37)
Ever breast-feeding				
No	1.551	0.213	0.76	(0.49-1.17)
Contraceptive use				
Yes	0.197	0.657	1.09	(0.74-1.61)
Vegetables intake				
Low	1.259	0.262	2.02	(0.59-6.89)
Fruits intake				
Low	2.367	0.124	0.33	(0.08-1.36)

Surprisingly the prevalence of overweight was found to be higher among respondents who have optimal vegetables intake (64.0%) as compared to those who have low intake (60.8%). Meanwhile, those who consumed fruits below the recommended level showed a higher prevalence of overweight (61.2%) as compared to those who took it optimally (50.0%).

DISCUSSION

The rise in the prevalence of overweight both in developed and developing countries reached a worrying trend. It is projected that the situation is likely to get worse over time along with modernization and changing of the population's lifestyle (dietary pattern, sedentary living, improved transportation, etc). The most affected group was the women, especially those within the reproductive age (15-45 years old). Previous study also suggested that women tend to gain greatest amount of weight at this period of age (Siega-Riz *et al*., 2004).

In this study, we found that the prevalence of overweight among the respondents was quite high, which is at 61%. In another term, almost two-thirds of the study populations were overweight regardless of their socio-economic background, obstetric and gynaecological factors and vegetables and fruits intake. This figure has increased by about two fold from the previous study done in 1999 where the prevalence of overweight among adult women at that time was only 28% (Khor *et al*., 1999). The overweight prevalence in this study is comparable to the prevalence among women aged 20-49 years old in other developing countries such as Turkey (62%), Mexico (65%) and South Africa (61%), while India and China showed lower prevalence at 30 and 22%, respectively (Mendez *et al*., 2005). In developed countries such as the United States, the

prevalence of overweight is also comparable to this study (64.7%) (Hedley *et al*., 2004). This indicates that prevalence of overweight in this study is at par with the prevalence in the developed countries.

In this study, we found that there was an association between respondents marital status and overweight (p = 0.001). Women who were married have a higher prevalence of overweight (63.2%) than women who were not married (41.5%). This finding is supported by a previous study where marriage was associated with a significant 2-year weight gain and divorce with a significant 2-year weight loss. Possible relation of marriage and weight is that marriage create an opportunity for eating where married people tend to eat together.

Another explanation is that, people who are separated or left a marriage-like relationship tend to lose weight as a strategy to attract a new partner, while those who are married tend to gain weight due to secure in relationship and lack of motivation to lose weight (Jeffery and Rick, 2002).

In term of other socio-economic parameters, there were no associations between age, locality, education level and employment with weight status of the respondents. This contradicts the results of most previous studies. For example, a previous study showed that the prevalence of overweight and obesity is increasing with age (Sidik and Rampal, 2009). In this study, the age of the respondents was limited until 45 years old, while previous study set the age until 59 years old. Regardless of that, the prevalence of overweight was still higher among respondents who were older than 40 years old (62.6%), compared to those who were younger than 40 (59.2%). Limitation of age could be the factor of non-association between age and weight status in this study. There was also no association between locality of the respondents and overweight, as both rural and urban areas recorded almost identical prevalence of overweight (63.2 and 58.8%). This finding is consistent with other study where the prevalence of overweight and obesity among women are identical between rural and urban area (Mendez *et al*., 2005).

As for obstetric and gynaecological factors, there was no significant association between factor of parity, breast-feeding and contraceptive use with overweight. This contradicted the study by Hilson *et al.* (1997) where they reported that overweight and obesity were negatively associated with the duration of exclusive or any breast-feeding. The prevalence of overweight was some what higher in those who have never breast-fed (62.8%) as compared to those who have ever breast-fed (59.7%). The limitation in this study is that, the data on the duration of breast-feeding was not taken. Although a previous study indicate a weak association between parity and both weight gain and overweight in women (Brown *et al*., 1992), there was no association between parity and overweight in this study, in which the prevalence of overweight is almost similar between respondents who have children (61.1%) and those without children (60.0%).

As for vegetables and fruits intake which is the main research question of this study, most of the respondents did not consume vegetables and fruits optimally as recommended in the nutritional guideline. Only 4.0% of the respondents consumed vegetables optimally and 2.5% consumed fruits optimally. There was no significant association between vegetables and fruits intake with overweight in this study. However, the trend shows that the prevalence of overweight was much higher in respondents who optimally took vegetables (64.0%) and in respondents who took low fruits (61.2%). This finding is different from a previous study where diet high in fruits and vegetables are linked to smaller weight gain and to a lower risk of overweight and obesity (Quatromani *et al*., 2002). There is a limitation in this study in determining body weight change associated with dietary pattern of respondents, for example the relation of consuming more vegetables and fruits for weight loss. A more detailed profile of the food items such as the amount of portion eaten, weight of food items and specific macronutrients and micronutrients of the food items are required. Furthermore, change in the dynamic of dietary pattern and weight status of respondents need to be monitor over time for a more precise result, in which this cross-sectional study is less suitable.

Other limitations of this study include other important contributing factors of overweight and obesity such as data on respondents physical activity, psychosocial profile, smoking, other dietary parameters such as dietary habit, type of cooking and many more.

Conclusion: The prevalence of overweight in this study was high particularly among married women. Low vegetables and fruits intake did not contribute to the overweight status of healthy reproductive age of Malay women.

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