

Energy, protein, fat and carbohydrate intakes of underweight, normal weight and obese government office workers in an urban area

Fatimah Arshad¹ PhD(UBC), MS, BS(LSU), PostGradDip(London) SRD, Md Idris Mohd Nor² MD(UKM) MPH(Hawaii), Romzi Md Ali¹ BScDietetic(UKM) and Faizah Hamzah¹ BSc(UKM)

1. Department of Dietetics, Faculty of Allied Health Sciences;

2. Dept of Community Health, Faculty of Medicine, National University of Malaysia, Kuala Lumpur, Malaysia

Diet is one of the major factors contributing to the development of obesity, apart from heredity and energy balance. The objective of this cross-sectional study is to assess energy, carbohydrate, protein and fat intakes in relation to bodyweight status among government office workers in Kuala Lumpur. A total of 185 Malay men and 196 Malay women aged 18 and above were randomly selected as the study sample. Height and weight were taken to determine body mass index (BMI). The dietary profile was obtained by using 24-hour dietary recalls and food frequency methods. This was analysed to determine average nutrient intake per day. Other information was ascertained from tested and coded questionnaires. The subjects were categorised into three groups of bodyweight status namely underweight (BMI < 20 kg/m²), normal weight (BMI 20-25 kg/m²) and obese (BMI > 25 kg/m²). The prevalence of obesity was 37.8%. The study showed that the mean energy intake of the respondents was 1709 ± 637 kcal/day. The energy composition comprised of 55.7 ± 7.6% carbohydrates, 29.7 ± 21.7 % fat and 15.6 ± 3.8% protein. There was no significant difference in diet composition among the three groups. The findings indicate that normal weight and overweight individuals had a lower intake of calories and carbohydrates than the underweight individuals (p<0.05). However, there were no significant differences in fat intakes.

Introduction

There is evidence that the prevalence of obesity in many developing countries including Malaysia is on the increase. Among urban subjects, the available studies show an average of one quarter to one third of the men and women are overweight^{1,2}.

Weight gain is associated with decreased physical activity and a progressive decline in caloric requirements for weight maintenance. Obesity has been regarded as a problem of nutrient imbalance. Initially it was thought that excessive energy intake was the primary cause of obesity among obese individuals. However, some studies report that obese individuals consume a minimal amount of energy per day. In some cases, obese individuals consumed less and expended more energy in resting metabolic rate and physical activity than normal weight individuals³.

Other factors than total energy value of food cause obesity. The total energy content of obese individuals is not the main cause of obesity. Other aspects, like the dietary composition of fat, protein and carbohydrate may be contributing factors. A study done by Miller⁴ reports that among adults, the percentage of fat as a source of energy, increases when there is an increase in body fat. He also reports that there is no relation between energy intake and body fatness even though underweight individuals were found to exercise more than the obese individuals. There is evidence suggesting that obesity is not associated with overeating, but with a high dietary fat to carbohydrate intake ratio⁵.

The objective of this study is to assess energy and nutrient intake associated with obesity among obese, normal weight and underweight individuals. The diet composition of 381

government office workers will be reported. The variables mentioned and their association with bodyweight status will be discussed.

This paper will only report parts of the findings of a larger study entitled "The Construction and Evaluation of a Health Education Package to Overcome Obesity Problem" which involved urban and rural subjects.

Methods

This cross-sectional study focuses on subjects from two governmental departments in the Federal Territory, the Prime Minister's Department and Ministry of National Unity and Community Development. A total of 385 adults (aged 18 and above) were randomly selected among Malay workers in the two departments. For the purpose of analysis, pregnant women and invalids were excluded. On the basis of Garrow's classification, three groups of workers were identified for the study: obese, body mass index (BMI) of greater than 25 kg/m²; normal weight, BMI of 20 to 25 kg/m²; underweight, BMI 20 kg/m² or less. This study was conducted as a part of an obesity project entitled "The preparation and Evaluation of a Health Education Package to Overcome Obesity Problem".

Height and weight of each subject were measured and a carefully prepared questionnaire was administered. Subjects were interviewed individually in the office meeting room by trained interviewers. Information on socioeconomic status, income and expenditure, education level, source of

Correspondence address: Assoc. Prof. Dr. Fatimah Arshad, Department of Dietetics, Faculty of Allied Health Sciences, National University of Malaysia, Jln. Raja Muda Abdul Aziz, 50300, Kuala Lumpur.
Tel: 09-4405273 Fax : (603) 2914304
Email: Fatimah@pkrisc.cc.UKM.my

information on health and nutrition, dietary profile and knowledge on obesity were obtained from the questionnaire. Physical activity recalls were also documented.

Height was measured to the nearest 0.1cm with a microtoise. Weight was measured to the nearest 0.05kg with a daily calibrated SECA beam balance. Bodyweight status was assessed based on BMI, determined by the following formula: Body mass index (BMI) = weight (kg)/ height (m)².

Dietary intake was assessed with combination of the 24-Hour Dietary Recall and Food Frequency methods. A nutrition intake profile for 7 days was obtained and averaged. The household measurement kits such as cups, tablespoons, teaspoons and Chinese bowls were used by interviewers to help the subjects in recalling and quantifying their food intake.

The amount of time each subject spent engaged in light, moderate and heavy physical activity was estimated using self-reported activity for the days in which the dietary intake was assessed. Categorisation of physical activity pattern in this study was based on the method of Folsom et al⁶. Dietary data were carefully coded using the Malaysian Food Composition Table compiled by Tee et al⁷ and analysed with a diet analysis computer program to obtain information on the intake of energy and nutrients. Nutrient variables included: dietary fat, carbohydrate and protein. Nutrients were also expressed as percentage of total energy intake.

All data were analysed by using procedures in the Dbstats statistical computer program. The association between bodyweight status and nutrient intakes and other variables were tested with Chi-Square and ANOVA.

Results

The total number of the respondents was 385 workers. They were comprised of 186 (48.3%) men and 199 (51.7%) women. Out of 385 subjects: 78.4% were clerks, 13.8% officers and 7.8% security guards and policemen. In terms of activity patterns, the majority of the respondents (71.1%) did light, 21.5% did moderate and 7.3% did heavy physical activity. Four subjects from whom data were collected were excluded due to incomplete data on height. Therefore, the final sample consisted of 381 workers as shown in Table 1. Average age for the total sample was 37.39 ± 6.65 years.

Table 1: Prevalence of underweight, normal weight and obese among 381 government office workers in Kuala Lumpur.

Bodyweight status	Men (n=185)	Women (n=196)	Total (n=384)
Underweight (BMI<20)	29 (15.7)	23 (11.7)	54 (14.1)
Normal weight (BMI 20-25)	88 (47.6)	97 (49.5)	185 (48.2)
Obese (BMI>25)	68 (36.8)	76 (38.8)	145 (37.8)

BMI = kg/m²

The average age and body mass index (BMI) of the subjects by sex and bodyweight status, are described in Table 2. There were significant differences in age and BMI between the underweight, normal weight and obese groups for both men and women. The obese men and women had a higher average age than the other two groups.

The average daily energy intake of the total sample was 1709.2 ± 637.3 Kcal. The diet consisted of 55.7 ± 7.6% carbohydrate, 15.6 ± 3.8% protein and 29.7 ± 21.7% fat. Table 3 describes energy and nutrient intakes by study group. The underweight ate a greater proportion of energy, carbohydrate, protein and fat than the normal weight and obese subjects. The overweight consumed slightly higher intake (1687 kcal) than

the normal weight (1669 kcal). However, they consumed significantly lower energy than the underweight subjects (1912 kcal). Similar differences were observed between the three groups regarding carbohydrate and protein intakes. There are no significant differences in fat intake between the obese, normal weight and underweight subjects. However, the obese consumed more fat than the underweight subjects.

Table 2: Average age and body mass index by sex and bodyweight status

Bodyweight status.	Underwt (n=29)	Normal wt (n=88)	Obese (n=68)
Men			
Age :*	32.8±8.1	37.7±6.6	40.2±8.4
BMI:*	18.0±1.1	22.1 ± 1.3	27.4±2.2
Women			
Age :*	33.5±4.9	36.9±6.3	38.6±5.4
BMI:*	18.3±1.1	22.0±1.4	28.0±3.7

* p<0.05

Table 3: The daily energy, carbohydrate, protein and fat intakes of the underweight, normal weight and overweight government office workers in Kuala Lumpur.

Bodyweight status	Underweight (n=52)	Normal (n= 185)	Obese (n= 144)
Nutrient:			
Energy (kcal)*	1912±712	1669±609	1687±636
Carbohydrate (g)*	258.4±90.1	229.5±77.9	231.6±80.2
Protein (g)*	76.3±39.8	65.7±31.8	67.8±34.3
Fat (g)	63.7±30.2	54.4±25.9	59.7±70.9

*p< 0 05

Table 4 describes average daily energy, carbohydrate, protein and fat intakes of the subjects and shows results from ANOVA (analysis of variance) by sex and study group. The obese men tended to consume more energy (1872 kcal) than did the normal weight (1825 kcal) but they consumed less energy than the underweight men (2110 kcal). There is a similar trend whereby the obese men had higher carbohydrate intakes than the normal weight man. They tended to consume more fat than the other two groups.

Among women, the obese consumed less energy (1522 kcal) than normal weight (1527 kcal) and underweight women (1661 kcal). As with the men, differences in carbohydrate and protein intakes between obese, normal weight and underweight were observed among women. The obese women ate a greater proportion of fat than the other two groups. (this is not what the table says)

The differences between daily energy and nutrient intakes by sex and group described were not significant. There was no significant difference of nutrient intake (expressed as percentage of energy) by sex and bodyweight status. Table 5 shows carbohydrate, protein and fat intakes expressed as percentages of energy intake. There is no significant difference between energy composition among the obese, the underweight and normal weight subjects.

Discussion

Several studies (eg Goth³) have attempted to determine the relationships between adiposity, diet composition and energy intake. Typically, obese individuals are reported to have lower energy intakes than non-obese individuals. The obese subjects in this study had less daily energy intake than the underweight subjects, but more daily energy intake than the normal weight subjects (Table 3). However, the difference is not significant

Table 4. Energy and nutrient intake by sex and bodyweight status.

Bodyweight status	Men			Women		
	Underwt (n=29)	Normal (n=88)	Obese (n=68)	Underwt (n=23)	Normal (n=97)	Obese (n=76)
Daily energy intake (Kcal):	2110±792	1825±655	1872±688	1661±507	1527±528	1522±536
Carbohydrate (g):	287.2±94.4	257.1±83.4	261.2±86.0	222.0±70.6	204.2±63.0	205.0±64.3
Protein (g):	84.7±47.7	70.6±35.0	74.0±37.1	65.5±23.4	61.1±28.0	62.1±30.7
Fat (g):	69.1±35.8	57.1±26.7	70.1±99.4	56.8±19.9	51.8±24.9	50.3±24.1

Table 5. The diet composition (expressed as percentage of energy) of the underweight, normal weight and overweight government office workers by sex, in Kuala Lumpur.

Bodyweight status	Men			Women		
	Underwt (n=117)	Normal (n=57)	Obese (n=11)	Underwt (n=23)	Normal (n=97)	Obese (n=76)
Carbohydrate (%)	57.0±7.8	57.1±6.7	54.9±9.0	53.6±6.3	54.3±7.5	55.1±7.6
Protein (%)	15.1±3.5	15.2±3.1	17.1±4.6	15.7±3.3	15.8±3.2	15.8±3.2
Fat (%)	27.7±5.3	34.6±54.7	27.8±5.9	30.5±4.7	29.8±5.4	28.9±5.5

when the energy intake is analysed by group and sex (Table 4). This could be explained by of non-homogeneity in the distribution of sex and its cross-sectional nature.

There is a similar observation regarding carbohydrate and protein intakes by sex and study group whereby obese men consumed less carbohydrate and protein than underweight men, but more than normal weight men. This is also true among the women whereby the obese women consumed less carbohydrate and protein than the underweight women.

Regarding fat intake, the obese men consumed more fat than the underweight and normal weight men. On the other

hand, the obese women consumed less fat than the other two groups. However, the differences are not significant.

In conclusion, there is a trend for the obese to have energy intake less than the underweight subjects. However, this study failed to document any significant differences among the obese, underweight and normal weight subjects regarding this documentation. It could be due to the activity levels of the obese individuals.

Acknowledgments

This study is made possible by support from IRPA (Intensification of Research in Priority Area) grant, 1993.

Energy, protein, fat and carbohydrate intake of underweight, normal weight and obese government office workers in an urban area

Fatimah Arshad, Idris MN, Romzi MA and Faizah H

Asia Pacific Journal of Clinical Nutrition (1996) Volume 5, Number 2: 88-91

體重不足、體重正常和肥胖的都市政府職員的 能量、蛋白質、脂肪和碳水化合物的進食量

摘要

除遺傳和能量平衡外，膳食是一個促成肥胖症的主要因素。該研究的目的是評估吉隆坡政府職員體重狀況與能量、碳水化合物、蛋白質和脂肪進食的關係。本文隨機選擇了18歲以上的馬來西亞男子185人和女子196人為對象。測定他們的身高與體重以計算體重指數(BMI)。由食物頻數和24小時回憶法得到膳食情況，並以此測定每日平均營養素進食量。其它資料從問卷取得，根據體重情況把對象分成體重不足(BMI < 20 公斤/米²)，體重正常(BMI 20-25 公斤/米²)和肥胖者(BMI > 25 公斤/米²)三組。結果顯示受試者的平均能量進食為1709±637 仟卡/日。55.7±7.6% 來自碳水化合物，29.7±21.7% 來自脂肪和15.6±3.8% 來自蛋白質。三組的膳食組成沒有明顯差異。該研究發現正常體重和超重者，其能量和碳水化合物進食較體重不足者低(p < 0.05)。但他們的脂肪進食量沒有明顯差異。

Energy, protein, fat and carbohydrate intake of underweight, normal weight and obese government office workers in an urban area

Fatimah Arshad, Idris MN, Romzi MA and Faizah H

*Asia Pacific Journal of Clinical Nutrition (1996) Volume 5, Number 2: 88-91***Pengambilan tenaga, protein, lemak dan karbohidrat di kalangan kakitangan kerajaan yang kurang berat badan, berat badan normal dan obes di satu kawasan bandar.**

Diet merupakan salah satu faktor utama yang menyumbang kepada kejadian obesiti, selain daripada faktor genetik dan pengeluaran tenaga. Objektif kajian garis lintang ini adalah untuk menilai hubungan di antara pengambilan tenaga, karbohidrat, protein dan lemak dengan status berat badan. Seramai 185 orang lelaki dan 196 orang perempuan Melayu berusia 18 tahun dan ke atas dipilih secara rawak sebagai sampel kajian. Tinggi dan berat badan mereka diukur untuk menentukan Indeks Jisim Tubuh (BMI). Profail diet diperolehi melalui kaedah Ingatan Diet 24 jam dan Frekuensi Makanan untuk menentukan purata pengambilan nutrien sehari. Lain-lain maklumat diperolehi daripada soalselidik yang telah diprauji dan dikodkan. Subjek telah dikategorikan kepada tiga kumpulan iaitu individu yang kurang berat badan (BMI <

20kg/m²), individu berberat badan normal (BMI 20-25kg/m²) dan individu obes (BMI > 25kg/m²). Didapati prevalens obesiti ialah 37.8%. Kajian ini menunjukkan bahawa min pengambilan tenaga oich responden ialah 1709.2 ± 637.3 kkal/hari. Komposisi tenaga terdiri dari 55.7 ± 7.6% karbohidrat, 29.7 + 21.7% lemak dan 15.6 ± 3.8% protein. Tidak terdapat perbezaan dari segi komposisi pengambilan tenaga di antara ketiga-tiga kumpulan. Hasil kajian menunjukkan pengambilan tenaga dan karbohidrat oleh kumpulan individu berberat badan normal dan obes adalah lebih tinggi berbanding dengan kumpulan individu kurang berat badan (p<0.05). Walaubagaimanapun, tidak terdapat perbezaan di antara status berat badan dengan pengambilan lemak.

References

1. Jones JJ, A comparative study of the prevalence of adult obesity in three racial groups of Kuala Lumpur. *Med J Mal* 1976; 30: 256-260.
2. Teo PH, Chong YH and Mohd. Zaini AR Coronary risk factors among Malaysian males executives in two urban areas. *Proc Nutr Soc Malaysia* 1988; 3: 24-31.
3. Goth E. Aetiological factors in obesity. *Proc Nutr Soc* 1973; 32: 175-9.
4. Miller WC et al. Diet composition, energy intake and exercise in relation to body fat in men and women. *Am J Clin Nutr* 1990; 52: 426-30.
5. Miller WC. Diet composition, energy intake and exercise in relation to body fat in men and women, *Med Sci Sports-Exercise* 1991. Mar; 23 (3): 280-84.
6. Folsom AR et al. Leisure time physical activity and its relationship to coronary risk factors in a population-based sample. *Am J Epidemiol* 1985; 121: 570.
7. Tee ES et al. ASEAN Food Habits Project National Sub-Committee on Protein: Food habits Research and Developments Malaysia, Nutrient Composition of Malaysian Food. 1988.