

A COMMUNITY HEALTH SCREENING CONDUCTED AT SUNGAI PINANG TOWNSHIP, STATE OF PULAU PINANG, MALAYSIA

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Non-communicable diseases are raising much concern in Malaysia due to changing lifestyles which is parallel to the economic development. Intervention program like community health screening (CHS) allows early detection, prevention and reduction of chronic diseases and its risk factors. This study aimed to assess the obesity level, risk factors for chronic diseases and blood cholesterol level among the Malaysian public. A health screening program was conducted on April 2012 at Sungai Pinang township, in the state of Pulau Pinang, Malaysia. A convenient sample of the general public was recruited. Screening tests consisted of measurements of blood pressure, body mass index (BMI), body fat percentage, visceral fat accumulation (VFA) and blood cholesterol. Chi-square analysis was used to determine the difference between prevalence of obesity among subjects with different age groups and gender. Out of 76 recruited subjects, 23.7% had systolic blood pressure of 140 mmHg or greater and 7.9% had diastolic blood pressure of 90 mmHg or greater. Approximately 51% of the subjects were obese (BMI ≥ 27.5 kg/m²). Body fat percentage was high in 63.6% and 63.0% of male and female subjects, respectively. High VFA (≥ 15) was found in 19.8% of subjects. There were three newly discovered hypercholesterolemia cases (total cholesterol ≥ 5.2 mmol/L). Counselling was given during the health screening program to help the public to take necessary measures to reduce risk factors while preventing complication resulting from these chronic diseases. In conclusion, prevalence of obesity found to be high in the present screened population.

Keywords: Community health screening, Obesity, Body mass index, Body fat percentage, Visceral fat accumulation

INTRODUCTION

Over the decades, rapid urbanisation and modernisation along with changing lifestyles in Malaysia have left significant impacts on the general health of the population. While the nation experiences the reduction in communicable diseases, non-communicable diseases such as diabetes mellitus, hypertension and cardiovascular diseases are on the rise (Wagner and Brath 2012). In Malaysia, cardiovascular disease is the number one cause of death in government hospitals in 2009 (Ministry of Health 2010). Besides that, the third National Health and Morbidity Survey in 2006 has shown that the prevalence of the Type 2 diabetes mellitus (T2DM) for adults aged 30 years old and above in Malaysia is 14.9%, which is a 79.5% increase over a 10-year span (Academy of Medicine of Malaysia 2009).

Prompt actions should be taken to overcome the increasing prevalence of common chronic illnesses. One of the measures is to carry out community health screening (CHS). CHS is an important part of preventive health care which allows early

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detection of serious and chronic health problems and identification of new cases of diseases (Strong *et al.* 2005). It provides detections for individuals with risk factors and clinical manifestations of chronic illnesses (Australian Population Health Development Principal Committee 2008). Besides, health counselling and education by trained healthcare providers provide useful information to the public to maintain optimum health and prevent chronic diseases. Referrals of possible new cases for further evaluation help to reduce health burden due to disease complications. This study aimed to assess the obesity level, risk factors for chronic diseases and blood cholesterol level among the Malaysian public.

METHODS

A one day CHS program was held at Jalan Sungai Pinang Primary School, Sungai Pinang township, in the state of Pulau Pinang, Malaysia on April 2012 by the School of Pharmaceutical Sciences, Universiti Sains Malaysia (USM). Sungai Pinang is a suburban area with a total population of 1696. The majority of the population consisted of Malays (73.6%), followed by the Chinese (22.1%), Indians (0.6%) and others (3.7%) [Department of Statistic Malaysia 2010]. Convenient sampling was used to collect data from the general public. Any public who voluntarily walked into the health screening counter and requested for the screening tests were recruited as the subjects. Two weeks before the health screening, flyers were placed at the main sites of Sungai Pinang township to advertise the venue, date and time of the screening. The public was asked to fast 10 hours prior to screening. This study was granted approval from the "1 Malaysia Community" Committee, Department of Information, Pulau Pinang.

Among the screening tests carried out were measurements of blood pressure, body mass index (BMI), body fat percentage, visceral fat accumulation (VFA) and blood cholesterol. Body fat percentage and VFA were measured through bioelectrical impedance analysis (model HBF-362, Omron Healthcare Co. Ltd., Kyoto, Japan). Blood pressure measurement was performed using British Hypertension Society-validated electronic blood pressure sets (model HEM-2703, Omron Healthcare Co. Ltd., Kyoto, Japan; accuracy ± 3 mmHg). Subjects were in seated position during the tests. The arm used in the measurement was elevated to heart level and supported by a table. Subjects were well rested for 5 minutes before measurement was taken in the morning. Two measurements were taken for each subject at 15 minutes apart. Total cholesterol was measured using 1 or 2 drops of blood obtained through a finger prick. The finger prick was done using a spring-loaded lancet device (Accu-Check® Safe-T-Pro Plus, Roche Diagnostics, Mannheim, Germany) that punctures the fingertip. The blood sample was placed on a test strip that was measured in a blood cholesterol monitor (Accutrend® Cholesterol, Roche Diagnostics, Mannheim, Germany; accuracy at 5.17 mmol/L, bias was -2.3% with a total error of 15%, at 6.21 mmol/L, bias was -0.2% with a total error of 13%).

Data analysis was performed using SPSS® for Window, version 16.0. Chi-square analysis was used to determine the difference between prevalence of obesity among subjects with different age groups and gender. Statistical significant was set at a *p* value of less than 0.05.

RESULTS

Demographic Data of Subjects

A total of 76 subjects were screened and 71.0% of the subjects were female (Table 1). The mean age of the subjects was 47.4 ± 13.8 years old and the majority (56.6%) of them were between 40 to 59 years. Most of the screened subjects were Malay (61.8%) and married (86.8%). Approximately 32% of the subjects were employed while the common co-morbidities respondents had were diabetes mellitus and hypertension with the prevalence of 13.3% (n=10) and 11.8% (n=9), respectively.

Table 1: Demographic data of the subjects.

Characteristics	n (%)
Gender	
Male	22 (29.0)
Female	54 (71.0)
Age group	
<20	5 (6.6)
20-29	2 (2.6)
30-39	9 (11.9)
40-49	22 (29.0)
50-59	21 (27.6)
60-69	15 (19.7)
70-79	2 (2.6)
Marital status	
Single	7 (9.2)
Married	66 (86.8)
Missing data	3 (4.0)
Ethnic groups	
Malay	47 (61.8)
Chinese	1 (1.3)
India	26 (34.2)
Missing data	2 (2.7)
Employment position	
Student	4 (5.3)
Working	24 (31.6)
Retired	8 (10.5)
Unknown	40 (52.6)
Co-morbidities	
None	58 (76.3)
1	11 (14.5) ^a
2	7 (9.2) ^a
^aTypes of co-morbidity	
Hypertension	9 (36.0)
Diabetes mellitus	10 (40.0)
Asthma	4 (16.0)
Cardiovascular diseases	2 (8.0)

Notes: ^aType of co-morbidities from the 18 subjects:
 4 subjects have diabetes mellitus and hypertension
 2 subjects have asthma and hypertension
 1 subject has diabetes mellitus and cardiovascular disease

Results of Screening Tests

The results of screening tests are shown in Table 2. Around 24% of the subjects have systolic blood pressure of 140 mmHg or more. Considering the diastolic blood pressure, 7.9% of the measured levels were at 90 mmHg or greater. Detailed analysis on 9 subjects with pre-existing hypertension found that only 2 subjects had systolic blood pressure of less than 140 mmHg whereas 8 subjects had diastolic blood pressure of less than 90 mmHg. When screening for BMI, 51.3% (n=39) of the subjects were found to be obese (BMI \geq 27.5 kg/m²). More detailed analysis revealed that 59.1% (n=13) male and 48.1% (n=26) female subjects were obese. High body fat content was found in 63.6% (n=14) male (>25%) and 63.0% (n=34) female (>35%) subjects. A total of 15 subjects (19.8%) had high VFA in which 4 of them had co-morbidities like hypertension, cardiovascular diseases and diabetes. Out of 12 subjects who underwent blood cholesterol screening, 75% (n=9) of them had normal cholesterol value (<5.2 mmol/L). However, the remaining three subjects were found to have high total cholesterol level (\geq 5.2 mmol/L) and these were newly discovered hypercholesterolemia cases in the present screening program.

Chi-square analysis found that there was no significant difference in the prevalence of obesity among different age groups and gender (Table 3). High fat percentage was noted in 3 (33.3%) out of 9 male and 16 (57.2%) out of 27 female subjects who were non-obese (Table 4).

Appropriate medical advice and counselling on the diseases (hypertension and obesity), the complications, treatment and prevention were delivered to all the subjects by trained healthcare providers (i.e. lecturers from the School of Pharmaceutical Sciences, USM who are also registered pharmacists in Malaysia) during the health screening. Referrals to healthcare institutions were recommended for those with high risks and with clinical manifestations of chronic diseases such as hypertension, obesity and hypercholesterolemia.

Table 2: Results of the screening tests.

Characteristics	Gender		Total, n (%)
	Male, n (%)	Female, n (%)	
Systolic blood pressure (mmHg)			
<120	5 (22.7)	22 (40.7)	27 (35.5)
120-139	12 (54.5)	19 (35.2)	31 (40.8)
140-159	4 (18.2)	12 (22.2)	16 (21.1)
160-179	1 (4.6)	1 (1.9)	2 (2.6)
Systolic blood pressure (mmHg)			
<80	14 (63.6)	41 (75.9)	55 (72.4)
80-89	5 (22.7)	10 (18.5)	15 (19.7)
90-99	3 (13.6)	2 (3.7)	5 (6.6)
100-109	0 (0.0)	1 (1.8)	1 (1.3)

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Table 2: (continued)

Characteristics	Gender		Total, n (%)
	Male, n (%)	Female, n (%)	
BMI (kg/m²)			
<18.5	0 (0.0)	1 (1.8)	1 (1.3)
18.5–22.9	3 (13.6)	4 (7.4)	7 (9.2)
23.0–27.4	6 (27.3)	23 (42.6)	29 (38.2)
27.5–34.9	13 (59.1)	21 (38.9)	34 (44.7)
35.0–39.9	0 (0.0)	3 (5.6)	3 (4.0)
≥40.0	0 (0.0)	2 (3.7)	2 (2.6)
Body fat percentage (%)^a			
10–20	2 (9.1)	0 (0.0)	2 (2.6)
21–25	5 (22.7)	1 (1.8)	6 (7.9)
26–30	7 (31.8)	5 (9.3)	12 (15.8)
31–35	5 (22.7)	12 (22.2)	17 (22.4)
>35	2 (9.1)	34 (63.0)	36 (47.4)
Missing data	1 (4.6)	2 (3.7)	3 (3.9)
VFA			
1–9	5 (22.7)	22 (40.7)	27 (35.5)
10–14	9 (40.9)	17 (31.5)	26 (34.2)
≥15	7 (31.8)	8 (14.8)	15 (19.8)
Missing data	1 (4.6)	7 (13.0)	8 (10.5)
Total cholesterol (mmol/L)			
<5.2	4 (80.0)	5 (71.4)	9 (75.0)
5.2–6.5	1 (20.0)	1 (14.3)	2 (16.7)
≥6.5	0 (0.0)	1 (14.3)	1 (8.3)

Note: ^aBody fat is high in male and female if the level is >25% and >35% respectively

Table 3: Prevalence of obese and non-obese subjects according to different age groups and gender.

Characteristics	Obese (BMI ≥ 27.5 kg/m ²), n (%)	Non-obese (BMI < 27.5 kg/m ²), n (%)	Chi-square analysis result
Age group (year)			
<50	18 (47.4)	20 (52.6)	X ² =0.749; p=0.387
≥50	21 (55.3)	17 (44.7)	
Gender			
Male	13 (59.1)	9 (40.9)	X ² =0.474; p=0.491
Female	26 (48.1)	28 (51.9)	

Table 4: Sub-group analysis of obese and non-obese subjects as compared to their body fat percentage.

Characteristics	Obese (BMI \geq 27.5 kg/m ²), n (%)	Non-obese (BMI < 27.5 kg/m ²), n (%)
Body fat percentage (%)^a		
Male		
10-20	1 (7.7)	1 (11.1)
21-25	3 (23.1)	2 (22.2)
>25	9 (69.2)	5 (55.6)
Missing data	0 (0.0)	1 (11.1)
Female		
10-20	0 (0.0)	0 (0.0)
21-25	0 (0.0)	1 (3.6)
26-30	1 (3.8)	4 (14.3)
31-35	1 (3.8)	11 (39.3)
>35	22 (84.6)	12 (42.9)
Missing data	2 (7.7)	0 (0.0)

Note: ^aBody fat is high in male and female if the level is >25% and >35% respectively

DISCUSSION

Parallel to the changing lifestyles of Malaysian population, the obesity problem among the public is a rising concern due to its potentially serious complications. Indeed, Malaysia is ranked number six in terms of obesity in Asia (Lim 2008). According to the Malaysian Clinical Practice Guideline on Management of Obesity 2003 (Academy of Medicine of Malaysia 2003), a subject with a BMI between 23.0 to 27.4 kg/m² is considered pre-obese while a BMI equals or more than 27.5 kg/m² is considered obese. The present screening shows that approximately half of the subjects screened were obese and the percentage of body fat was found to be high in more than half of the male and female. However, the prevalence of obesity found in the present study (51.3%) was higher than reported in the nationwide data in which 30% of population in Malaysia was obese (Lim 2008). In the present study, there is no significant difference for age group in the prevalence of obesity. This finding reflects that sedentary life style may be common among the screened subjects regardless of their age group.

Overweight or obese people are at increased risk of developing Type 2 diabetes mellitus, dyslipidaemia, metabolic syndrome, breathlessness and sleep apnoea (Said *et al.* 2010; Caballero 2007; Finkelstein *et al.* 2007; Academy of Medicine of Malaysia 2003). However, the literatures have elucidated the use of body fat percentage as a more accurate parameter in predicting cardiometabolic risk as BMI does not differentiate between body fat and lean mass (Shea *et al.* 2012; De Lorenzo *et al.* 2011). In fact, there were non-obese men and women in our current screening result who had high percentage of body fat. Thus, body fat percentage is an important parameter to predict cardiometabolic risks apart

from BMI. Concerted efforts in educating the general public on obesity and body fat issues may help to raise awareness of the complications of these illnesses and promoting healthy lifestyles.

Visceral fat consists of fats in abdominal cavity surrounding muscles and vital organs. Individuals with excess visceral fat have greatly increased chances of having diabetes, cardiovascular disease and hypertension (Nakamura *et al.* 1994; Kanai *et al.* 1990). Possible mechanism is metabolism of visceral fats results in excess fatty acids in the liver. This subsequently leads to enhanced lipid synthesis and insulin resistance which may progress to hyperlipidaemia and glucose intolerance (Matsuzawa *et al.* 1994). In fact, 4 out of 15 subjects manifested with high VFA in the present health screening had such chronic diseases. Hence, health promotion programs and lifestyle modification to reduce the visceral fat are useful and have been shown to be beneficial in reducing obesity-related cardiovascular risks (Okauchi *et al.* 2010).

The Malaysian National Cardiovascular Disease Database has revealed that 55.9% of patients had dyslipidemia before presentation of acute coronary syndrome (ACS) [National Cardiovascular Disease Database Malaysia 2006]. In the present screening, 3 out of 12 subjects who underwent blood cholesterol test had blood cholesterol level of 5.2 mmol/L or more. This is a worrying finding. A study by the Asia Pacific Cohort Studies Collaboration (APCSC) has shown that every 1 mmol/L increase in the level of total cholesterol is associated with 35% increased risk of coronary death and 25% increased risk of fatal or non-fatal ischemic stroke (Zhang *et al.* 2003). Furthermore, health-care cost due to complications of dyslipidemia would increase with the increase of population with high cholesterol level in this country. Thus, any activities or programs aiming to control blood cholesterol levels among the public should give more emphasis on this group of subjects. Complete lipid profile should be done for those with manifestation of dyslipidemia as some studies have shown the importance of low density lipoprotein particle size (LDL-P) in predicting cardiovascular disease incidence (El Harchaoui *et al.* 2007; Cromwell and Otvos 2004).

In addition, the screening program also discovered three new cases of subjects with high blood cholesterol levels. As proposed by the Australia population based screening framework (Australian Population Health Development Principal Committee 2008), individuals with risks or disease symptoms should be referred to health professionals with appropriate expertise for further management. The detection of subjects with risks and symptoms of disease fulfils one of the aims of screening programs, which results in an early management of the condition (Strong *et al.* 2005).

Hypertension is one of the risk factors of coronary heart disease (CHD). A study by Thomas *et al.* (2002) had shown that the risk of CHD is dramatically increased, especially in men, in the presence of both hypercholesterolemia and high systolic blood pressure. The present health screening revealed that the majority of the hypertensive subjects have uncontrolled systolic blood pressure. Besides, among all the screened subjects, around 20% have unsatisfactory level of systolic blood pressure (140 mmHg or greater) [Academy of Medicine of Malaysia 2008]. Thus, further management and routine follow up should be carried out to control their blood pressure.

The results of this study cannot be extrapolated to the whole population due to several reasons. Firstly, this study was conducted for one day in one location with only a small number of subjects involved. As the national data shows that different ethnic groups have different prevalence of obesity and hypertension (Rampal *et al.* 2008, 2007), the small sample size of the Chinese subjects limits the generalisability of the findings. However,

this study has provided insights into the prevalence of obesity and associated risk factors for chronic diseases in a local setting.

CONCLUSION

The prevalence of obesity has been found to be high in the present screened population. This calls for more aggressive antiobesity health programs to be held. Early detections of hypercholesterolemia would lead to better health outcomes and reduce national health burden.

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