Chula Med J Vol. 54 No. 5 September - October 2010

Health-risk behaviors relate to health problems on annual health check-up

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Kongsomboon K, Loetthiraphan S. Health-risk behaviors relate to health problems on annual health check-up. Chula Med J 2010 Sep – Oct; 54(5): 437 - 48

Background : *Annual health check-up is an important process to evaluate health status and identify health risk behaviors i.e. cigarette smoking, sleep deprivation, alcoholic drinking, inadequate exercise, eating unhealthy foods, and unsafe driving.*

Objective : *To determine the effect of gender, age group, and health-risk behaviors on health problems.*

Design : *Cross-sectional analytic study*

Materials and Methods : *Data were collected from 412 persons who went to Her Royal Highness (HRH) Princess Maha Chakri Sirindhorn Medical Center for their routine health check-up from November, 2007 to December, 2008. The authors used logistic regression and simple linear regression for multivariate analysis with two-tailed p-value of less than 0.05.*

Results : *Men had smoking, eating unhealthy diet and alcohol drinking more than women. Smoking and abdominal obesity increased according to age group. Eating unhealthy diet increased creatinine. Alcohol drinking increased triglyceride and High density lipoprotein (HDL). Adequate exercise increased HDL. Abdominal obesity related to hypertension with odds ratio of 8.65. Men had more obesity and high fasting blood sugar than women with odds ratio of 3.34 and 2.73, respectively.*

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Conclusion : *Men had health-risk behaviors and had health problems more than women. Health risk behaviors changed in blood chemistry which could predict risks to cardiovascular disease, diabetes mellitus, dyslipidemia, liver disease, or kidney disease. Healthcare providers should encourage people to have regular annual health check-up, especially the older age group.*

Keywords : *Health-risk behaviors, health problems, annual health check-up.*

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Received for publication. March 18, 2010

กิตติพงษ์ คงสมบูรณ์, สุรเชษฐ์ เลิศถิรพันธุ์. พฤติกรรมเสี่ยงต่อสุขภาพกับปัญหาสุขภาพในผู้ที่มารับบริการตรวจสุขภาพประจำปี. จุฬาลงกรณ์เวชสาร 2553 ก.ย. – ต.ค.; 54(5): 437 – 48

บทนำ : *การตรวจสุขภาพประจำปีเป็นกระบวนการสำคัญในการประเมินสุขภาพและค้นหาปัจจัยเสี่ยงต่อสุขภาพ ซึ่งประกอบด้วยการสูบบุหรี่ การอดนอน การดื่มเครื่องดื่มที่มีแอลกอฮอล์ การไม่ออกกำลังกาย การรับประทานอาหารที่เกิดโทษ และการไม่สวมหมวกกันน็อคหรือคาดเข็มขัดนิรภัยขณะขับขี่ยานพาหนะ*

วัตถุประสงค์ : *เพื่อหาความสัมพันธ์ของเพศ กลุ่มอายุ และพฤติกรรมเสี่ยงต่อสุขภาพกับปัญหาสุขภาพ*

ชนิดของการวิจัย : *การวิจัยเชิงวิเคราะห์ แบบภาคตัดขวาง*

วัสดุและวิธีการ : *การศึกษาแบบภาคตัดขวางโดยเก็บข้อมูลจากผู้มารับบริการตรวจสุขภาพประจำปีที่ศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดา ฯ สยามบรมราชกุมารี ตั้งแต่เดือนพฤศจิกายน 2550 ถึงเดือนธันวาคม 2551 รวมทั้งสิ้น 412 คน วิเคราะห์สหสัมพันธ์ด้วย Logistic regression หรือ Simple linear regression ทดสอบสมมติฐานแบบสองทางด้วยค่า $p < 0.05$*

ผลการศึกษา : *ผู้ชายมีพฤติกรรมเสี่ยงต่อสุขภาพมากกว่าผู้หญิง การสูบบุหรี่และเส้นรอบพุงที่เกินปกติพบมากขึ้นตามอายุที่เพิ่มขึ้น การรับประทานอาหารที่เกิดโทษจะมีค่าครีเอตินีนเพิ่มขึ้น การดื่มสุราจะมีค่าไขมันไตรกลีเซอไรด์และ High density lipoprotein (HDL) เพิ่มขึ้น การออกกำลังกายอย่างสม่ำเสมอจะเพิ่มค่า HDL เส้นรอบพุงที่เกินปกติสัมพันธ์กับโรคความดันโลหิตสูงมีค่า odds ratio 8.65 ผู้ชายเป็นโรคอ้วนและมีค่าน้ำตาลขณะอดอาหารสูงเมื่อเทียบกับผู้หญิงมีค่า odds ratio 3.34 และ 2.73 ตามลำดับ*

สรุป : *ผู้ชายมีพฤติกรรมเสี่ยงและปัญหาสุขภาพมากกว่าผู้หญิง พฤติกรรมเสี่ยงต่อสุขภาพทำให้ผลการตรวจเลือดผิดปกติซึ่งเสี่ยงต่อการเกิดโรคหัวใจและหลอดเลือด เบาหวาน ไขมันในเลือดสูง โรคตับ หรือโรคไต ควรกระตุ้นให้ประชาชนทั่วไปมารับบริการตรวจสุขภาพประจำปีอย่างสม่ำเสมอ โดยเฉพาะอย่างยิ่งผู้สูงอายุ*

คำสำคัญ : *พฤติกรรมเสี่ยงต่อสุขภาพ, ปัญหาสุขภาพ, การตรวจสุขภาพประจำปี.*

Annual health check-up is an important routine process to evaluate health status and identify risk factors of health problems such as obesity, hypertension, diabetes mellitus, dyslipidemia, depression, anemia, and excessive daytime sleepiness.[1] Most of these health problems are usually found in elderly people with gender difference.[2] Thai people have the prevalence of hypertension in the age group of 35 – 60 years old as 17.8%[3] and have incidence of diabetes mellitus in the age group of 35 – 55 years old as 11.2 per 1,000 person-year.[4] The prevalence of dyslipidemia increases with advancing age and increasing BMI. Women have 2 to 3.5 folds higher prevalence of hypercholesterolemia and high low density lipoprotein-cholesterol (LDL-C) than men.[5] Depression in Thai people aged 45 years and over was 29.2% with increasing age.[6] Anemia is also common among Thai population with its incidence varying between 30 - 80%, depending upon geographical area,[7] and about 30 - 40% of Thai population are carriers at least one of the abnormal genes: thalassemias and hemoglobinopathies.[8] The other health problem is excessive daytime sleepiness which causes one-third of the total accidents in Thailand: the major causes of sleepiness (90%) is sleep deprivation.[9]

Annual health check-up programs depend on gender, age groups, and health risk behaviors. Health-risk behaviors as defined by the Ministry of Public Health of Thailand include cigarette smoking, sleep deprivation, alcoholic drinking, inadequate exercise, eating unhealthy foods, and unsafe driving. Men smoke more than women and early age of initiation more dependent smoking, so young smokers have risk factor throughout their adulthood.[10] Sleep deprivation is associated with increasing body weight, insulin resistance and blood pressure.[11] Alcohol consumption of more than 2 drinks (46 g of ethanol) per day causes higher levels of triglyceride[12], uric acid level[12], HDL level[13], and may cause higher blood pressure.[12] A previous study found that overweight, physical inactivity, high sodium intake, and low potassium intake had impact on hypertension.[14] Healthy diet (low sugar, low fat, and low salt), adequate exercise, weight control, and alcohol reduction are non-pharmacologic therapy of hypertriglyceridemia in the risk group of coronary artery disease.[15]

The objective of present study was to determine the effect of gender, age group, and health risk behaviors on health problems such as obesity, hypertension, dyslipidemia, excessive daytime sleepiness, depression, anemia, and high fasting blood sugar.

Materials and Methods

Study population

Data were collected from 412 subjects who went to Her Royal Highness (HRH) Princess Maha Chakri Sirindhorn Medical Center for their routine health check-up. They were cluster sampled of the time from November, 2007 to December, 2008; the participation rate was 100%. The design was cross-sectional study. This project has been approved by the Ethics Committee of the Faculty of Medicine, Srinakharinwirot University.

Operative definition

The diagnostic screening test for depression

in Thai population was Health-Related Self-Reported (HRSR) Scale from Department of Mental Health, Ministry of Public Health, Thailand. The authors defined depression as depressive score is 25 or more that includes stress situation, depressive mood, or other psychological problems and major depression.

The Epworth sleepiness scale (ESS) was a questionnaire which has been designed to evaluate daytime sleepiness. It defined as Epworth sleepiness scale was 10 or more. This can be helpful in diagnosing sleep disorders. It was introduced in 1991 by Dr Murray Johns of Epworth Hospital in Melbourne, Australia.[16]

Body mass index (BMI) is an index, calculated by body weight in kilograms divided by height in square meters. It was classified by Ministry of Public Health, Thailand. The authors, hereby, define obesity as BMI equals to 25 and more, including obesity type 1 and type 2.[17]

Abdominal obesity is defined by the National Cholesterol Education Program in Adult Treatment Panel III (NCEP ATP III) in Asian adults as waist circumference was 90 centimeters in male and 80 centimeters in female.[18]

High fasting blood sugar is defined by NCEP ATP III as fasting blood sugar is 110 mg / dl or more.[18]

Hypertension is defined by World Health Organization (WHO) as blood pressure was 140 / 90 mmHg or more.[19]

Anemia in adult is defined by WHO as hematocrit less than 33% in female and less than 36% in male.

Health-risk behaviors modified from health-risk behaviors of the Ministry of Public Health, Thailand included smoking cigarette, sleeping less than 5 hours per day[20], exercise less than 30 minutes per day and less than 3 days per week, eating unhealthy foods (high fat, high salt, or high sugar but low fibers), drinking alcohol more than 2 drinks in men and 1 drink in women, driving without seatbelt or helmet, and having family history of hypertension, dyslipidemia, diabetes mellitus, stroke, acute coronary syndrome, or cancer.

Data collection

Data collection included age, gender, waist circumference, weight, height, underlying disease, health risk behaviors, screening test for depression, Epworth sleepiness scale, and blood chemistry. The data were collected from November, 2007 to December, 2008 and did not identify the subjects' name.

Statistical analysis

Qualitative variables were analyzed using Chi-square test and quantitative variables were analyzed by t-test. The authors first identified significant explanatory variables through bivariate analysis, followed by logistic regressions for binary outcome and simple linear regression for continuous outcome. A two-tailed p-value of less than 0.05 was considered significant.

Results

Health risk factors which had gender difference were smoking, eating unhealthy diet, and alcohol drinking but sleeping less than 5 hours, inadequate exercise, abdominal obesity, and unsafe drive were not. Male had smoking, eating unhealthy diet, and alcohol drinking more than female with odds ratio of 2.58, 1.42, and 2.63, respectively. (Table 1)

Table 1. Health-risk factors according to gender.

Health-risk factor	Gender (%)		Prevalence rate ratio*	95% Confidence interval
	Male	Female		
Smoking[1]	50 (30.3)	6 (2.7)	2.58	2.17 – 3.07
Sleep deprivation[2]	69 (41.3)	83 (37.4)	1.10	0.87 – 1.38
Inadequate exercise[3]	100 (60.2)	151 (68.0)	0.83	0.66 – 1.04
Abdominal obesity[4]	62 (37.6)	99 (44.4)	0.85	0.67 – 1.08
Unhealthy diet[5]	132 (79.5)	152 (68.5)	1.42	1.05 – 1.92
Alcohol drinking[6]	74 (44.6)	17 (7.6)	2.63	2.16 – 3.21
Unsafe driving[7]	36 (21.7)	50 (22.4)	0.98	0.74 – 1.29

Note: [1] Smoking means current smoking

[2] Sleep deprivation means sleep less than 5 hours per day

[3] Inadequate exercise means exercise less than 30 minutes per day and less than 3 days per week

[4] Abdominal obesity means waist circumference more than 80 cm in female or 90 cm. in male

[5] Unhealthy diet means eating foods with high fat or high salt or high sugar

[6] Alcohol drinking means drinking alcohol more than 2 drinks in men and 1 drink in women

[7] Unsafe driving means driving without seatbelt or helmet

* Prevalence rate ratio =Prevalence rate of male/Prevalence rate of female in each health-risk behavior

The prevalence rates of smoking and abdominal obesity significantly increased according to age groups. Sleep less than 5 hours, inadequate exercise, eating unhealthy diet, alcohol drinking, and unsafe drive were not significantly different with age groups. (Table 2)

Table 2. Health-risk factors according to age groups.

Health-risk factor	Age groups in years (%)					P value*
	< 30	30 - 39	40 - 49	50 - 59	60+	
Smoking	1(2.9)	7(7.7)	27(18.6)	21(20)	0	0.008
Sleep deprivation	9(26.5)	34(37)	53(36.6)	49(46.7)	7(53.9)	0.161
Inadequate exercise	19(55.9)	66(71.7)	99(67.8)	60(57.1)	7(63.6)	0.171
Abdominal obesity	6(17.7)	32(34.8)	68(46.9)	48(45.7)	7(58.3)	0.009
Unhealthy diet	25(73.5)	67(72.8)	111(76.6)	71(67.6)	10(83.3)	0.536
Alcohol drinking	7(20.6)	17(18.5)	33(22.6)	31(29.5)	3(25)	0.454
Unsafe drive	10(29.4)	19(20.7)	34(23.3)	20(19.1)	3(25)	0.752

Note: *P value calculated with Chi-square test

Health-risk factors are described in Table 1.

Blood urea nitrogen (BUN) increased significantly according to male, older age group, and abdominal obesity. Creatinine increased significantly according to the male gender, eating healthy diet, and no smoking. Increase of uric acid was significantly related to the male gender and abdominal obesity. Increased cholesterol was significantly related to abdominal obesity. Increased triglyceride was significantly related to the male gender, alcohol drinking, and abdominal obesity. Increased HDL was significantly related to the female gender, no abdominal obesity, adequate exercise, and alcohol drinking. Increased LDL was significantly associated to abdominal obesity. Increased SGPT was significantly related to the male gender and SGOT increased significantly in men, abdominal obesity, and inadequate exercise. Alkaline phosphatase increased significantly in men, older age group, and sleep deprivation. (Table 3)

People with abdominal obesity had hypertension with the odds ratio of 8.65. Men had obesity 3.34 times more than women. The age group of 40 – 49 years and the age group of 50 – 59 years had obesity 3.58 times and 4.52 times more than the age group that was less than 30 years, respectively. People with abdominal obesity had obesity or BMI > 25 kg/m^2 with the odds ratio of 13.67. Men had high fasting blood sugar than women with the odds ratio of 2.73. People who slept less than 5 hours had excessive daytime sleepiness with the odds ratio of 9.12. Depression and anemia had no statistical significant relation with these risk factors. (Table 4)

Discussion

Men smoke more, eat more unhealthy food, and drink more alcohol than women (Table 1). These effects may be caused by the difference between social role and lifestyle of men and women.[21] In addition, the difference of risk attitudes was also found in gender, race, and educational status.[22] Smoking and abdominal obesity were related to age group; this may be an accumulative effect of smoking from the younger age groups and inactive activity of the older age groups that led to abdominal obesity (Table 2). Smoking is a risk factor for visceral fat which is illustrated as abdominal obesity.[23] The prevalence rate of smoking in the age group 60+ years was 0, perhaps the number of this age group was too low, merely 3.4% of the total number of subjects.

Blood chemistry across the gender found that men had higher blood urea nitrogen (BUN), creatinine, uric acid, triglyceride, serum glutamic pyruvic transaminase (SGPT), serum glutamic oxaloacetic transaminase (SGOT), and alkaline phosphatase than women (Table 3). Women had higher HDL than men (Table 3). These blood chemistries may have gender specific standardization. BUN and alkaline phosphatase in the older age group were higher than the younger age group (Table 3). People who had abdominal obesity, had higher BUN, uric acid, cholesterol, triglyceride, LDL, and SGOT than those who had no abdominal obesity (Table 3). Abdominal obesity is, therefore, a criterion of metabolic syndrome and often found with abnormal chemistry as mentioned above.[18] People who had no abdominal obesity, had HDL more than persons who had abdominal obesity (Table 3). The abdominal obesity increases the risk of cardiovascular disease and often found with low HDL as mentioned in metabolic syndrome.[18] Eating unhealthy food had higher

Table 3. Multivariate analysis of blood chemistry according to gender, age, smoking, sleep deprivation, inadequate exercise, abdominal obesity, eating unhealthy diet, and alcohol drinking by simple linear regression.

Blood chemistry	Factor	Coefficiency	95% CI	P value
BUN	Male[1]	1.98	1.25 – 2.71	< 0.001
	Older age group[2]	0.44	0.01 – 0.87	0.046
	Abdominal obesity[3]	0.83	0.11 – 1.55	0.023
Creatinine	Male[1]	0.28	0.25 – 0.32	< 0.001
	Eating healthy diet[4]	0.04	0.00 – 0.08	0.046
	No smoking[5]	0.06	0.01 – 0.11	0.013
Uric acid	Male[1]	1.73	1.43 – 2.03	< 0.001
	Abdominal obesity[3]	0.72	0.45 – 0.99	< 0.001
Cholesterol	Abdominal obesity[3]	10.04	0.74 – 19.34	0.034
Triglyceride	Male[1]	71.92	45.01 – 98.82	< 0.001
	Alcohol drinking[6]	48.46	17.29 – 79.64	0.002
	Abdominal obesity[3]	40.45	16.27 – 64.62	0.001
HDL	Female[7]	12.43	8.98 – 15.89	< 0.001
	No abdominal obesity[8]	4.78	1.65 – 7.91	0.003
	Adequate exercise[9]	4.11	0.86 – 7.36	0.014
	Alcohol drinking[6]	4.48	0.15 – 8.81	0.043
LDL	Abdominal obesity[3]	9.65	1.09 – 18.22	0.027
SGPT	Male[1]	12.00	4.94 – 19.07	0.001
SGOT	Male[1]	24.79	15.14 – 34.43	< 0.001
	Abdominal obesity[3]	13.70	4.98 – 22.43	0.002
	Inadequate exercise[10]	9.74	0.73 – 18.75	0.034
Alkaline phos	Male[1]	5.17	0.69 – 9.66	0.024
	Older age group[2]	2.99	0.22 – 5.76	0.035
	Sleep deprivation[11]	7.48	3.01 – 11.95	0.001

Note: Alkaline phos means alkaline phosphatase

Health-risk factors: smoking, sleep deprivation, inadequate exercise, abdominal obesity, eating unhealthy diet, and alcohol drinking are described in Table 1.

[1] Reference group is female

[2] Reference group is younger age group

[3] Reference group is no abdominal obesity

[4] Reference group is eating unhealthy diet

[5] Reference group is smoking

[6] Reference group is no alcohol drinking

[7] Reference group is male

[8] Reference group is abdominal obesity

[9] Reference group is inadequate exercise

[10] Reference group is adequate exercise

[11] Reference group is no sleep deprivation

creatinine more than eating healthy food (Table 3). Unhealthy food with high sodium, high fat, and high glucose increases creatinine clearance or increases glomerular filtration rate. Habitual intake of high sodium diet may effect the loss of ability to appropriately vary renal filtration and may increase creatinine.[24] People who did not smoke, had higher creatinine than those who smoked (Table 3). Alcohol drinking increased triglyceride and HDL more than those who do not drink alcohol as shown in a previous study.[12,13] However, excessive and habitual drinking lead to higher mortality risk such as accident, hypertension, hyperuricemia[12], malignancy[25], and chronic liver disease[26] (Table 3). Adequate exercise increased HDL more than inadequate exercise but inadequate exercise had SGOT more than adequate exercise (Table 3). Exercise could reduce the risk of metabolic syndrome by increasing HDL and the earlier, the best.[27] Exercise programs should not be only limited to the younger age groups, but must include of all age groups.[27] Sleep deprivation had alkaline phosphatase more than normal sleep (Table 3). A previous study showed that sleep deprivation related to abnormal metabolism such as insulin resistance, increasing salt retention, and hypertension; therefore, they should pay more attention to have better quality of sleep.[11]

Studying the health problems across the health risk factors found that abdominal obesity is related to hypertension with odds ratio of 8.65 (Table 4). They were defined as metabolic syndrome which was a high risk to cardiovascular disease.[18,19] Men had obesity 3.34 times more than women and they also had high fasting blood sugar 2.73 times more than women (Table 4). The present study found that men had unhealthy foods more than women, so they had high fat intake and ate sugar more than women. The age group 40 – 49 years and age group 50 – 59 years had obesity more than the age group that was less than 30 years as 3.58 and 4.52 times, respectively (Table 4). These results may be cumulative effects from obesity in the younger age groups and they had not been concerned to prevent obesity or to reduce their weight gain. Abdominal obesity was related to obesity or BMI > 25 Kg/m^2 with odds ratio of 13.67 (Table 4). People who had BMI more than 25 Kg/m^2 should aware the risk of cardiovascular disease, diabetes, and hyperlipidemia.[28] Sleep that is less than 5 hours had excessive daytime sleepiness 9.12 times more than the other (Table 4). This very short sleep in adult (sleep < 5 hours) may cause sleepiness-related accident and obesity.[20] No health-risk factors related to depression and anemia (Table 4).

In conclusion, men had health-risk behaviors (smoking, eating unhealthy diet, and alcohol drinking) more than women. Therefore, they had more health problems (obesity and high fasting blood sugar) than women. The health-risk behaviors effect on blood chemistry and could predict risks to cardiovascular disease, diabetes mellitus, dyslipidemia, liver disease, or kidney disease. Healthcare providers should encourage other people to have annual health check-up regularly, especially the older age group.

Acknowledgement

The authors appreciated the grant from the Faculty of Medicine, Srinakharinwirot University and participations of the staffs of the Department of Health Check-up Center of HRH Princess Maha Chakri Sirindhorn Medical Center.

Table 4. Odds ratio of hypertension, obesity, high fasting blood sugar, excessive daytime sleepiness (EDS), depression, and anemia according to gender, age groups, smoking, sleep deprivation, inadequate exercise, abdominal obesity, eating unhealthy diet, alcohol drinking, and unsafe drive by logistic regression.

Health problem	Risk factor	Odds ratio	95% CI	P value
Hypertension	Abdominal obesity	8.65[1]	2.39 – 31.26	0.001
Obesity (BMI>25)	Male	3.34[2]	1.71 – 6.53	<0.001
	Age 40 – 49 years	3.58[3]	1.21 – 10.64	0.022
	Age 50 – 59 years	4.52[3]	1.50 – 13.62	0.007
	Abdominal obesity	13.67[1]	7.63 – 24.49	< 0.001
High FBS	Male	2.73[2]	1.16 – 6.47	0.022
EDS	Sleep < 5 hours	9.12[4]	4.99 – 16.65	< 0.001
Depression		No statistical significance		
Anemia		No statistical significance		

Note: 95% CI means 95% confidence interval
FBS means fasting blood sugar
EDS means excessive daytime sleepiness
[1] Odds ratio compares to no abdominal obesity
[2] Odds ratio compares to female
[3] Odds ratio compares to age > 60+ years
[4] Odds ratio compares to sleep > 5 hours

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