ความสัมพันธ์ระหว่างภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกของประชากรวัยทำงานในกรุงเทพมหานคร

นางสาวมัทวัน สุจินพรัหม

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเภสัชศาสตรมหาบัณฑิต
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RELATIONSHIP BETWEEN DEPRESSION AND METABOLIC SYNDROME IN WORKING AGE POPULATION IN BANGKOK

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Pharmacy Program in Food Chemistry and Medical Nutrition
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มัทวัน สุจินพรัหม : ความสัมพันธ์ระหว่างภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกของประชากรวัยทำงานในกรุงเทพมหานคร (RELATIONSHIP BETWEEN DEPRESSION AND METABOLIC SYNDROME IN WORKING AGE POPULATION IN BANGKOK) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ภญ. ดร. สุญาณี พงษ์ธนานิกร, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. ภญ. ดร. กุลวรา เมฆสวรรค์, หน้า.

การศึกษาเชิงพรรณนา ณ จุดเวลาใดเวลาหนึ่งนี้มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างภาวะซึมเศร้ากับกลุ่มอาการเมแทบอลิก และแบบแผนการบริโภคอาหาร ในกลุ่มประชากรวัยทำงานในกรุงเทพมหานคร กลุ่มตัวอย่างมีจำนวน 446 คน (เพศชาย 123 คน และเพศหญิง 323 คน) อายุ 20 ปีขึ้นไปที่ได้รับการตรวจสุขภาพประจำปี 2560 การวินิจฉัยกลุ่มอาการเมแทบอลิกใช้เกณฑ์ของ NCEP ATP III ที่ปรับจุดตัดเส้นรอบเอวสำหรับคนเอเชีย โดยเก็บข้อมูลผลการตรวจระดับน้ำตาลในเลือด ระดับไตรกลีเซอไรด์ ระดับเอช-ดี-แอล คอเลสเตอรอล ระดับความดันโลหิต เส้นรอบเอว คะแนนประเมินภาวะซึมเศร้า และรูปแบบการบริโภคอาหาร เพื่อประเมินความสัมพันธ์ของภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกและแบบแผนการบริโภคอาหาร

ผลการศึกษาพบความชุกของภาวะซึมเศร้า และกลุ่มอาการเมแทบอลิกในกลุ่มประชากรวันทำงานในกรุงเทพมหานครเท่ากับร้อยละ 29.4 และ 12.6 ตามลำดับ ไม่พบความสัมพันธ์ระหว่างภาวะซึมเศร้ากับกลุ่มอาการเมแทบอลิก (p = 0.423) ด้านความสัมพันธ์ระหว่างภาวะซึมเศร้าและพฤติกรรมการบริโภคอาหาร พบว่าการรับประทานอาหารประเภทธัญพืชน้อยกว่า 3 วันต่อสัปดาห์ (OR = 1.81, 95%CI = 1.09-3.00, p = 0.021) การรับประทานผักน้อยกว่า 3 วันต่อสัปดาห์ (OR = 1.60, 95% CI = 1.09-2.49, p = 0.25) และการรับประทานผลไม้น้อยกว่า 3 วันต่อสัปดาห์ (OR = 1.65, 95%CI = 1.09-2.94 p = 0.017) มีความสัมพันธ์กับการเกิดภาวะซึมเศร้าอย่างมีนัยสำคัญทางสถิติ จากผลการศึกษาแสดงให้เห็นว่าภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกเป็นปัญหาทางสุขภาพของประชากรเขตเมืองในกรุงเทพมหานคร และรูปแบบการบริโภคอาหารก็เป็นอีกหนึ่งปัจจัยที่ส่งผลต่อภาวะซึมเศร้า โดยการรับประทานอาหารประเภทธัญพืช ผัก และผลไม้มากขึ้น อาจจะช่วยลดความเสี่ยงการเกิดภาวะซึมเศร้าได้

ภาควิชา	อาหารและเภสัชเคมี	ลายมือชื่อนิสิต .....
สาขาวิชา	อาหารเคมีและโภชนศาสตร์ทางการแพทย์	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....
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MATTHAWAN SUJINNAPRAM: RELATIONSHIP BETWEEN DEPRESSION AND METABOLIC SYNDROME IN WORKING AGE POPULATION IN BANGKOK. ADVISOR: ASST. PROF. SUYANEE PONGTHANANIKORN, Dr.P.H., CO-ADVISOR: ASSOC. PROF. KULWARA MEKSAWAN, Ph.D., pp.

The objectives of this observational descriptive cross-sectional study were to determine the prevalences of depression and metabolic syndrome and to examine the relationship between depression and metabolic syndrome and dietary pattern in working age people in Bangkok. The samples were 446 participants (123 males and 323 females) aged 20 and over who received an annual health examination 2017. The metabolic syndrome was defined by NCEP ATP III criteria. The data on waist circumference, fasting blood glucose, triglycerides, high-density lipoprotein cholesterol, blood pressure, depression score, and dietary pattern were collected. The relationship between depression and metabolic syndrome and dietary patterns were evaluated.

The results showed that the prevalence of depression and metabolic syndrome were 29.4% and 12.6%, respectively. There was no relationship between depression and metabolic syndrome (p = 0.423). The analysis of depression and dietary pattern showed that intakes of whole grains (OR = 1.81, 95% CI = 1.09-3.00, p = 0.021), vegetables (OR = 1.60, 95% CI = 1.09-2.49 p = 0.025) and fruits (OR = 1.65, 95% CI = 1.09-2.94 p = 0.017) 3 days and below per week were significantly related to depression. This study illustrated that dietary pattern is one of the factors that influences the symptoms of depression. Increased consumption of whole grains, vegetables and fruits may help reduce risk of depression.

Department:	Food and Pharmaceutical Chemistry	Student's Signature	.....
		Advisor's Signature	.....
Field of Study:	Food Chemistry and Medical Nutrition	Co-Advisor's Signature	.....
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LIST OF TABLES

LIST OF ABBREVIATIONS

et al	et alia (and other)
DM	diabetic mellitus
CVD	cardiovascular disease
CES-D	The Center for Epidemiologic Studies Depression Scales
WHO	World Health Organization
EGIR	The European Group for the Study of Insulin Resistance
AACE	The American Association of Clinical Endocrinologist
NCEP ATP III	The National Cholesterol Education Program Adult Treatment Panel III
IDF	International Diabetes Federation
WC	waist circumference
FPG	fasting plasma glucose
TG	triglyceride
HDL-C	high-density lipoprotein cholesterol
BP	blood pressure
SBP	systolic blood pressure
DBP	diastolic blood pressure
HbA1c	haemoglobin A1c
TC	Total cholesterol
mg/dL	milligram per deciliter
mm/Hg	millimeter of mercury
cm	centimeter
kg	kilogram
CRP	C-reactive protein
PAI-1	plasma plasminogen activator inhibitor

U.S.	United State
PUFAs	polyunsaturated fatty acids
etc	et cetera (and other)
p	*p*-value
n	number
SD	standard deviation
CI	confidence interval

CHAPTER 1
INTRODUCTION

1.1 Background and rationale

Depression is a major global mental health problem. According to the data from World Health Organization (WHO), more than 300 million people suffer from depression (World Health Organization, 2017). The information from WHO indicated that depression is the fourth leading cause of disability. By the year of 2020, depression will become the second leading cause of disability in the world (World Health Organization, 2001). In the global population, the prevalence of depression was 4.4% in people aged 25-34 years (Ferrari et al., 2013). In Thailand, the prevalence of depression by the Department of Mental Health in 2008 was 2.7% in Thai people aged 15 years and over. According to the region, the highest prevalence of depression (5.1%) was found in Bangkok, followed by the Northeast area (2.7%) (Ministry of Public Health, 2009). Depression affects both mental and physical health. Physical health problems include diabetes, obesity, malnutrition, and other chronic diseases such as metabolic syndrome.

Metabolic syndrome is a cluster of symptoms caused by abnormal metabolism that can lead to cardiovascular disease (CVD) and diabetes mellitus (DM). These metabolic factors include abdominal obesity, atherogenic dyslipidemia, insulin resistance, and raised blood pressure (Beilby, 2004). The criteria used for the diagnosis

are from several organizations such as WHO (World Health Organization, 1999), the European Group for the Study of Insulin Resistance (EGIR) (Balgau and Charles, 1999), the American Association of Clinical Endocrinologists (AACE) (Grundy et al., 2005), the National Cholesterol Education Program Adult Treatment Panel (NCEP/ATP) III (National Institutes of Health, 2002), and the International Diabetes Federation (IDF) (George et al., 2005). The prevalence of metabolic syndrome depends on age, race and other variables. In the United states (1999-2010), the prevalence of metabolic syndrome was 34% (Ramphal et al., 2014). According to Thai Health Survey in 2008-2009, the prevalence of metabolic syndrome was 32% in people age 15 years old and above, and the prevalence increased with age. In addition, it was reported that the highest prevalence was found in central region and Bangkok. Moreover, they found that metabolic syndrome is a risk factor for CVD and leading cause of death in the country (Public Health Survey, 2009).

Several studies have provided evidence that depression is associated with metabolic syndrome and its components, including elevated fasting glucose, hypertension and central obesity. Park et al. (2016) found the relationship between depression and metabolic syndrome in South Korean women. In Japanese population, the relationship between depression and metabolic syndrome was found only in male (Sekita et al., 2013). There are few studies about the prevalence of metabolic syndrome in patients with depression and other mental health problems in Thailand. The prevalence of metabolic syndrome was 31.3% in patients with major depressive

disorder (Kooptiwoot et al., 2012). There was the study identifying the prevalence of metabolic syndrome and its association with depression in patients with schizophrenia. It showed that the prevalence of metabolic syndrome was 37.0% and 35.0% defined by NCEP ATP III and IDF criteria, respectively and it was found that depressed mood, middle insomnia, and retardation were significantly associated with metabolic syndrome in patients with schizophrenia (Suttajit and Pilakanta, 2013). In addition, several studies have found that dietary pattern is another factor affecting depression (Akbaraly et al., 2009; Li et al., 2017). However, the relationship between depression and metabolic syndrome in general Thai population has not been investigated, especially in working age population in Bangkok. The purpose of the present study was to determine the prevalence of depression and metabolic syndrome in working age population in Bangkok. The relationships between depression, metabolic syndrome and dietary pattern were also investigated.

1.2 Objective of the study

The aims of this study were to investigate the prevalence of depression and metabolic syndrome and to examine the relationship between depression and metabolic syndrome and dietary pattern in working age people in Bangkok.

1.3 Definition of terms

Depression is characterized by sadness, depressed mood, loss of interest or pleasure, decreased energy, low self-worth or feeling of guilt, poor concentration, and disturbed appetite or sleep (Kim et al., 2015).

Metabolic syndrome is a cluster of symptoms that can lead to cardiovascular disease and type 2 diabetes mellitus (type 2 DM). The metabolic risk factors are abnormal obesity, atherogenic dyslipidemia which are elevated serum triglycerides and reduced serum high-density lipoprotein cholesterol (HDL-C), raised blood pressure, insulin resistance or glucose intolerance, proinflammatory and prothrombotic states (Beilby, 2004; Grundy et al., 2005). The NCEP ATP III modified criteria of metabolic syndrome requires the presence of 3 or more of the following: (1) abnormal obesity (waist circumference > 90 cm in men and > 80 cm in women); (2) a high triglyceride level (≥150 mg/dL) or drug treatment; (3) low HDL-C level (< 40 mg/dL in men and < 50 mg/dL in women) or drug treatment; (4) high blood pressure (≥130/85) mmHg or drug treatment; and (5) a high fasting plasma glucose concentration (≥100 mg/dL) or previously diagnosed type 2 DM (Grundy et al., 2005).

Dietary pattern is a representation of dietary behaviors including the amount, variety, or combination of foods and beverages, and the frequency of consumption.

Working age population is representation of the population aged between 20 to 65 years old.

1.4 Research benefits

The information on the prevalence of depression and metabolic syndrome and the association of depression and metabolic syndrome and dietary pattern will be a guide for prevention of depression and metabolic syndrome in working age population. In addition, the dietary factor associated with depression and metabolic syndrome obtained from this study may be beneficial in developing dietary advice for health promotion in the working age population in Bangkok.

CHAPTER II

LITERATURE REVIEW

2.1 Depression

Depression is an emotional condition characterized by sadness, loss of interest in activity, depressed mood, and decreased energy. These symptoms will prolong and interfere with the person daily's activities (Kim et al., 2015). According to WHO, there were over 300 million cases of major depressive disorder (MDD). Depression is the leading cause of disability worldwide, and is a major contributor to the overall global burden of diseases (World Health Organization, 2017). Major depression is now ranked fourth among the ten leading causes of the global burden of disease. In 2020, depression will become the second leading cause of the global disease burden (World Health Organization, 2001).

2.1.1 Prevalence of depression

In the global population, the prevalence of depression in people aged 25-34 years was 4.4% with higher in females (5.5%) than males (3.2%) (Ferrari et al., 2013). Similarly, the study of Kim et al. (2015) in United stated (2007-2010) also found higher prevalence of depression in women (12.1%) than in men (7.9%). In Thailand, there was the study examining the prevalence of depression in Thai population in 2003. It showed that the prevalence of depression was 3.2% in the people aged 15-59 years, and the prevalence was higher in females than males (Siriwanrangsan et al., 2004).

2.1.2 Symptoms of depression

The main symptoms of depression are feeling sad, loss of interest or pleasure in usual activities and loss of energy. Other symptoms include loss of confidence and self-esteem, inappropriate guilt, thoughts of death and suicide, diminished concentration, and disturbance of sleep and appetite. A variety of somatic symptoms may also present. Though depressive feelings are common, especially after experiencing setbacks in life, depressive disorder is diagnosed only when the symptoms reach a threshold and last at least two weeks (World Health Organization, 2001).

2.1.3 Cause of depression

The causes of depression can be classified into three categories (Friedman and Anderson, 2014):

1) Biological factors

Exposure to long-term stress causes specific changes in brain neurotransmitter function described as "chemical imbalance". This refers to alterations in the major chemical messenger systems: serotonin, norepinephrine, and dopamine.

2) Psychological factors

Include important changes and important life stressors such as a death of the loved one, loss of job, and financial troubles can cause depression. Other psychological factors that lead to loss of self-esteem such as very sensitive, guilty, fearful, anxious, or obsessed with being perfect may also involve.

3) Social factors

Socio-economic and cultural factors such as gender, religion, culture, socio-economic status, and marital status may be the risk factors of depression. For examples, women are more likely to have depression than men, single marital status is associated with depression, and differences in culture in different countries result in different prevalences of depression.

2.1.4 Assessment of depression

Depression assessment can be divided into two types: (Charernboon, 2011)

1) Self-report measurement

A self-report measurement is a depression assessment that the respondents were self-evaluators. This type of evaluation is very useful and can be evaluated in a large number of samples. This type of measurement does not need a lot of personnels. However, there may be the limitation that respondents must be able to read and write. The examples of evaluation form included in this category are Thai Geriatric Depression Scale, Thai Hospital Anxiety and Depression Scale, Children's Depression Inventory, The Center for Epidemiologic Studies Depression Scales, Health-Related Self-Reported Scale, Thai Depression Intervention, Thai version Patient Health Questionnaire, and etc.

2) Clinician-rated measurement

Clinician-rated measurement is an assessment of depression that the patients were interviewed by trained physicians or healthcare providers. The advantages of this

type of assessment are that it is quite accurate and can be used in respondents who cannot read and write. However, there are some disadvantages that it may not be suitable for screening in large numbers of population, and it takes time and needs many evaluators. This evaluation form included in this category such as Hamilton Rating Scale for Depression, Beck Depression Inventory (BDI), Montgomery-Asberg Depression Rating Scale, and etc. Table 1 shows the type of depression assessment.

2.1.5 Treatment for depression

There are four types of treatment for depression (Friedman and Anderson, 2014):

1) Medical treatment

The medications for depression include selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), monoamine oxidase inhibitors (MAOIs), and other medications including monoamine receptor-active drugs, and norepinephrine/dopamine reuptake inhibitors.

2) Psychological treatment

Psychological treatments (also known as talking therapies) can help patients change their thinking patterns and improve their coping skills such as nondirective therapy/counseling, problem-solving therapy, cognitive-behavioral therapy (CBT), behavior therapy/behavioral activation, and interpersonal psychotherapy (IPT).

Table 1 Type of depression assessment

Type	No. of item	Application	Reliability	Sensitivity	Specificity	Remark
Self-rating measurement						
TGDS	30	Screening	-	-	-	Elderly (60-70 years)
Thai-HADS	14	Screening	0.75	-	-	Hospital use only
CDI	27	Screening	0.83	78.7%	91.3%	Children
Thai CES-D	20	Screening	0.92	93.3%	94.2%	Adults
HRSR	20	Screening	0.91	90.2%	84.3%	Thai version only
TDI	20	Symptom-severity	0.86	-	-	
PHQ-9	9	Screening	0.79	84.0%	77.0%	Hospital use
Clinician-rated measurement						
HRSD-17	17	Symptom-severity	0.74	-	-	
BDI	21	Symptom-severity, screening	0.93	-	-	
MADRS	10	Symptom-severity	0.80	-	-	

TGDS = Thai Geriatric Depression Scale, Thai-HADS = Thai Hospital Anxiety and Depression Scale, CDI = Children's Depression Inventory, Thai CES-D = The Center for Epidemiologic Studies Depression Scales (Thai-version), HRSR = Health-Related Self-Reported Scale, TDI = Thai Depression Intervention, PHQ-9 = Thai version Patient Health Questionnaire, HRSD-17 = Hamilton Rating Scale for Depression, BDI = Beck Depression Inventory, MADRS = Montgomery-Asberg Depression Rating Scale

3) Physical treatment

The main physical treatments for depression comprise drug treatments and electroconvulsive therapy (ECT). ECT is a method of inducing seizures by stimulating the brain through the brain, which can result in the treatment of psychiatric disorders. ECT is a relatively safe procedure and has some short-term side-effects.

4) Complementary treatment

Complementary therapy refers to a set of health care practices such as herbal medicine, nutritional therapy, massage therapy, homeopathy, traditional Chinese medicine, and acupuncture that are not included in the primary health care system. These health care practices have been used in previous studies and they may be useful for depression (Slomon and Adams, 2015).

2.2 Metabolic syndrome

The metabolic syndrome is a group of characteristics that increases risk for developing cardiovascular disease (CVD) and type 2 diabetes mellitus (type 2 DM). These are related to abnormal obesity, elevated serum triglycerides, reduced serum HDL-C, raised blood pressure, insulin resistance or glucose intolerance, and proinflammatory (elevated C-reactive protein, CRP) and prothrombotic (increased plasma plasminogen activator inhibitor (PAI-1) and fibrinogen) states (Beilby, 2004; Grundy et al., 2005).

2.2.1 Clinical diagnosis of metabolic syndrome

There are several criteria used to diagnose metabolic syndrome such as World Health Organization (World Health Organization, 1999), the European Group for the Study of Insulin Resistance (EGIR) (Balgau and Charles, 1999), the American Association of Clinical Endocrinologists (AACE) (Grundy et al., 2005), the National Cholesterol Education Program Adult Treatment Panel (NCEP ATP) III (National Institutes of Health, 2002), and the International Diabetes Federation (IDF) (George et al., 2005). The NCEP ATP III and IDF criteria are commonly used to assess the metabolic syndrome in general population (Pan et al., 2008). However, there are some differences in details between NCEP ATPIII and IDF criteria. The NCEP ATP III criteria focus on abdominal adiposity, high blood pressure, hyperglycemia, and elevated triglyceridemia and low HDL-C, whereas the IDF criteria focuses on central obesity (Grundy et al., 2005; Pan et al., 2008). The

NCEP ATP III criteria and IDF criteria are presented in Table 2. According to NCEP ATP III criteria, people who have three or more components are considered to have metabolic syndrome (National Institutes of Health, 2002). According to the IDF criteria, for a person to be defined as having the metabolic syndrome, they must have central obesity (large waist circumference) plus any two of four factors.

Table 2 The metabolic syndrome defined by NCEP ATP III and IDF criteria[a]

Components	Criteria
Waist circumference (WC) [b]	Male ≥ 90 cm
	Female ≥ 80 cm
Fasting plasma glucose (FPG)	≥ 100 mg/dl or
	previous diagnosed type 2 DM
Triglyceride (TG)	≥ 150 mg/dl or
	Drug treatment for triglyceridemia
High-density lipoprotein cholesterol (HDL-C)	Male < 40 mg/dl
	Female < 50 mg/dl or
	Drug treatment for low HDL-C
Blood pressure (BP)	≥ 130/85 mmHg or
	Drug treatment for hypertension

[a] NCEP ATP III = three or more components, IDF = Waist circumference plus any two of four components

[b] Using the cut-off point of waist circumference for Asian population as ≥ 90 cm in male and ≥ 80 cm in female (Grundy et al., 2005; World Health Organization Western Pacific Region. et al., 2000).

2.2.2 Epidemiology of metabolic syndrome

The number of people with metabolic syndrome are raising worldwide. The prevalence of metabolic syndrome varied across different countries depending on age, race, gender, and other variables. Park et al. (2003) studied the prevalence of metabolic syndrome defined by NCEP ATP III guideline in the United State (US) population. They found that the prevalence were 22.8% in men and 22.6% in women. The highest prevalence was found in Mexican American. Using IDF criteria, Ramphal et al. (2014) found that the prevalence of metabolic syndrome was 34% in US population. In the study, the prevalence was lower in Mexican American men than Mexican American women. Recent study by Aguilar et al. (2015) in the US population aged ≥20 years showed that the prevalence of metabolic syndrome using the NCEP ATPIII criteria was 33.0% with significantly higher prevalence in women compared with men (35.6% and 30.3%, respectively). In 10 European countries, the prevalence of metabolic syndrome defined by ATP III criteria was 24.3% (Scuteri et al., 2015).

In Asian countries, there were several studies about the prevalence of metabolic syndrome. In South Korea, the prevalence of metabolic syndrome in 1998, 2001, 2005 and 2007 was 24.9%, 29.2%, 30.4%, and 31.1%, respectively. Over the 10 years, the low HDL-C, abdominal obesity, hypertriglyceridemia increased by 13.8%, 8.7% and 4.9%, respectively (Lim et al., 2011). Afterward, in 2008-2013, the prevalence of metabolic syndrome was 28.9% in South Korean people. Age and obesity were associated with increased metabolic syndrome risk in both men and women. It was

also found that metabolic syndrome was related to vitamin D deficiency. (Tran et al., 2017). Urashima et al. (2005) studied in 22,892 Japanese population aged 20-93 years old (72.2% in males and 27.8% in females). They found that the prevalence of metabolic syndrome was 8.4%, and it may be associated with smoking, size of food portion, alcohol consumption, and family history of hypertension and diabetes. Xiao et al. (2015) studied in 20,502 rural Chinese population (13,505 women and 6,997 men) aged 18-74 years and found that the prevalence of metabolic syndrome was 21.1%.

In Thailand, metabolic syndrome is common in adults aged 15 years and over (Public Health Survey, 2009). There were several studies on the prevalence of metabolic syndrome in Thailand. Aekplakorn et al. (2011) investigated the prevalence of metabolic syndrome defined by both IDF and NCEP ATP III criteria in 5,305 Thai adults aged 35 years and over. The results showed that the prevalence of metabolic syndrome was 24.0% (16.4% in men and 31.6% in women) by IDF criteria and 32.6% (28.7% in men and 36.4% in women) by NCEP ATPIII criteria. In Bangkok, Lohsoonthorn et al. (2007) studied the prevalence of metabolic syndrome using NCEP ATPIII criteria in 1,339 professional and office workers (535 men and 804 women) who participated in the annual health checkup of King Chulalongkorn Memorial Hospital. They found that the prevalence of metabolic syndrome was 15.2%, and the prevalence in males (25.8%) was higher than in females (8.2%). The most common metabolic abnormalities in both men and women were high blood pressure and body mass index (BMI).

The prevalence of metabolic syndrome was also investigated in some provinces of Thailand. Kaewtrakulpong (2008) found that the prevalence of metabolic syndrome in 1,004 people in Si Chiang Mai District, Nong Khai Province was 16.9% by NCEP ATPIII, 15.0% by IDF and 3.7% by WHO. Moreover, the higher prevalence was shown in female and elderly. In Nakhon Ratchasima Province, the prevalence of metabolic syndrome was 15.4% defined by IDF and 17.9% defined by NCEP ATPIII (Sutadarat et al., 2009). In suburban community in Pathum Thani Province, the prevalence of metabolic syndrome defined by NCEP ATP III guideline in 222 people aged 35-65 years was 36.49% with no significant differences between males and females (Yuenyongchaiwat et al., 2016). In Khon Kaen Province, the prevalence of metabolic syndrome determined by the modified ATPIII criteria in 307 healthy men and 295 healthy females aged 20 - 90 years who participated in annual health examination between 2003-2004 was 15.0%. The prevalence was increased with age (9.5% in the age group of 20-39 to 24.7% in the age group of over 50) (Pongchaiyakul et al., 2007).

2.3 Depression and metabolic syndrome

2.3.1 Depression and components of metabolic syndrome

Depression and metabolic syndrome are common and have significant impact on health outcomes. There were several studies about depression and the components of metabolic syndrome. From the systemic review, the coexistence of diabetes and depression is associated with significant morbidity, mortality, and

increased healthcare cost (Egede and Ellis, 2010). Zheng et al. (2014) investigated the relationship between depressive symptoms and waist-to-hip ratio (WHR), dyslipidemia, glycemic levels or blood pressure among 11,908 diabetic and non-diabetic Chinese women aged ≥40 years. The results showed relationships between WHR, total cholesterol, haemoglobin A1c, diastolic blood pressure, and depressive symptoms among non-diabetic women. Moreover, the prevalence of depressive symptoms was significantly higher in previously diagnosed diabetes, compared with the non-diabetic subjects. Li et al. (2009) studied the correlation between depression and diabetes in U.S. adults. The results showed that the unadjusted and age-adjusted prevalences of undiagnosed depression were 8.7% and 9.2% respectively. About 45% of diabetic patients with depression were undiagnosed. Based on the study, depression is associated with increased risk of diabetes-related complications. Therefore, early detection of depression is needed in clinical settings.

For Thai population, there were some studies about depression and the components of metabolic syndrome. Jarassaeng et al. (2012) studied about depression in patients with chronic disease at Srinakarin Hospital, Khonkaen Province. The results showed that the prevalence of depression in diabetic patients was 39.6%. In addition, the association between depression and glycemic control was investigated in diabetic patients at Phuthasothon Hospital, Chachoengsao Province and the association between depression and dietary control and glycemic control were found (Wirunrat and Pongthananikorn, 2013).

2.3.2 Depression and metabolic syndrome

In Asian countries, there were several studies examining the prevalence of metabolic syndrome in depressed patients. In India, Agarwal et al. (2016) studied the prevalence of metabolic syndrome in patient with depression at the Department of Psychiatry, King George's Medical University. The results showed that the prevalence of metabolic syndrome was significantly higher in the depression group when compared to the healthy controls. In South Korea, the cross-sectional study in 23,385 women aged 19 years and older showed higher prevalence of metabolic syndrome in women with a prior diagnosis of depression than those without diagnosed depression (26.20% and 19.07%, respectively). In addition, it was found that depression was significantly associated with metabolic syndrome (odd ratio, 1.20; 95% confidence interval, 1.01–1.43) (Park et al., 2016).

There are few studies about the prevalence of metabolic syndrome in patients with depression and other mental health problems in Thailand. Suttajit and Pilakanta (2013) studied the prevalence of metabolic syndrome and its association with depression in patients with schizophrenia at Maharaj Nakorn Chiang Mai Hospital. In this study, the prevalence of metabolic syndrome defined by the modified NCEP-ATP III and IDF criteria were 37.0% and 35.0%, respectively. In 110 patients with major depressive disorder (aged 21-82 years) at Siriraj Hospital, Kooptiwoot et al. (2012) found that the prevalence of metabolic syndrome defined by IDF criteria was 31.3%.

2.3.3 Depression and dietary pattern

Dietary pattern is one of the factors associated with the pathology of depression. It was found that healthy food such as fruits, vegetables, grains, poultry, fish, and low fat foods can reduce the risk of depression (Lai et al., 2014). Fruits and vegetables protect against neuronal damage from oxidative stress by antioxidant activity of some components in fruits and vegetables (Akbaraly et al., 2009). Dietary fiber from grains also affects the intestinal microflora, which affects behavior and mood (Dash et al., 2015). Several studies have provided evidence that omega-3 fatty acids (polyunsaturated fatty acids, PUFAs) reduced the risk of depression (Colangelo et al., 2009; Grosso et al., 2014). There is an evidence suggesting relationship between high levels of fish intake and low incidence of depression (Hibbeln, 1998). The mechanism involved may be the reduction of inflammation in the nervous system and the induction of serotonin release from the serotonin neurons (Lai et al., 2014; Rogers, 2007). Moreover, other nutrients such as folate highly found in fruits and vegetables, vitamin B12 highly found in meat and vitamin B1 highly found in whole grain cereals, can reduce the risk of depression. It was found that the people with stress had low plasma concentrations of antioxidants. Therefore, antioxidants such as vitamin C and vitamin E may help prevent or treat depression. However, there have been only few studies revealing the effects of antioxidants on depression symptoms (Okura et al., 2009; Sahraian et al., 2015).

CHAPTER III

MATERIALS AND METHODS

3.1 Research design

This study was an observational descriptive cross-sectional design to determine the prevalence of depression and metabolic syndrome and to examine the association of depression with metabolic syndrome and dietary pattern in working age people in Bangkok. The study was approved by The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (COA No. 166/2017) (Appendix A).

3.2 Population and Samples

Population : Working age population in Bangkok

Samples : Working age population in Bangkok who received the annual health examination during October, 2017 through March, 2018.

3.2.1 Sample size

The number of participants participating in this study was calculated as follow:

$$n = \frac{(Z_{\alpha/2})^2 PQ}{d^2}$$

By n = number of sample

$Z_{\alpha/2}$ = the standard value under normal curve at 95%

= 1.96

P = proportion of the prevalence of metabolic syndrome = 0.326 (Aekplakorn et al., 2011)

Q = 1 – P

d = acceptable error allowable in estimating proportion in sample size and population = 0.05

The number of participants in this study was

$$n = \frac{(1.96)^2(0.326)(1-0.326)}{(0.05)^2}$$

$$= 338$$

The number of participants was adjusted 20% for error in collecting sample.

$$\text{Sample size} = n / (1-R)$$

$$= 338 / (1 - 0.2)$$

$$= 423$$

3.2.2 Inclusion and exclusion criteria

Males or females aged 20 years and over who were the office workers and received the annual health examination were included. In addition, the participants must be able to read and write Thai language, and informed consent must be provided before the data collection. The pregnant or breastfeeding women were excluded.

3.3 Research instruments

3.3.1 Measuring tape for measurement of waist circumference

3.3.2 The participants information sheet and informed consent form (Appendix A)

3.3.3 Research questionnaires were composed of four parts: (Appendix B)

Part 1 Demographic information

This questionnaire comprised of 8 questions (5 questions for general information; gender, age, occupation, exercise, and physical activity) and 3 questions for health information; smoking, alcohol consumption and medication use).

Part 2 Center for Epidemiologic Studies Depression Scale; CES-D (Thai version)

The self-report questionnaire was used for scanning the depression's screening in working age population in Bangkok. CES-D is composed of 20 questions. If persons have total score above 16 of 60, they will be considered as the person with depression (Kuptniratsaikul and Ketmarn, 1997).

Part 3 Food frequency questionnaire

This test comprised of 13 questions. The questionnaire was proven by 3 experts for testing validity, and they were corrected according to expert's recommendations. The reliability was tested in 30 persons who had similar characteristics to the samples. The reliability of food frequency questionnaire by Cronbach's alpha was 0.709.

Part 4 Metabolic syndrome assessment

There were 5 components of metabolic syndrome. These included WC, FPG, TG, HDL-C, and BP.

3.4 Research procedure

The participants in this study were recruited by sampling in working age population 8 districts from 21 districts of an inner area in Bangkok. These districts included Pathumwan, Din Daeng, Huai Khwang, Sathorn, Chatuchak, Bangsue, Phaya Thai, Ratchathewi. Fifty participants per district were randomly recruited in this study. The procedure of the study was explained and the informed consent form was provided to each participant. The participants' information including gender, age, occupation, and lifestyle behaviors (physical exercise's behavior, smoking and alcohol consumption) was collected. The participants were asked to do the CES-D test and the food frequency questionnaires. WC of the participants was measured by researcher. The data from annual health examinations were collected including FPG, TG, HDL-C and BP. The diagnosis of metabolic syndrome was defined by NCEP-ATP III.

3.5 Data analysis

The general information of the participants (gender, age, occupation, exercise, physical activity, health behavior information, and the prevalences of depression and metabolic syndrome) were presented as number, percentage of frequency, and mean ± standard deviation. The relationship between depression and metabolic syndrome was interpreted by chi-square test. Multivariate analysis was illustrated the

relationship between each variable of dietary pattern and depression by multiple logistic regression.

CHAPTER IV
RESULTS

The purpose of this study was to investigate the prevalence of depression and metabolic syndrome and to examine the relationship between depression and metabolic syndrome in working age population in Bangkok. Data were collected from 446 working age people in Bangkok using questionnaires. In this study, depression was defined by CES-D, and metabolic syndrome was defined by NCEP ATP III modification criteria.

4.1 Prevalence of depression and metabolic syndrome and its components

There were 446 participants in this study. One hundred and twenty-three participants (27.6%) were males and 323 (72.4%) were females. The average age of participants was 35.6 ± 9.5 years. There were no significant differences in age, occupation, physical activity, and medication between males and females. There were significant differences in exercise, smoking, and alcohol consumption between groups (Table 3). The prevalence of depression and metabolic syndrome are presented in Table 4. The results showed that the prevalence of depression was 29.4% which higher in females than males. The average CES-D score of all participants was 12.15 ± 6.7, and the average CES-D score of participants in the depression group was 20.47 ± 4.46. The prevalence of metabolic syndrome was 12.6% which higher in males than females in this study.

Table 3 Characteristics of the participants stratified by gender

Variables	Male N (%)	Female N (%)	Total N (%)	*p* - value[a]
Age (years)				
20-29	39 (31.7)	101 (31.3)	140 (31.4)	
30-39	51 (41.5)	137 (42.4)	188 (42.2)	
40-49	16 (13.0)	53 (16.4)	69 (15.5)	0.458
50-59	16 (13.0)	26 (8.0)	42 (9.4)	
≥60	1 (0.8)	6 (1.9)	7 (1.6)	
Mean ± SD	36.0 ± 9.7	35.4 ± 9.4	35.6 ± 9.5	0.582[b]
Occupation				
Employee	4 (3.3)	19 (5.9)	23 (5.2)	
Office worker	77 (62.6)	213 (65.9)	290 (65.0)	
Government officer/ state enterprise worker	36 (29.3)	81 (25.1)	117 (26.2)	0.166
Business owner/Trader	3 (2.4)	1 (0.3)	4 (0.9)	
Others	3 (2.4)	9 (2.8)	12 (2.7)	
Exercise				
Never	36 (29.3)	146 (45.2)	182 (40.8)	
< 3 days/week, <30 min	21 (17.1)	77 (23.8)	98 (22.0)	
< 3 days/week, ≥ 30 min	31 (25.2)	35 (10.8)	66 (14.8)	< 0.001
≥ 3 days/week, < 30 min	3 (2.4)	8 (2.5)	11 (2.5)	
≥ 3 days/week, ≥ 30 min	32 (26.0)	57 (17.6)	89 (20.0)	
Physical activity	(n=122)	(n=315)	(n=437)	
Low	7 (5.7)	11 (3.5)	18 (4.1)	
Moderate	43 (35.2)	107 (34.0)	150 (34.3)	0.523
High	72 (59.0)	197 (62.5)	269 (61.6)	

[a] Chi-square test for comparison between males and females

[b] Independent sample T-test for comparison between males and females

Table 3 Characteristics of the participants stratified by gender (continued)

Variables	Male N (%)	Female N (%)	Total N (%)	*p* - value[a]
Cigarette smoking				
Non-smoker	90 (73.2)	317 (98.1)	407 (91.3)	
Ex-smoker	16 (13.0)	19 (4.3)	19 (4.3)	< 0.001
Smoker	17 (13.8)	20 (4.5)	20 (4.5)	
Alcohol consumption				
Never	60 (48.8)	237 (73.4)	297 (66.6)	
Sometime (1-3 times/week)	58 (47.2)	82 (25.4)	140 (31.4)	< 0.001
Often (> 3 times/week)	5 (4.1)	4 (1.2)	9 (2.0)	
Medications				
No	101 (82.1)	262 (81.1)	363 (81.4)	
Diabetic/Dyslipidemia	13 (10.6)	22 (6.8)	35 (7.8)	0.256
Hypertension				
Depression	0 (0.0)	3 (0.9)	3 (0.7)	
Others	9 (7.3)	36 (11.1)	45 (10.1)	

[a] Chi-square test for comparison between males and females

Table 4 Prevalence of depression and metabolic syndrome

Variables	Male n (%)	Female n (%)	Total n (%)
Depression			
No	89 (72.4)	226 (70.0)	315 (70.6)
CES-D score (Mean ± SD)	8.93 ±3.37	8.59 ± 3.81	8.69 ± 3.70
Yes	34 (27.6)	97 (30.0)	131 (29.4)
CES-D score (Mean ± SD)	20.18 ±3.89	20.58 ± 4.66	20.47 ± 4.46
CES-D scores (Mean ± SD)	12.04 ± 6.2	12.19 ± 6.9	12.15 ± 6.7
Metabolic syndrome			
No	103 (83.7)	287 (88.9)	390 (87.4)
Yes	20 (16.3)	36 (11.1)	56 (12.6)

4.2 Demographic data

The demographic data of the participants included gender, age, occupation, exercise, physical activity, smoking, alcohol consumption, and medication. When stratified by depression, the characteristics of the participants are presented in table 5. There were 315 participants in non-depression group and 131 participants in depression group. There were no significant differences in gender, average age, exercise, cigarette, smoking, and alcohol consumption between the non-depression and depression groups. There were significant differences in occupation between both groups ($p = 0.035$). Most of the participants in both groups had no exercise. There were significant difference in physical activity between groups ($p < 0.001$). Most of the participants in both groups were non-smokers. In addition, they had no alcohol consumption and no medication use.

When the participants were classified by metabolic syndrome, the characteristics are shown in table 6. There were no significant differences in gender, occupation, exercise, cigarette smoking, and alcohol consumption between the participants in non-metabolic syndrome and metabolic syndrome groups. The average age of the participants with metabolic syndrome was significantly higher than those without metabolic syndrome (42.4 ± 10.0 and 34.6 ± 9.0 years; $p < 0.001$). Most of the participants in both groups were office workers and had non-exercise behavior. The results showed that there was significant difference in physical activity between the metabolic syndrome and non-metabolic syndrome groups ($p = 0.001$). More than 50%

of the participants were non-smokers and had no alcohol consumption. For the medication use, there was significant difference between both groups (p = 0.001).

4.3 Dietary pattern data

The dietary patterns were determined by food frequency questionnaire. Table 7 presents the dietary pattern of the participants stratified by depression status. There were significant differences in whole grain, vegetable and fruits intakes (p = 0.021, p = 0.025, p = 0.017, respectively) between the non-depression and depression groups. Table 8 presents the dietary pattern of the participants stratified by metabolic syndrome status. There were no significant differences in dietary patterns between the non-metabolic syndrome and metabolic syndrome groups.

Table 5 Characteristics of the participants stratified by non-depression and depression groups

Variables	Non-depression group (n=315)	Depression group (n=131)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Gender				
Male	89 (28.2)	34 (25.9)	123 (27.6)	0.621
Female	226 (71.8)	97 (74.1)	323 (72.4)	
Age (years)				
20-29	105 (33.3)	35 (26.7)	140 (31.4)	
30-39	130 (41.3)	58 (44.3)	188 (42.2)	
40-49	48 (15.2)	21 (16.0)	69 (15.5)	0.673
50-59	27 (8.6)	15 (11.5)	42 (9.4)	
≥60	1 (1.6)	6 (1.5)	7 (1.5)	
Mean ± SD	35.3 ± 9.5	36.4 ± 9.2	35.6 ± 9.5	0.229[b]
Occupation				
Employee	12 (3.8)	11 (8.4)	23 (5.2)	
Office worker	200 (63.5)	90 (68.7)	290 (65.0)	
Government officer/ state enterprise worker	88 (27.9)	29 (22.1)	117 (26.2)	0.035
Business owner/Trader	3 (1.0)	1 (0.8)	4 (0.9)	
Others	12 (3.8)	0 (0.0)	12 (2.7)	

[a] Chi-square test for comparison between depression and non-depression groups

[b] Independent sample T-test for comparison between depression and non-depression groups

Table 5 Characteristics of the participants stratified by non-depression and depression groups (continued)

Variables	Non-depression group (n=315)	Depression group (n=131)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Exercise				
Never	126 (40.0)	56 (42.8)	182 (40.8)	
< 3 days/week, <30 min	61 (19.4)	37 (28.2)	98 (22.0)	
< 3 days/week, ≥ 30 min	50 (15.9)	16 (12.2)	66 (14.8)	0.130
≥ 3 days/week, < 30 min	8 (2.5)	3 (2.3)	11 (2.4)	
≥ 3 days/week, > 30 min	70 (22.2)	19 (14.5)	89 (20.0)	
Physical activity (n=437)				
Low	11 (3.6)	7 (5.5)	18 (4.1)	
Moderate	90 (29.0)	60 (45.3)	150 (34.3)	<0.001
High	209 (67.4)	60 (47.2)	269 (61.6)	
Cigarette smoking				
Non-smoker	287 (91.1)	120 (91.6)	407 (91.3)	
Ex-smoker	12 (3.8)	7 (5.3)	19 (4.2)	0.507
Smoker	16 (5.1)	4 (3.1)	20 (4.5)	
Alcohol consumption				
Never	213 (67.6)	84 (64.1)	297 (66.6)	
Sometime (1-3 times/week)	95 (30.2)	45 (34.4)	140 (31.4)	0.635
Often (> 3 times/week)	7 (2.2)	2 (1.5)	9 (2.0)	

[a] Chi-square test for comparison between depression and non-depression group groups

Table 5 Characteristics of the participants stratified by non-depression and depression groups (continued)

Variables	Non-depression group (n=315)	Depression group (n=131)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Medications				
No	258 (81.9)	105 (80.2)	363 (81.4)	
Diabetic/Dyslipidemia	26 (2.3)	9 (6.9)	35 (7.8)	
Hypertension				0.455
Depression	1 (0.3)	2 (1.5)	3 (0.7)	
Others	30 (9.5)	15 (11.4)	45 (10.1)	

[a] Chi-square test for comparison between depression and non-depression groups

Table 6 Characteristics of the participants classified by modified NCEP ATP III criteria

Variables	Non-metabolic syndrome group (n=390)	Metabolic syndrome group (n=56)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Gender				
Female	103 (26.4)	20 (35.7)	123 (27.6)	0.145
Male	287 (73.6)	36 (64.3)	323 (72.4)	
Age (years)				
20-29	135 (34.6)	5 (8.9)	140 (31.4)	
30-39	170 (43.6)	18 (32.1)	188 (42.1)	
40-49	52 (13.3)	17 (30.4)	69 (15.5)	<0.001
50-59	26 (6.7)	16 (28.6)	42 (9.4)	
≥60	7 (1.8)	0 (0.0)	7 (1.6)	
Mean ± SD	34.6 ± 9.0	42.4 ± 10.0	35.6 ± 9.5	<0.001[b]
Occupation				
Employee	19 (4.9)	4 (7.2)	23 (5.2)	
Office worker	257 (65.9)	33 (58.9)	290 (65.0)	
Government officer/ state enterprise worker	99 (25.4)	18 (32.1)	117 (26.2)	0.649
Business owner/Trader	4 (1.0)	0 (0.0)	4 (0.9)	
Others	11 (2.8)	1 (1.8)	12 (2.7)	

[a] Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

[b] Independent sample T-test for comparison between metabolic syndrome and non-metabolic syndrome groups

Table 6 Characteristics of the participants classified by modified NCEP ATP III criteria (continued)

Variables	Non-metabolic syndrome group (n=390)	Metabolic syndrome group (n=56)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Exercise				
Never	157 (40.3)	25 (44.6)	182 (40.8)	
< 3 days/week, <30 min	80 (20.5)	18 (32.2)	98 (22.0)	
< 3 days/week, ≥ 30 min	62 (15.9)	4 (7.1)	66 (14.8)	0.097
≥ 3 days/week, < 30 min	11 (2.8)	0 (0.0)	11 (2.4)	
≥ 3 days/week, > 30 min	80 (20.5)	9 (16.1)	89 (20.0)	
Physical activity (n=437)				
Low	11 (2.9)	7 (12.5)	18 (4.1)	
Moderate	127 (33.3)	23 (41.1)	150 (34.3)	0.001
High	243 (63.8)	26 (46.4)	269 (61.6)	
Cigarette smoking				
Non-smoker	357 (91.5)	50 (89.3)	407 (91.3)	
Ex-smoker	17 (4.4)	2 (3.6)	19 (4.2)	0.575
Smoker	16 (4.1)	4 (7.1)	20 (4.5)	
Alcohol consumption				
Never	256 (65.6)	41 (73.21)	297 (66.6)	
Sometime(1-3times/week)	125 (32.1)	15 (26.79)	140 (31.4)	0.342
Often (> 3 times/week)	9 (2.3)	0 (0.0)	9 (2.0)	

[a] Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

Table 6 Characteristics of the participants classified by modified NCEP ATP III criteria (continued)

Variables	Non-metabolic syndrome group (n=390)	Metabolic syndrome group (n=56)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Medications				
No	332 (85.1)	31 (55.4)	363 (81.4)	
Diabetic/Dyslipidemia	17 (4.4)	18 (32.1)	35 (7.9)	
Hypertension				<0.001
Depression	2 (0.5)	1 (1.8)	3 (0.7)	
Others	39 (10.0)	6 (10.7)	45 (10.0)	

[a] Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

Table 7 Dietary pattern of the participants stratified by non-depression and depression groups

Variables	Non-depression group (n=315)	Depression group (n=131)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Bakery product intake				
≤ 3 days/week	242 (76.8)	101 (77.1)	343 (76.9)	0.950
> 3 days/week	73 (23.2)	30 (22.9)	103 (23.1)	
High-sugar food intake				
≤ 3 days/week	201 (63.8)	80 (61.1)	281 (63.0)	0.585
> 3 days/week	114 (36.2)	51 (38.9)	165 (37.0)	
Fatty meat intake				
≤ 3 days/week	263 (83.5)	112 (85.5)	375 (84.1)	0.598
> 3 days/week	52 (16.5)	19 (14.5)	71 (15.9)	
Fish food intake				
≤ 3 days/week	53 (16.8)	19 (14.5)	72 (16.1)	0.544
> 3 days/week	262 (83.2)	112 (85.5)	374 (83.9)	
Fried food intake				
≤ 3 days/week	222 (70.5)	86 (65.6)	308 (69.1)	0.315
> 3 days/week	93 (29.5)	45 (34.4)	138 (30.9)	
Single-plate food intake				
≤ 3 days/week	250 (79.4)	105 (80.2)	355 (79.6)	0.851
> 3 days/week	65 (20.6)	26 (19.9)	91 (20.4)	

[a] Chi-square test for comparison between depression and non-depression groups

Table 7 Dietary pattern of the participants stratified by non-depression and depression groups (continued)

Variables	Non-depression group (n=315)	Depression group (n=131)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Coconut milk food intake				
≤ 3 days/week	306 (97.1)	124 (94.7)	430 (96.4)	0.198
> 3 days/week	9 (2.9)	7 (5.3)	16 (3.6)	
Snack intake				
≤ 3 days/week	259 (82.2)	114 (87.0)	373 (83.6)	0.212
> 3 days/week	56 (17.8)	17 (13.0)	73 (16.4)	
Semi-instant food intake				
≤ 3 days/week	300 (95.2)	127 (96.9)	427 (95.7)	0.416
> 3 days/week	15 (4.8)	4 (3.1)	19 (4.3)	
Salty processed food intake				
≤ 3 days/week	303 (96.2)	123 (93.9)	426 (95.5)	0.286
> 3 days/week	12 (3.8)	8 (6.1)	20 (4.5)	
Whole grain intake				
≤ 3 days/week	91 (28.9)	24 (18.3)	115 (25.8)	0.021
> 3 days/week	224 (71.1)	107 (81.7)	331 (74.2)	
Vegetable intake				
≤ 3 days/week	181 (57.5)	60 (45.8)	241 (54.0)	0.025
> 3 days/week	134 (42.5)	71 (54.2)	205 (46.0)	
Fruit intake				
≤ 3 days/week	169 (53.7)	54 (41.2)	223 (50.0)	0.017
> 3 days/week	146 (46.3)	77 (58.8)	223 (50.0)	

[a] Chi-square test for comparison between depression and non-depression groups

Table 8 Dietary pattern of the participants stratified by metabolic syndrome as defined by modified NCEP ATP III criteria

Variables	Non-metabolic syndrome group (n=390)	Metabolic syndrome group (n=56)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Bakery product intake				
≤ 3 days/week	296 (75.9)	47 (83.9)	343 (76.9)	0.182
> 3 days/week	94 (24.1)	9 (16.1)	103 (23.1)	
High-sugar food intake				
≤ 3 days/week	242 (62.1)	26 (69.6)	281 (63.0)	0.271
> 3 days/week	148 (37.9)	17 (30.4)	165 (37.0)	
Fatty meat intake				
≤ 3 days/week	331 (84.9)	44 (78.6)	375 (84.1)	0.228
> 3 days/week	59 (15.1)	12 (21.4)	71 (15.9)	
Fish food intake				
≤ 3 days/week	60 (15.4)	12 (21.4)	72 (16.1)	0.250
> 3 days/week	330 (84.6)	44 (78.6)	374 (83.9)	
Fried food intake				
≤ 3 days/week	273 (70.0)	35 (62.5)	308 (69.1)	0.256
> 3 days/week	117 (30.0)	21 (37.5)	138 (30.9)	
Single-plate food intake				
≤ 3 days/week	308 (79.0)	47 (83.9)	355 (79.6)	0.390
> 3 days/week	82 (21.0)	9 (16.1)	91 (20.4)	

[a] Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

Table 8 Dietary pattern of the participants stratified by metabolic syndrome as defined by modified NCEP ATP III criteria (continued)

Variables	Non-metabolic syndrome group (n=390)	Metabolic syndrome group (n=56)	Total	*p*-value[a]
	N (%)	N (%)	N (%)	
Coconut milk food intake				
≤ 3 days/week	378 (96.9)	52 (92.9)	430 (96.4)	0.126
> 3 days/week	12 (3.1)	4 (7.1)	16 (3.6)	
Snack intake				
≤ 3 days/week	324 (83.1)	49 (87.5)	373 (83.6)	0.403
> 3 days/week	66 (16.9)	7 (12.5)	73 (16.4)	
Semi-instant food intake				
≤ 3 days/week	374 (95.9)	53 (94.6)	427 (95.7)	0.664
> 3 days/week	16 (4.1)	3 (5.4)	19 (4.3)	
Salty processed food intake				
≤ 3 days/week	374 (95.9)	52 (92.9)	426 (95.5)	0.304
> 3 days/week	16 (4.1)	4 (7.1)	20 (4.5)	
Whole grain intake				
≤ 3 days/week	100 (25.6)	15 (26.8)	115 (25.8)	0.855
> 3 days/week	290 (74.4)	41 (73.2)	331 (74.2)	
Vegetable intake				
≤ 3 days/week	211 (54.1)	30 (53.6)	241 (54.0)	0.941
> 3 days/week	179 (45.9)	26 (46.4)	205 (46.0)	
Fruit intake				
≤ 3 days/week	190 (48.7)	33 (58.9)	223 (50.0)	0.153
> 3 days/week	200 (51.3)	23 (41.1)	223 (50.0)	

[a] Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

4.4 Metabolic syndrome and its components

The mean values of five metabolic syndrome components of all participants were in normal range (Table 9). The number of the components of the metabolic syndrome of the participants in non-depression group and depression group are presented in Table 10. The results showed that there were no significant differences in metabolic syndrome components between participants in the non-depression and depression groups. Table 11 presents the number of the metabolic syndrome components of the participants with and without metabolic syndrome as defined by modified NCEP ATP III criteria. The results showed that there were significant differences in every components of metabolic syndrome between participants in the non-metabolic syndrome group and metabolic syndrome group. There were 82.1% of the participants with metabolic syndrome having abdominal obesity, 72.7% having increased FPG, 84.9% having high TG level, 52.0% having low HDL-C level, and 39.3% having raised BP.

Table 9 The mean value of variables of the components of metabolic syndrome

variables	Mean	± SD
Waist circumference (cm) (n=446)		
Male	85.4	± 10.7
Female	75.1	± 9.6
Fasting plasma glucose (mg/dL) (n=439)	90.8	± 18.7
Triglycerides (mg/dL) (n=413)	103.7	± 57.5
HDL-C (mg/dL) (n=368)		
male	59.4	± 27.3
female	68.1	± 22.3
Blood pressure (mmHg) (n=436)		
SBP	115.7	± 13.0
DBP	74.0	± 9.8

HDL-C = high-density lipoprotein cholesterol, SBP = systolic blood pressure, DBP = diastolic blood pressure

Table 10 The number of components of the metabolic syndrome of participants in the non-depression and depression groups

Variables	Non-depression group	Depression group	Total	*p*-value[a]
Waist circumference (cm) (n=446)	N (%)	N (%)	N (%)	
<90/80 (male/female)	231 (73.3)	93 (71.0)	324 (72.7)	0.613
≥90/80 (male/female)	84 (26.7)	38 (29.0)	122 (27.3)	
Fasting plasma glucose (mg/dL) (n=439)				
< 100	264 (84.6)	111 (87.4)	375 (85.4)	0.453
≥ 100	48 (15.4)	16 (12.6)	64 (14.6)	
Triglycerides (mg/dL) (n=413)				
< 150	237 (82.0)	97 (78.2)	334 (80.9)	0.371
≥ 150	52 (18.0)	27 (21.8)	79 (19.1)	
High-density lipoprotein cholesterol (mg/dL) (n=368)				
< 40 (male) / 50 (female)	38 (14.8)	20 (18.0)	58 (15.8)	0.435
≥ 40 (male) / 50 (female)	219 (85.2)	91 (82.0)	310 (84.2)	
Blood pressure (mmHg) (n=436)				
< 130 (Systolic) or 85 (Diastolic)	274 (88.7)	117 (92.1)	391 (89.7)	0.282
≥ 130 (Systolic) or 85 (Diastolic)	35 (11.3)	10 (7.9)	45 (10.3)	

[a] Chi-square test for comparison between depression and non-depression groups

Table 11 The number of components of the metabolic syndrome of participants in the non-metabolic syndrome and metabolic

variables	Non-metabolic syndrome	Metabolic syndrome	Total	*p*-value[a]
Waist circumference (cm) (n=446)	N (%)	N (%)	N (%)	
<90/80 (male/female)	314 (80.5)	10 (17.9)	324 (72.7)	<0.001
≥90/80 (male/female)	76 (19.5)	46 (82.1)	122 (27.3)	
Fasting plasma glucose (mg/dL) (n=439)				
< 100	360 (93.8)	15 (27.3)	375 (85.4)	<0.001
≥ 100	24 (6.2)	40 (72.7)	64 (14.6)	
Triglycerides (mg/dL) (n=413)				
< 150	326 (90.6)	8 (15.1)	334 (80.9)	<0.001
≥ 150	34 (9.4)	45 (84.9)	79 (19.1)	
High-density lipoprotein cholesterol (mg/dL) (n=368)				
< 40 (male) / 50 (female)	32 (10.1)	26 (52.0)	58 (15.8)	<0.001
≥ 40 (male) / 50 (female)	286 (89.9)	24 (48.0)	310 (84.2)	
Blood pressure (mmHg) (n=436)				
< 130 (Systolic) or 85 (Diastolic)	357 (94.0)	34 (60.7)	391 (89.7)	<0.001
≥ 130 (Systolic) or 85 (Diastolic)	23 (6.0)	22 (39.3)	45 (10.3)	

[a]Chi-square test for comparison between metabolic syndrome and non-metabolic syndrome groups

4.5 Depression and metabolic syndrome

The relationship between depression and metabolic syndrome is presented in Table 12. The results showed that depression was not associated with metabolic syndrome (p = 0.423). The relationship between depression and all components of metabolic syndrome including WC, FPG, TG, HDL-C, BP were analyzed by multiple logistic regression. The results showed that none of the metabolic syndrome components were significantly associated with depression (Table 13). Table 14 presents the number of metabolic syndrome components in the non-metabolic syndrome and metabolic syndrome groups. Most of the participants (75.0%) with metabolic syndrome had 3 metabolic syndrome components. Table 15 presents the number of metabolic syndrome components in the non-depression and depression groups. Most of the participants in the depression group (56.5%) had no metabolic syndrome components, followed by 1 component (19.8%) and 3 components (11.6%).

Table 12 The relationship between depression and metabolic syndrome

		Non-depression	Depression	*p*-value[a]
		N (%)	N (%)	
Non-metabolic syndrome	N (%)	278 (88.3)	112 (85.5)	0.423
Metabolic syndrome	N (%)	37 (11.7)	19 (14.5)	

[a] Chi-square test for comparison between depression and metabolic syndrome.

Table 13 The relationship between depression and each component of metabolic syndrome

variables	Non-depression group	Depression group	Total	OR (95% CI)	*p*-value[a]
Waist circumference (cm) (n=446)	N (%)	N (%)	N (%)		
<90/80 (male/female)	231 (73.3)	93 (71.0)	324 (72.7)	1.00	0.614
≥90/80 (male/female)	84 (26.7)	38 (29.0)	122 (27.3)	1.12 (0.71-1.77)	
Fasting plasma glucose (mg/dL) (n=439)					
< 100	264 (84.6)	111 (87.4)	375 (85.4)	1.00	0.454
≥ 100	48 (15.4)	16 (12.6)	64 (14.6)	0.79 (0.43-1.46)	
Triglycerides (mg/dL) (n=413)					
< 150	237 (82.0)	97 (78.2)	334 (80.9)	1.00	0.371
≥ 150	52 (18.0)	27 (21.8)	79 (19.1)	1.27 (0.75-2.14)	
High-density lipoprotein cholesterol (mg/dL) (n=368)					
< 40/50 (male/female)	38 (14.8)	20 (18.0)	58 (15.8)	1.27 (0.70-2.30)	0.436
≥ 40/50 (male/female)	219 (85.2)	91 (82.0)	310 (84.2)	1.00	
Blood pressure (mmHg) (n=436)					
< 130 (Systolic) or 85 (Diastolic)	274 (88.7)	117 (92.1)	391 (89.7)	1.00	0.284
≥ 130 (Systolic) or 85 (Diastolic)	35 (11.3)	10 (7.9)	45 (10.3)	0.67 (0.32-1.40)	

[a]*p*-value was based on multiple logistic regression

Table 14 The number of metabolic syndrome components of the participants in the non-metabolic syndrome and metabolic syndrome groups

Number of metabolic syndrome components	Non-metabolic syndrome group	Metabolic syndrome group	Total
	N (%)	N (%)	N (%)
None	248 (63.6)	-	248 (63.6)
1	97 (24.9)	-	97 (24.9)
2	45 (11.5)	-	45 (11.5)
3	-	42 (75.0)	42 (75.0)
4	-	11 (19.6)	11 (19.6)
5	-	3 (5.4)	3 (5.4)

Table 15 The number of metabolic syndrome components of participants in the non-depression and depression groups

Number of metabolic syndrome components	Non-depression group	Depression group	Total
	N (%)	N (%)	N (%)
None	174 (55.2)	74 (56.5)	248 (55.9)
1	71 (22.5)	26 (19.8)	97 (21.6)
2	37 (11.8)	12 (9.2)	49 (10.9)
3	23 (7.3)	15 (11.6)	38 (8.4)
4	7 (2.2)	4 (3.1)	11 (2.5)
5	3 (1.0)	-	3 (0.7)

4.6 Depression and dietary pattern

The relationship between depression and each type of food intake were analyzed by multiple logistic regression. Table 17 presents the odds ratio for the relationship between depression and dietary patterns. The results indicated significant relationships between depression and intakes of whole grains, vegetables and fruits. The participants who had whole grain intake 3 days and below per week had 1.81 times higher risk of depression than those who had whole grain intake more than 3 days per week (95% CI = 1.09-3.00, p = 0.021). The participants who had vegetable intake 3 days and below per week had 1.60 times higher risk of depression than those who had vegetable intake more than 3 days per week (95% CI = 1.09-2.49 p = 0.025). The participants who had fruit intake 3 days and below per week had 1.65 times higher risk of depression than those who had fruit intake more than 3 days per week (95% CI = 1.09-2.94 p = 0.017).

Table 16 The relationship between depression and dietary pattern

Variables	Non-depression n (%) (n=315)	Depression n (%) (n=131)	Total n (%)	OR (95% CI)	*p*-value[a]
Bakery product intake					
≤ 3 days/week	242 (76.8)	101 (77.1)	343 (76.9)	1.00	
> 3 days/week	73 (23.2)	30 (22.9)	103 (23.1)	0.98 (0.61-1.59)	0.950
High-sugar food intake					
≤ 3 days/week	201 (63.8)	80 (61.1)	281 (63.0)	1.00	
> 3 days/week	114 (36.2)	51 (38.9)	165 (37.0)	1.12 (0.74-1.71)	0.585
Fatty meat intake					
≤ 3 days/week	263 (83.5)	112 (85.5)	375 (84.1)	1.00	
> 3 days/week	52 (16.5)	19 (14.5)	71 (15.9)	0.86 (0.49-1.52)	0.598
Fish food intake					
≤ 3 days/week	53 (16.8)	19 (14.5)	72 (16.1)	1.19 (0.68-2.11)	
> 3 days/week	262 (83.2)	112 (85.5)	374 (83.9)	1.00	0.544
Fried food intake					
≤ 3 days/week	222 (70.5)	86 (65.7)	308 (69.0)	1.00	
> 3 days/week	93 (29.5)	45 (34.3)	138 (31.0)	1.25 (0.81-1.93)	0.316
Single-plate food intake					
≤ 3 days/week	250 (79.4)	105 (80.1)	355 (79.6)	1.00	
> 3 days/week	65 (20.6)	26 (19.9)	91 (20.4)	0.95 (0.57-1.58)	0.851
Coconut milk food intake					
≤ 3 days/week	306 (97.1)	124 (94.7)	430 (96.4)	1.00	
> 3 days/week	9 (2.9)	7 (5.3)	16 (3.6)	1.92 (0.69-5.27)	0.206

[a] *p*-value was based on multiple logistic regression

Table 16 The relationship between depression and dietary pattern (n=446) (continued)

Variables	Non-depression n (%) (n=315)	Depression n (%) (n=131)	Total n (%)	OR (95% CI)	*p*-value[a]
Snack intake					
≤ 3 days/week	259 (82.2)	114 (87.0)	373 (83.6)	1.00	
> 3 days/week	56 (17.8)	17 (13.0)	73 (16.4)	0.69 (0.38-1.24)	0.214
Semi-instant intake					
≤ 3 days/week	300 (95.2)	127 (96.9)	427 (95.7)	1.00	
> 3 days/week	15 (4.8)	4 (3.1)	19 (4.3)	0.63 (0.21-1.94)	0.420
Salty processed food intake					
≤ 3 days/week	303 (96.2)	123 (93.9)	426 (95.5)	1.00	
> 3 days/week	12 (3.8)	8 (6.1)	20 (4.5)	1.64 (0.66-4.11)	0.290
Whole grain intake					
≤ 3 days/week	91 (28.9)	24 (18.3)	115 (25.8)	1.81 (1.09-3.00)	0.021
> 3 days/week	224 (71.1)	107 (81.7)	331 (74.2)	1.00	
Vegetable intake					
≤ 3 days/week	181 (57.5)	60 (45.8)	241 (54.0)	1.60 (1.09-2.49)	0.025
> 3 days/week	134 (42.5)	71 (54.2)	205 (46.0)	1.00	
Fruit intake					
≤ 3 days/week	169 (53.7)	54 (41.2)	223 (50.0)	1.65 (1.09-2.94)	0.017
> 3 days/week	146 (46.3)	77 (58.8)	223 (50.0)	1.00	

[a] *p*-value was based on multiple logistic regression

CHAPTER V
DISCUSSION

This study was an observational descriptive cross-sectional design to investigate the prevalence of depression and metabolic syndrome and to examine the association of depression with metabolic syndrome and dietary pattern in working age people in Bangkok.

5.1 Prevalence of depression and metabolic syndrome and its characteristics

The prevalence of depression in this study was 29.4%. This was higher than those in previous studies in Thailand. According to a survey by Ministry of Public Health (2009), the prevalence of depression in population in Bangkok aged 15 years and over was 5.1%. In Roi-Et province, the prevalence of depression in general outpatients department of Phanomprai Hospital aged 18-59 years old was 11.5% (Nuntatikul, 2009). The difference may be due to the characteristics of the participants. Most of the participants in this study were office workers (65.0%) who have long working hours. It was found that long-term work was associated with increased stress (Bannai and Tamakoshi, 2014). Therefore, the higher prevalence of depression in this study may result from participants'stressful conditions of long working hours. However, the prevalence of depression in this study was similar to some other previous studies in South Asia. The prevalence of depression in general population who had an average age in the range of 39-43 years in Bangladesh, India and Nepal were 39.0%, 17.7% and

49.9%, respectively. The varied prevalences of depression among these countries may be due to different quality of life. The lowered prevalence of depression was found in the countries with better quality of life (Bishwajit et al., 2017).

The prevalence of metabolic syndrome defined by NCEP ATP III in this study was 12.6%. This was similar to the previous studies. The prevalence of metabolic syndrome defined by NCEP ATP III of the professional and office workers in Bangkok who received the annual examination was 15.2% (Lohsoonthorn et al., 2007). The prevalence of metabolic syndrome in Nong Khai population was 16.93% (defined by NCEP ATP III criteria) and 15.04% (defined by IDF criteria) (Kaewtrakulpong, 2008), In Nakhon Sawan province, the prevalence of metabolic syndrome was 18.7% (defined by IDF) (Santibhavank, 2007). Furthermore, In Nakhon Ratchasima and Khon Kean province, the prevalence of metabolic syndrome was 17.9% (defined by NCEP ATP III criteria), 15.4% (defined by IDF criteria) and 15.0% (defined by NCEP ATP III), respectively (Pongchaiyakul et al., 2007; Sutadarat et al., 2009). The prevalences of metabolic syndrome in other countries, including South Korea, Japan and China were in the range of 8.4 - 31.1% (Lim et al., 2011; Tran et al., 2017; Urashima et al., 2005; Xiao et al., 2015).

5.2 Depression and metabolic syndrome

The association between depression and metabolic syndrome was found in general population (Park et al., 2016). People with depression and metabolic syndrome have abnormalities in eating patterns. It is well accepted that there is a relationship between metabolic syndrome and food consumption (Moreira et al., 2016). Depression is also known to cause unwanted health behaviors such as smoking, alcohol consumption, low exercise, and to cause non-compliance with medical treatments, which may lead to metabolic syndrome (Lett et al., 2004; Rozanski et al., 2005).

While a previous study found the relationship between depression and metabolic syndrome in 42-50 year-old women (Raikkonen et al., 2002), this study found no relationship between depression and metabolic syndrome in working age population in Bangkok. This may be due to the age of participants. Most of the participants in this study were early adulthood age (20-40 years old), while the relationship between depression and metabolic syndrome was found in middle age (40-60 years old). The percentage of the participants with depression and metabolic syndrome was 4.26 (19 participants), which was quite small. The result from the present study was consistent with the study by Kinder et al. (2004) who found no relationship between depression and metabolic syndrome in population aged 17-39 years with no history of CVD and DM. They found that the prevalence of metabolic syndrome increased in females with a history of depression. No association between

depression and metabolic syndrome was also found in Northern Finland population aged 31 years old (Herva et al., 2006).

5.3 Depression, metabolic syndrome and dietary pattern

Dietary intake plays an important role to depression. Several studies have found that good quality diet is related to good mental health, and inverse association between depression and healthy diet intake was found (Akbaraly et al., 2009; Lai et al., 2014). In this study, there were 3 factors of dietary pattern that showed significant relationships with depression. The first significant factor was whole grain intake. The participants who had whole grain intake 3 days and below per week had 1.81 times higher risk to have depression when compared with the participants who had whole grain intake more than 3 days per week. The second significant factor was fruit intake. The participants who had fruit intake 3 days and below per week had 1.65 times higher risk to have depression when compared with the participants who had fruit intake more than 3 days per week. The last significant factor was vegetable intake. The participants who had vegetable intake 3 days and below per week had 1.60 times higher risk to have depression when compared with the participants who had vegetable intake more than 3 days per week. This result was consistent to the previous studies (Akbaraly et al., 2009; Lai et al., 2014; Li et al., 2017).

Whole grains, vegetables and fruits are source of dietary fiber, antioxidant and folate. Dietary fiber helps keep the function of insulin and improve blood lipids. It also reduces the inflammatory markers such as C-reactive protein (CRP) and tumor necrosis

factor α receptor 2 (Huang et al., 2015). Previous studies have shown that whole grains can help to prevent type 2 diabetes (De Munter et al., 2007; Huang et al., 2015), cardiovascular diseases and cancer (Benisi-Kohansal et al., 2016; Huang et al., 2015). Whole grains contain high dietary fiber. A high fiber diet is important for the promotion of gut health (O'Keefe et al., 2015). One study found that higher intake of dietary fiber may be associated with a lower prevalence of depressive symptoms (Miki et al., 2016). Gut microflora imbalance are common in mental disorder by alteration in behavior, cognition and emotion (Dash et al., 2015). Fiber can alter the gut microflora to reduce oxidative stress and inflammation (Miki et al., 2016). O'Keefe et al. (2015) found that a western diet, low fiber diet, increased gut mucosal inflammation. So high whole grain intake may have a role in reducing risk of mental disorder such as depression.

Fruits and vegetables are high in antioxidants which protect against neuronal damage from oxidative stress (Akbaraly et al., 2009). Antioxidants have beneficial effects on inflammatory markers. Antioxidants in green tea (catechins, phenolic acids, and flavonols) reduced depressive symptoms in a mouse model of post-stroke depression (Di Lorenzo et al., 2016). Low plasma concentrations of carotenoids are associated with depressive symptoms and it can predict the development of new depressive symptoms in older persons (Milaneschi et al., 2012). Depression is strongly associated with increased levels of CRP (Ford and Erlinger, 2004). Moreover, fruits and vegetables are source of folate, an important water-soluble vitamin. The previous study found that low folate intake increased the risk of depression (Tolmunen et al.,

2004). The study in general US population aged 15-39 years found that these with major depression had lower folate status than those who had never been depressed (Morris et al., 2003). Consistent with the study of Nguyen et al. (2017), low folate concentrations level may increase risk of moderate to severe depression in non-pregnant reproductive age women in the U.S. Folate deficiency may lead to impaired methylation, neurotransmitter metabolism and hyperhomocysteinemia. (Bottiglieri, 2005). Folate helps to regulate methionine for S-adenosylmethionine synthesis which is a cofactor in methylation reaction in dopamine, norepinephrine, and serotonin synthesis (Fernstrom, 2000). Depression is associated with deficiencies of serotonin, dopamine and norepinephrine. Therefore, the consumption of dietary with high folate content may help prevent depression.

According to the present study, dietary pattern with high whole grains, vegetables and fruits related to reduced risk of depression. It is well known that this kind of dietary pattern is also related to metabolic syndrome. Several studies found that high intake of whole grains, vegetables and fruits associated with a lower risk of metabolic syndrome (Cho et al., 2011; Shin et al., 2009; Suliga et al., 2015). However, there was no relationship between metabolic syndrome and dietary pattern in this study. This may be due to the age of participants in this study was early adulthood age. This study found the low prevalence of metabolic syndrome, so it was not found the significant relationship between depression and metabolic syndrome.

CHAPTER VI

CONCLUSION

This observational descriptive cross-sectional study was to investigate the association of depression with metabolic syndrome and dietary pattern in working age population in Bangkok. The prevalence of depression was 29.4%, which was higher in females than in males. The prevalence of metabolic syndrome was 12.6%, which was higher in males than in females. This is the first study determining the relationship between depression and metabolic syndrome in general population in Thailand. This study showed no relationship between depression and metabolic syndrome. There was no relationship between dietary pattern and metabolic syndrome. However, there were three factors of dietary pattern (whole grain, vegetable, and fruit intakes) that showed significantly associated with depression. The participants with whole grain, vegetable and fruit intakes 3 days and below per week had higher risk to have depression than those with whole grain, vegetable and fruit intakes more than 3 days per week (1.81, 1.60, and 1.65 times, respectively). Therefore, dietary pattern may be important factor affecting depression. Increased consumption of whole grains, vegetables and fruits may help reduce risk of depression.

The current study may have a few limitations. First, the data collection was provided from self-reports and it may affect the accuracy of data. Second, this study has a small sample size which may not be able to clarify the relationship between

depression and metabolic syndrome. For the further study, the number and the area of population should be increased for better illustration of the relationship between depression and metabolic syndrome and some factors of dietary pattern related to depression. The data on other daily dietary intakes should be recorded for exploration of other factors that related to depression such as total energy and calorie distribution. Moreover, a semi-quantitative food frequency questionnaire should be designed for estimation of other nutrients that related to depression.

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APPENDICES

Appendix A

Certificate of Approval

Information sheet for participants

Informed consent form

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel/Fax: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 166/2017

Certificate of Approval

Study Title No. 112.1/60 : RELATIONSHIP BETWEEN DEPRESSION AND METABOLIC SYNDROME IN WORKING AGE POPULATION IN BANGKOK

Principal Investigator : MISS MATTHAWAN SUJINNAPRAM

Place of Proposed Study/Institution : Faculty of Pharmaceutical Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP).

Signature: Prida Tasanapradit (Associate Professor Prida Tasanapradit, M.D.) Chairman

Signature: Nuntaree Chaichanawongsaroj (Assistant Professor Nuntaree Chaichanawongsaroj, Ph.D.) Secretary

Date of Approval : 17 August 2017 Approval Expire date : 16 August 2018

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaire

Protocol No. 112.1/60
Date of Approval 17 AUG 2017
Approval Expire Date 16 AUG 2018

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the RECCU for any serious adverse events within 5 working days*
5. *Report to the RECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

AF 01-12

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย
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COA No. 166/2560

ใบรับรองโครงการวิจัย

โครงการวิจัยที่ 112.1/60 : ความสัมพันธ์ระหว่างภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกของประชากรวัยทำงานในกรุงเทพมหานคร

ผู้วิจัยหลัก : นางสาวมัทวัน สุจินพรัหม

หน่วยงาน : คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย ได้พิจารณา โดยใช้หลัก ของ The International Conference on Harmonization – Good Clinical Practice (ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

ลงนาม.....
(รองศาสตราจารย์ นายแพทย์ปรีดา ทัศนประดิษฐ)
ประธาน

ลงนาม.....
(ผู้ช่วยศาสตราจารย์ ดร.นันทรี ชัยชนะวงศาโรจน์)
กรรมการและเลขานุการ

วันที่รับรอง : 17 สิงหาคม 2560 **วันหมดอายุ** : 16 สิงหาคม 2561

เอกสารที่คณะกรรมการรับรอง

1) โครงการวิจัย
2) ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3) ผู้วิจัย
4) แบบสอบถาม

ลำดับที่โครงการวิจัย 112.1/60
วันที่รับรอง 17 ส.ค. 2560
วันหมดอายุ 16 ส.ค. 2561

เงื่อนไข

1. *ข้าพเจ้ารับทราบว่าเป็นการผิดระเบียบ หากดำเนินการเก็บข้อมูลการวิจัยก่อนได้รับการอนุมัติจากคณะกรรมการพิจารณาจริยธรรมการวิจัยฯ*
2. *หากใบรับรองโครงการวิจัยหมดอายุ การดำเนินการวิจัยต้องชุดิ เมื่อต้องการต่ออายุต้องขออนุมัติใหม่ล่วงหน้าไม่ต่ำกว่า 1 เดือน พร้อมส่งรายงานความก้าวหน้าการวิจัย*
3. *ต้องดำเนินการวิจัยตามที่ระบุไว้ในโครงการวิจัยอย่างเคร่งครัด*
4. *ใช้เอกสารข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย ใบยินยอมของกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และเอกสารเชิญเข้าร่วมวิจัย (ถ้ามี) **เฉพาะที่ประทับตราคณะกรรมการเท่านั้น***
5. *หากเกิดเหตุการณ์ไม่พึงประสงค์ร้ายแรงในสถานที่เก็บข้อมูลที่ขออนุมัติจากคณะกรรมการ ต้องรายงานคณะกรรมการภายใน 5 วันทำการ*
6. *หากมีการเปลี่ยนแปลงการดำเนินการวิจัย ให้ส่งคณะกรรมการพิจารณารับรองก่อนดำเนินการ*
7. *โครงการวิจัยไม่เกิน 1 ปี ส่งแบบรายงานสิ้นสุดโครงการวิจัย (AF 03-12) และบทคัดย่อผลการวิจัยภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น สำหรับโครงการวิจัยที่เป็นวิทยานิพนธ์ให้ส่งบทคัดย่อผลการวิจัย ภายใน 30 วัน เมื่อโครงการวิจัยเสร็จสิ้น*

ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย

ชื่อโครงการวิจัย ความสัมพันธ์ระหว่างภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกของประชากรวัยทำงานในกรุงเทพมหานคร

ชื่อผู้วิจัย นางสาวมัทวัน สุจินพรัหม นิสิตระดับบัณฑิตศึกษา

สถานที่ติดต่อผู้วิจัย (ที่ทำงาน) ภาควิชาอาหารและเภสัชเคมี คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

(ที่บ้าน) 25/173 คอนโดลุมพินีวิลล์ ถ.สุทธิสารวินิจฉัย แขวงสามเสนใน พญาไท กทม.

โทรศัพท์ 0-2218-8294 โทรศัพท์มือถือ 09-0245-9456 E-mail : yo.mattawan@gmail.com

ขอเรียนเชิญท่านเข้าร่วมในการวิจัย ก่อนที่ท่านจะตัดสินใจเข้าร่วมในการวิจัย กรุณาใช้เวลาในการอ่านข้อมูลต่อไปนี้อย่างละเอียดรอบคอบ และสอบถามข้อมูลเพิ่มเติมหรือข้อมูลที่ไม่ชัดเจนได้ตลอดเวลา

โครงการนี้เกี่ยวข้องกับการหาความสัมพันธ์ระหว่างภาวะซึมเศร้าและภาวะอ้วนลงพุงของประชากรวัยทำงานในกรุงเทพมหานคร มีวัตถุประสงค์เพื่อหาความชุกของภาวะซึมเศร้าและภาวะอ้วนลงพุง และเพื่อหาความสัมพันธ์ของภาวะซึมเศร้ากับปัจจัยต่างๆของภาวะอ้วนลงพุง รวมถึงพฤติกรรมการบริโภคอาหาร โดยผู้เข้าร่วมการศึกษาในครั้งนี้ คือประชากรวัยทำงานอายุตั้งแต่ 20 ปีขึ้นไป ทำงานอยู่ในบริษัทเอกชนหรือรัฐวิสาหกิจสามารถอ่านและเขียนภาษาไทยได้ ยินยอมตอบแบบสอบถามและให้ข้อมูลผลการตรวจร่างกาย ด้วยความสมัครใจ และลงนามในหนังสือแสดงความยินยอม และจะคัดหญิงตั้งครรภ์หรือให้นมบุตรออกจากศึกษา โดยจะให้ท่านตอบแบบสอบถามด้วยตนเองทั้งหมด 4 ส่วน ได้แก่ ข้อมูลทั่วไปและข้อมูลสุขภาพ 8 ข้อ แบบคัดกรองภาวะซึมเศร้า 20 ข้อ แบบบันทึกความถี่และชนิดของการบริโภคอาหาร 13 ข้อ และแบบบันทึกการบริโภคอาหารย้อนหลัง 24 ชั่วโมง หลังจากนั้นผู้วิจัยจะวัดรอบเอวโดยใช้สายวัดให้ท่านอยู่ในท่ายืน และผู้วิจัยจะขอเก็บข้อมูลผลการตรวจสุขภาพประจำปีของท่าน ได้แก่ ความดันเลือด ระดับไขมัน และระดับน้ำตาลในเลือด เพื่อนำไปประเมินภาวะอ้วนลงพุง ให้เสร็จสิ้นภายในวันที่ทำแบบสอบถาม โดยใช้เวลาทั้งสิ้นประมาณ 15-30 นาที *ซึ่งท่านอาจไม่สะดวกในการตอบบางข้อคำถาม และอาจเสียเวลาในการตอบแบบสอบถาม* ในกรณีที่ท่านไม่สามารถให้ข้อมูลผลการตรวจสุขภาพภายในวันที่ทำแบบสอบถามได้ ผู้วิจัยขออนุญาตติดตามข้อมูลในภายหลังผ่านทางโทรศัพท์ หรือจดหมายอิเล็กโทรนิค ข้อมูลจากการวิจัยนี้ สามารถนำไปใช้เป็นแนวทางการสร้างเสริม และพัฒนาสุขภาพของประชากรวัยทำงานทั่วไปได้ งานวิจัยนี้เป็นไปโดยความสมัครใจ *ไม่มีค่าชดเชยการเสียเวลา*

การเข้าร่วมในการวิจัยของท่านเป็นโดย**สมัครใจ** และสามารถ**ปฏิเสธ**ที่จะเข้าร่วมหรือ**ถอนตัว**จากการวิจัยได้ทุกขณะ โดยไม่ต้องให้เหตุผลและไม่สูญเสียประโยชน์ที่พึงได้รับ

ข้อมูลที่เกี่ยวข้องกับท่านจะเก็บเป็น**ความลับ** หากมีการเสนอผลการวิจัยจะเสนอเป็นภาพรวม ข้อมูลใดที่สามารถระบุถึงตัวท่านได้จะไม่ปรากฏในรายงาน และเมื่อเสร็จสิ้นการวิจัยแล้วข้อมูลที่เกี่ยวข้องกับผู้มีส่วนร่วมในการวิจัยจะถูกทำลาย

AF 04-07

"หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าวสามารถร้องเรียนได้ที่ คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 E-mail: eccu@chula.ac.th"

เอกสารโครงการวิจัย 112.1/60

วันที่รับรอง 17 ส.ค. 2560

วันหมดอายุ 16 ส.ค. 2561

AF 05-07

หนังสือแสดงความยินยอมเข้าร่วมการวิจัย

ทำที่.....

วันที่.....เดือน.....พ.ศ. .....

เรื่อง ประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย.....

ข้าพเจ้า ซึ่งได้ลงนามท้ายหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย

ชื่อโครงการวิจัย ความสัมพันธ์ระหว่างภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิกของประชากรวัยทำงานในกรุงเทพมหานคร

ชื่อผู้วิจัย นางสาวมัทวัน สุจินพรัหม

ที่อยู่ที่ติดต่อ ภาควิชาอาหารและเภสัชเคมี คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย โทรศัพท์ 09-0245-9456

ข้าพเจ้า **ได้รับทราบ**รายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดย**ได้**อ่านรายละเอียดในเอกสาร**ชี้แจงผู้เข้าร่วม**การวิจัยโดยตลอด และ**ได้รับ**คำอธิบายจากผู้วิจัย **จนเข้าใจ**เป็นอย่างดีแล้ว

ข้าพเจ้า**จึงสมัครใจ**เข้าร่วมในโครงการวิจัยนี้ ตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย โดยข้าพเจ้ายินยอมให้ผู้วิจัยสามารถนำผลการตรวจสุขภาพ และเส้นรอบเอว ผลการประเมินภาวะซึมเศร้า และแบบบันทึกความถี่และชนิดของการบริโภคอาหาร และแบบบันทึกการบริโภคอาหารย้อนหลัง 24 ชั่วโมง มาใช้วิเคราะห์ในโครงการวิจัยนี้ และข้าพเจ้ายินยอมตอบแบบสอบถาม ซึ่งประกอบด้วย 4 ส่วน ได้แก่ 1) ข้อมูลทั่วไปและข้อมูลสุขภาพ 8 ข้อ 2) แบบคัดกรองภาวะซึมเศร้า 20 ข้อ 3) แบบบันทึกความถี่และชนิดของการบริโภคอาหาร 13 ข้อ 4) แบบบันทึกการบริโภคอาหารย้อนหลัง 24 ชั่วโมง ผู้วิจัยวัดรอบเอว และบันทึกข้อมูลผลการตรวจสุขภาพ หากกรณีที่ข้าพเจ้าไม่สามารถให้ข้อมูลผลการตรวจสุขภาพได้ในวันที่ตอบแบบสอบถาม ข้าพเจ้ายินยอมให้ผู้วิจัยสอบถามข้อมูลทางโทรศัพท์หรือจดหมายอิเล็กโทรนิคได้ในภายหลังการให้ข้อมูลการวิจัยนี้จะใช้เวลารวมทั้งสิ้นประมาณ 15-30 นาที เมื่อเสร็จสิ้นการวิจัยแล้วข้อมูลที่เกี่ยวข้องกับผู้มีส่วนร่วมในการวิจัยจะถูกทำลาย

ข้าพเจ้ามี**สิทธิ**ถอนตัวออกจากการวิจัย**เมื่อใดก็ได้**ตามความประสงค์ **โดยไม่ต้องแจ้งเหตุผล** ซึ่งการถอนตัวออกจากการวิจัยนั้น จะไม่มีผลกระทบในทางใดๆ ต่อข้าพเจ้าทั้งสิ้น

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติต่อข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และข้อมูลใดๆ ที่เกี่ยวข้องกับข้าพเจ้า ผู้วิจัยจะเก็บรักษาเป็นความลับ โดยจะนำเสนอข้อมูลการวิจัยเป็นภาพรวมเท่านั้น ไม่มีข้อมูลใดในการรายงานที่จะนำไปสู่การระบุตัวข้าพเจ้า

หากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถร้องเรียนได้ที่คณะกรรมการพิจารณาจริยธรรมการวิจัยในคน กลุ่มสหสถาบัน ชุดที่ 1 จุฬาลงกรณ์มหาวิทยาลัย 254 อาคารจามจุรี 1 ชั้น 2 ถนนพญาไท เขตปทุมวัน กรุงเทพฯ 10330 โทรศัพท์/โทรสาร 0-2218-3202 **E-mail: eccu@chula.ac.th**

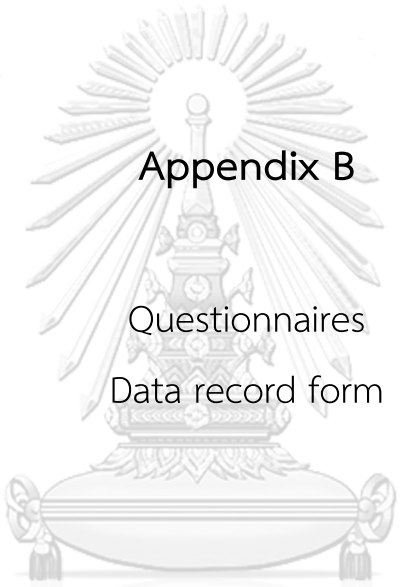
ข้าพเจ้าได้ลงลายมือชื่อไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารชี้แจงผู้เข้าร่วมการวิจัยและสำเนาหนังสือแสดงความยินยอมไว้แล้ว

ลงชื่อ.....
(นางสาวมัทวัน สุจินพรัหม)
ผู้วิจัยหลัก

ลงชื่อ.....
(.....)
ผู้มีส่วนร่วมในการวิจัย

ลงชื่อ.....
(.....)
พยาน

เอกสารโครงการวิจัย 112.1/60
วันที่รับรอง 17 ส.ค. 2560
วันหมดอายุ 16 ส.ค. 2561



Appendix B

Questionnaires

Data record form

ลำดับที่.....

ส่วนที่ 1 ข้อมูลทั่วไปและข้อมูลสุขภาพ

คำชี้แจง โปรดใส่เครื่องหมาย ✓ ลงในช่องว่าง ☐ หรือเติมข้อความลงในช่องว่าง

ข้อมูลทั่วไป

1. เพศ ☐ เพศชาย ☐ เพศหญิง
2. อายุ ..... ปี
3. อาชีพ
   ☐ ลูกจ้าง ☐ พนักงานบริษัท ☐ ข้าราชการ/รัฐวิสาหกิจ
   ☐ ธุรกิจส่วนตัว/ค้าขาย ☐ อื่นๆ ระบุ.....
4. โดยปกติท่านออกกำลังกายหรือไม่
   ☐ ไม่ได้ออกกำลังกาย
   ☐ ออกกำลังกาย บ่อยแค่ไหน ☐ < 3 ครั้ง/สัปดาห์ ☐ ≥ 3 ครั้ง/สัปดาห์
   ระยะเวลา ☐ < 30 นาที ☐ ≥ 30 นาที
5. ท่านคิดว่าท่านเป็นคนกระฉับกระเฉงระดับใด

1	2	3	4	5	6	7	8	9	10

ข้อมูลสุขภาพ

6. ท่านสูบบุหรี่หรือไม่
   ☐ ไม่เคยสูบ ☐ เคยสูบแต่เลิกแล้ว.....ปี ☐ สูบจำนวน.....มวน/วัน
7. ท่านดื่มเครื่องดื่มแอลกอฮอล์หรือไม่
   ☐ ไม่ดื่ม ☐ ดื่มเป็นบางครั้ง (1-3 ครั้ง/สัปดาห์)
   ☐ ดื่มเป็นประจำ (> 3 ครั้ง/สัปดาห์)
8. ยาที่รับประทาน
   ☐ ไม่มี ☐ โรคเบาหวาน ☐ โรคไขมันในเลือดสูง
   ☐ โรคความดันโลหิตสูง ☐ โรคซึมเศร้า ☐ โรคอื่นๆ ระบุ.....

ลำดับที่.....

หากท่านต้องการให้ผู้วิจัยแจ้งผลการวิเคราะห์ข้อมูลภาวะซึมเศร้าและกลุ่มอาการเมแทบอลิก (โปรดระบุช่องทางที่สะดวกติดต่อ)
โทร. .....
อีเมลล์ .....

ลำดับที่.....

ส่วนที่ 2 แบบคัดกรองภาวะซึมเศร้า (CES-D) ฉบับภาษาไทย

คำชี้แจง กรุณาใส่เครื่องหมาย ✓ ในช่องที่ตรงกับความรู้สึกของท่านมากที่สุด โดยเลือกเพียง 1 คำตอบในแต่ละข้อ

ท่านมีความรู้สึกดังต่อไปนี้บ่อยเพียงใดใน 1 สัปดาห์ที่ผ่านมา

ในระยะ 1 สัปดาห์ที่ผ่านมา	ไม่เลย (< 1 วัน)	นานๆ ครั้ง (1-2 วัน)	บ่อย ๆ (3-4 วัน)	ตลอดเวลา (5-7 วัน)
1.ฉันรู้สึกหงุดหงิดง่าย				
2.ฉันรู้สึกเบื่ออาหาร				
3.ฉันรู้สึกว่าฉันไม่สามารถขจัดความหม่นหมองออกไป แม้ว่าจะมีคนในครอบครัวหรือเพื่อนคอยช่วยเหลือ				
4.ฉันรู้สึกว่าตนเองมีความดีทัดเทียมคนอื่นๆ				
5.ฉันรู้สึกลำบากในการตั้งสมาธิเพื่อทำสิ่งใดสิ่งหนึ่ง				
6.ฉันรู้สึกหดหู่ใจ				
7.ฉันรู้สึกว่าทุก ๆ สิ่งที่ฉันกระทำจะต้องฝืนใจทำ				
8.ฉันรู้สึกมีความหวังเกี่ยวกับอนาคต				
9.ฉันคิดว่าชีวิตฉันมีแต่ความล้มเหลว				
10.ฉันรู้สึกหวาดกลัว				
11.ฉันนอนไม่ค่อยหลับ				
12.ฉันมีความสุข				
13.ฉันพูดคุยน้อยกว่าปกติ				
14.ฉันรู้สึกอ้างว้าง เดียวดาย				
15.ฉันรู้สึกว่าผู้คนทั่วๆไปไม่ค่อยมีความเป็นมิตร				
16.ฉันรู้สึกว่าชีวิตนี้สนุกสนาน				
17.ฉันมักร้องไห้				
18.ฉันรู้สึกไม่มีความสุข				
19.ฉันรู้สึกว่าผู้คนรอบข้างไม่ชอบฉัน				
20.ฉันรู้สึกท้อถอยในชีวิต				
รวมคะแนน				

ลำดับที่.....

ส่วนที่ 3 แบบบันทึกความถี่และชนิดของการบริโภคอาหาร

คำชี้แจง ในช่วง 1 เดือนที่ผ่านมา ท่านรับประทานอาหารต่างๆ เหล่านี้ บ่อยครั้งเพียงใด

โปรดใส่เครื่องหมาย ✓ ลงในช่องว่างแต่ละข้อ โดยเลือกเพียงคำตอบเดียว

รายการอาหาร	ไม่เคย	1-3 ครั้ง ต่อเดือน	1-3 ครั้ง ต่อสัปดาห์	มากกว่า 3 วัน ต่อสัปดาห์
1.อาหารกลุ่มเบเกอรี่ เช่น เค้ก คุกกี้ โดนัท ขนมปังทาเนยน้ำตาล พาย ครัวซอง ฯลฯ				
2.อาหารที่มีน้ำตาลสูง เช่น ขนมหวานไทยชนิดต่างๆ ผลไม้แช่อิ่ม ผลไม้กระป๋อง น้ำหวาน น้ำอัดลม ชานมไข่มุก ชาเย็น โกโก้เย็น กาแฟเย็น ฯลฯ				
3.เนื้อสัตว์ติดมัน เช่น หมูสามชั้น หนังหมู หมูกรอบ ฯลฯ				
4.เมนูปลา เช่น ปลาจาระเม็ด ปลาสำลี ปลากะพง ปลาอินทรี ปลาทู ปลาเก๋า ปลาคุก ปลาสวาย ปลาช่อน ปลาสลิด ปลาตะเพียน ปลากราย ปลานิล ปลาแซลมอน ปลาทูน่า เป็นต้น				
5.อาหารทอด อาหารมัน เช่น หมูทอด ไก่ทอด ทอดมัน ไข่เจียว				
6.อาหารจานเดียว เช่น ข้าวขาหมู ข้าวมันไก่ ข้าวคลุกกะปิ ผัดไทย หอยทอด ฯลฯ				
7.อาหารใส่กะทิ เช่น ขนมหวานใส่กะทิ แกงใส่กะทิ				
8.ขนม ของว่างกินเล่น เช่น มันฝรั่งทอดกรอบ กล้วยทอด ข้าวเกรียบ ขนมเคลือบน้ำตาลต่างๆ ฯลฯ				
9.อาหารกึ่งสำเร็จรูป เช่น บะหมี่กึ่งสำเร็จรูป โจ๊กสำเร็จรูป ฯลฯ				
10. อาหารแปรรูป (ใส่เกลือ) เช่น ผัก-ผลไม้ดอง ปลาเค็ม เนื้อเค็ม ปลาร้า กะปิ ฯลฯ				
11.ธัญพืชขัดสีน้อย เช่น ข้าวกล้อง ข้าวไรซ์เบอรี่ ขนมปังโฮลวีท ข้าวโอ๊ต ถั่ว งา ฯลฯ				
12.ผักชนิดต่างๆ เช่น ผักใบเขียว มะเขือเทศ หัวหอม ถั่วงอก				
13.ผลไม้สด เช่น แตงโม ฝรั่ง มะละกอ ส้ม ชมพู่ แอปเปิ้ล ฯลฯ				

ลำดับที่.....

<u>ส่วนที่ 4</u> แบบบันทึกการประเมินกลุ่มอาการเมแทบอลิก (สำหรับผู้วิจัย)

ตัวชี้วัด	**ใช้ยารักษา**
1.เส้นรอบเอว (WC).....cm.	
2.ระดับน้ำตาลในเลือดขณะอดอาหาร(FBS).....mg/u	
3.ระดับไตรกลีเซอไรด์ (TG).....mg/dL	
4.ระดับเอช-ดี-แอล คอเลสเตอรอล (HDL-C).....mg/dL	
5.ระดับความโลหิต (BP).....mmHg	

อื่นๆ : น้ำหนัก.....kg.

: ส่วนสูง.....cm.

: ระดับคอเลสเตอรอล (Total cholesterol) .....mg/dl

: แอล-ดี-แอล คอเลสเตอรอล (LDL-C) .....mg/dL

VITA

Miss Matthawan Sujinnapram was born on May 4, 1987 in Surin, Thailand. She recieved a Bachelor of Science in Pharmacy from Pharmaceutical Sciences, Khon Kean University, Thailand in 2010. After graduated, she worked as a pharmacist at Rattanaburi Hospital, Surin, Thailand for a year. In addition, she worked as a pharmacist at Surin Hospital, Thailand in 2011-present.