ASSOCIATION BETWEEN DEPRESSION AND TREATMENT ADHERENCE AMONG PULMONARY TUBERCULOSIS PATIENTS AT THE CHEST DISEASE INSTITUTE, NONTHABURI PROVINCE, THAILAND

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ABSTRACT

This cross-sectional study aimed to determine the association between depression and adherence to tuberculosis treatment. Subjects were 350 patients receiving tuberculosis treatment and coming for follow up visits at the tuberculosis clinic of the Chest Disease Institute, Nonthaburi province from May 25 to September 30, 2007. Depression, health behavior, social support and treatment adherence were determined by self-administered questionnaires. Descriptive statistics, chi-square test and multivariate analysis by logistic regression with 95% confidence interval was used to analyse the results.

The results of this study showed the prevalence of depression in subjects was 33.1% and only 39.4% of the subjects had good treatment adherence. The factors related to treatment adherence were age (OR for age group > 60 years=3.40, 95%CI=1.31-8.84), gender (OR for male=1.68, 95%CI=1.03-2.75), education level (OR for senior high school=2.03, 95%CI=1.05-4.10) and depression (OR=1.83, 95%CI=1.10-3.07).

Although depression is not the only factor that leads pulmonary tuberculosis patient to poor adherence to treatment, it is an important factor and it can be treated. The researcher suggests that it is reasonable to assess the psychiatric status of the patient with particular reference to depression of an early phase of treatment and to ensure appropriate and timely intervention.

KEY WORDS: DEPRESSION/ PULMONARY TUBERCULOSIS/ TREATMENT ADHERENCE
80 pp.

ความสัมพันธ์ระหว่างภาวะซึมเศร้ากับความร่วมมือในการรักษาของผู้ป่วยวัณโรคปอด ณ สถาบันโรคทรวงอก จังหวัดนนทบุรี(ASSOCIATION BETWEEN DEPRESSION AND TREATMENT ADHERENCE AMONG PULMONARY TUBERCULOSIS PATIENTS AT THE CHEST DISEASE INSTITUTE, NONTHABURI PROVINCE, THAILAND)

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บทคัดย่อ

การศึกษานี้เป็นการศึกษาแบบภาคตัดขวาง(cross-sectional) โดยมีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างภาวะซึมเศร้ากับความร่วมมือในการรักษาของผู้ป่วยวัณโรคปอด โดยทำการศึกษา ในกลุ่มผู้ป่วยวัณโรคปอด จำนวน 350 ราย ที่มารับการรักษาในคลินิกวัณโรค สถาบัน โรคทรวงอก จังหวัดนนทบุรี ระหว่างวันที่ 25 พฤษภาคม ถึงวันที่ 30 กันยายน 2550 ประเมินภาวะซึมเศร้าโดยใช้แบบวัดภาวะซึมเศร้า เก็บข้อมูลด้านลักษณะประชากร, พฤติกรรมสุขภาพ, การสนับสนุนทางสังคม และความร่วมมือในการรักษาโดยใช้แบบสัมภาษณ์ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และทดสอบความสัมพันธ์โดยใช้สถิติไคว์-สแควร์ (chi-square test)ใช้สถิติ multiple logistic regression ในการทดสอบขนาดและทิศทางของความสัมพันธ์ โดยการคำนวณหาค่าความ เสี่ยงสัมพัทธ์ โดยดูนัยสำคัญทางสถิติ และใช้ค่าความเชื่อมั่น 95 เปอร์เซ็นต์

ผลการศึกษาพบ ความชุกของภาวะซึมเศร้าในกลุ่มตัวอย่างร้อยละ 33.1 และมีเพียงร้อยละ 39.4 ของกลุ่มตัวอย่าง ที่ให้ความร่วมมือในการรักษาในระดับดี เมื่อวิเคราะห์ด้วยตัวแปรเชิงซ้อน โดยควบคุมอิทธิพลของปัจจัยตัวอื่นๆ พบว่า ปัจจัยที่มีความสัมพันธ์กับความร่วมมือในการรักษา วัณโรคอย่างมีนัยสำคัญทางสถิติ ได้แก่ อายุ (อายุ > 60 ปีขึ้นไป OR = 3.40, 95%CI = 1.31-8.84), เพศ (สำหรับเพศชาย OR = 1.68, 95%CI = 1.03-2.75), ระดับการศึกษา (สำหรับผู้ที่จบการศึกษาระดับมัธยมศึกษาตอนปลาย OR =2.03, 95%CI = 1.05-4.10), ภาวะซึมเศร้า (OR = 1.83, 95%CI = 1.10-3.07)

ถึงแม้ว่าภาวะซึมเศร้าจะไม่ใช่สาเหตุเพียงอย่างเดียวที่ทำให้ผู้ป่วยวัณโรคปอดขาดความร่วมมือในการรักษา แต่ภาวะซึมเศร้าก็เป็นปัจจัยหนึ่งที่ทำให้ผู้ป่วยขาดความร่วมมือในการรักษาได้เช่นกัน ผู้วิจัยมีข้อเสนอแนะว่าควรมีการประเมินภาวะสุขภาพจิต โดยเฉพาะภาวะซึมเศร้าในผู้ป่วยวัณโรคปอด ตั้งแต่เริ่มรับการรักษาและในระหว่างที่รับการรักษา เพื่อจัดโปรแกรมสุขภาพที่เหมาะสมให้แก่ผู้ป่วยได้ทันเวลาต่อไป

80 หน้า

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CHAPTER I
INTRODUCTION

1.1 Rationale and background

Tuberculosis (TB) is an ancient infectious disease caused by microorganism called “Mycobacterium tuberculosis bacillus” was discovered by Robert Kock in 1882(1). Pathogenesis of tuberculosis can occur in all organs, but the mostly found is pulmonary tuberculosis. Pulmonary tuberculosis transmission is airborne via the droplets (2). Tuberculosis still remains one of the major public health problems worldwide. The World Health Organization estimated that at least one - third of the world population (or 1.9 billion people) are infected with tuberculosis. Every year, 8 million people become sick with tuberculosis and more than 2 million people die (2, 3, 4). About 95% of tuberculosis cases and 98% of tuberculosis deaths occur in the developing countries, and 80% of all cases worldwide occur in Sub Saharan Africa and South - East Asia (5). It is the leading infectious disease that causes of death in the most economically productive age group (15 – 54 years) in developing countries. Some industrialized countries have recently seen re-emergence of this health problem. New TB cases began to alarmingly increase as the result of Human Immuno Deficiency Virus (HIV), particularly in the area heavily affected by HIV. Tuberculosis causes more deaths than AIDS, malaria and diarrhea combined. Tuberculosis kills more women than all causes of maternal mortality put together. Without urgent action, it is estimated that 70 million people may die from tuberculosis between now and the year 2020 (2).

The South-East Asia Region accounts for nearly 40% of the world’s burden of TB, with 3 million new cases and nearly three-quarter of a million deaths occurring annually due to the disease. Over 95% of cases and deaths due to TB in the Region are

reported from the five high-burden countries in the Region: Bangladesh, India, Indonesia, Myanmar and Thailand. India alone accounts for nearly a third of the global burden of disease. The incidence of disease is the highest in the age group 15-54 years, seriously affecting social and economic development, the financial loss sustained in the Region. The spread of HIV in the Region and the emergence in recent years of multi-drug resistant strains of tuberculosis pose additional threats (5-8).

In 2004, Thailand is one of the global TB high burden contries ranked 18 th in the world. Between 1998 and 2004, WHO estimated that Tuberculosis incidence rate was 140, 141, 140, 135, 128, 142,142 per 100,000 population respectively. The rate of smear-positive TB cases registered increased from 59 to 63 per 100,000 population and the mortality rate increased from 6.1 to 19 per 100,000 population, respectively which compares to other infectious disease, TB is the major leading cause of death (4, 9-14).

While number of TB cases in the world are increasing. The main intervention for TB control is Directly Observed Treatment – Short course (DOTS) strategy that was developed and recommended by WHO. The department of Communicable Disease Control (CDC), Ministry of Public Health has adopted this strategy as the core policy of the National Tuberculosis Program (NTP) which was established since 1996 (15). Although short course chemo – therapy provides a high cure rate and treatment completion rate, some of the patients still have poor adherence or lost follow up before treatment completion. The evaluation of TB control program in Thailand since 1999 – 2003 regarding in smear – positive pulmonary tuberculosis patients ; cure rate was 73, 65, 71, 69, 68% respectively (that lower than WHO recommended cure rate of at least 85%). Default rate was 8.2, 6.5, 8.5, 9.5, 8.0 % respectively (that was higher than WHO recommended default rate of at least 5%) and treatment success rate was 77, 69, 75, 74, 73% respectively (that lower than WHO recommended treatment success rate of at least 85%) (4, 11-14). Low treatment completion rate in tuberculosis (TB) patients is a major concern. This causes problems to TB control program. Non – adherence with treatment has many negative consequences, not only for the individual patients and their families, but also for

society, the inability to reduce transmission. In addition, occurrence emergence of multi – drug resistance and may increase the cost of treatment.

In Thailand there are many research studies on patient's medication adherence exploring relation of adherence to treatment with knowledge about disease, social support, health belief, perception, background characteristics, drug factor (16-21) but TB is a chronic condition, requires long – term treatment. The impact of TB was not only their physical health, social, economic but also their psychological well-being on patients. TB patients may be rejected by family and friends or lost their jobs, quarantine and stigma (22). Such discrimination can result in anxiety, depression and reduction in the quality of life (5, 23-25). The lifetime prevalence of depression among general population varies from 5-18 percent (26). Tuberculosis patients have the range of depression more frequently than general population some studies examining psychiatric morbidity in tuberculosis patients showed high rates of depression. Previous studies (27-32) reported prevalence of depression in tuberculosis patients between 21.6% and 65%. Depression was a commonly mentioned consequence of TB. Therefore, the researcher is interested in exploring prevalence of depression in pulmonary tuberculosis patients and to study the association between depression and adherence of pulmonary tuberculosis patients during treatment.

1.2 Objective

1. To study the prevalence of depression in pulmonary tuberculosis patients at the Chest Disease Institute, Nonthaburi province, Thailand.

2. To examine the relationship between treatment adherence and demographic characteristics, social support, health behaviors and depression.

1.3 Research hypothesis

The pulmonary tuberculosis patients with depression have lower adherence to treatment than those without depression.

1.4 Variable of the research

1. Independent variables
    1.1 Demographic characteristics
        - Age
        - Gender
        - Marital status
        - Education level
        - Occupation
        - Family income
        - Duration of treatment
        - Anti-TB drug regimen
    1.2 Health behaviors
        - Smoking
        - Alcohol consumption
        - Drug addiction
    1.3 Social support
    1.4 Depression

2. Dependent variable
    Treatment adherence

1.5 Scope of the study

This study subjects comprised pulmonary tuberculosis patients who had recieved TB treatment for at least 3 month in the TB clinic at The Chest Disease Institute, Nonthaburi province, Thailand during 25 May 2007 to 30 September 2007.

1.6 Expected outcome and benefit

1. The result of the study will be helpful for health care personnel in planning for intervention programs for caregivers to enhance patient’s adherence to treatment.

2. The study will be useful as information for health care personnel to help the tuberculosis patients increase their adherence to treatment.

1.7 Operational definition

1. Patient with pulmonary tuberculosis is a patient who is diagnosed as pulmonary tuberculosis by positive direct smear and/or abnormal of chest X-rays, relevant with tuberculosis.

2. Smoking means a habit of currently smoking some kind of tobacco product, or used to smoke but had stopped for less than or equal 6 months.(habitual smoking means smoking every day for at least 3 months) (33, 34).

3. Alcohol consumption means a habit of drinking beverages containing alcohol, or used to drink but had stopped for less than or equal 6 months.(habitual drinking means drinking 2-3 times a week for at least 3 months) (33, 34).

4. Drug addiction means the patients who are using analgesic, opium, heroin, marijuana, amphetamine et al. during or used to do so and had stopped for less than or equal 6 months (33, 34).

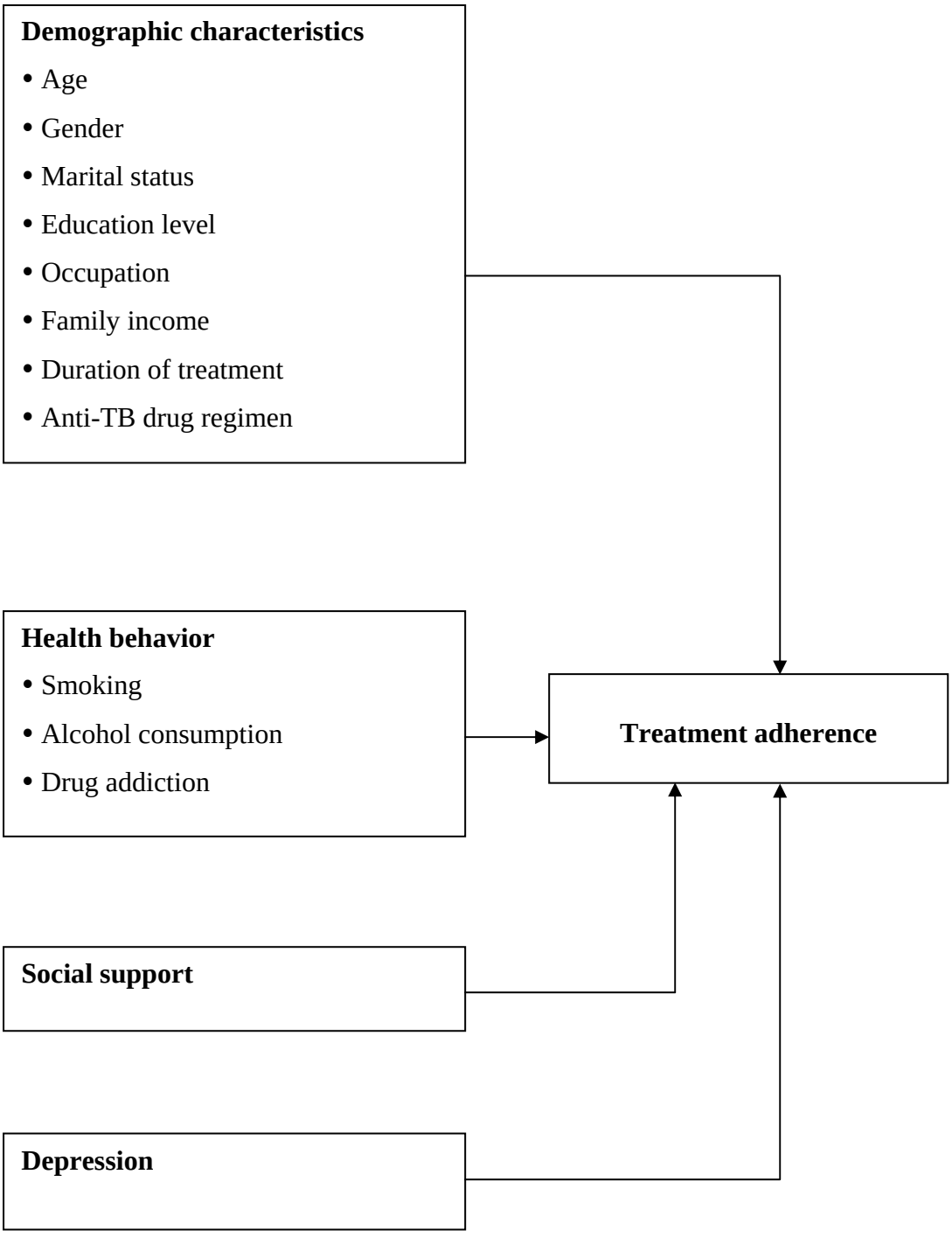
5. Duration of treatment means the time period from the initiation of pulmonary tuberculosis therapy to the study enrollment date. It was evaluated from the patient's medical records.

6. Social support means the relational provisions for attachment/intimacy, social integration, opportunity for nurturance behavior, reassurance of worth as an individual and assistance measured by Personal Resource Questionnaire-85 (PRQ-85) Part 2 developed by Weinert and Brandt (35) which was translated into Thai by Chommanard Wannapornsiri (36).

7. Depression was determined by The Center for Epidemiological Studies-Depression : CES-D (37).

8. Treatment adherence was determined by Morisky Adherence Score (MAS). The treatment adherence scores were divided into 2 levels as good adherence and poor adherence (38, 39).

1.8 Conceptual framework



CHAPTER II
LITERATURE REVIEW

Reviewing of the literature is divided into 4 parts as follows:

2.1 Pulmonary Tuberculosis

2.2 Depression and Tuberculosis

2.3 Importance of treatment adherence and assessment for adherence

2.4 The relevant research:

2.4.1 Demographic characteristics and treatment adherence

2.4.2 Health behaviors and treatment adherence

2.4.3 Social support and treatment adherence

2.4.4 Depression and treatment adherence

2.1 Pulmonary Tuberculosis

Tuberculosis is infectious disease caused by Mycobacterium tuberculosis, which spread through the air when the infected person coughs or sneezes (40). TB is spread by airborne particles that contain Mycobacterium tuberculosis, called droplet nuclei. Droplet nuclei may be expelled when a person with infectious TB coughs or sneezes. Close contacts are at the highest risk of becoming infected. It can infected any parts of the body like bone and joints, tissue surrounding the brain, lymph nodes etc., but the pulmonary (lung) tuberculosis is the most common. The pulmonary tuberculosis is highly transmitted from patients to health person via airborne. Therefore, pulmonary tuberculosis is major public health problem because one sputum smear positive tuberculosis patient can transfer disease to 10 – 15 persons per year if untreated. Regular cough more than three weeks, chest pain, fever/night sweats, loss of appetite, breathlessness, tiredness and hemoptysis are the symptoms of pulmonary

tuberculosis. Cough more than 3 weeks is the most common symptom to suspect symptomatic tuberculosis for diagnosis (41). The strategy chosen for treatment was Directly Observed Treatment - Short course (DOTS) developed by the World Health Organization to improve adherence (and response) to TB treatment, and as the most important step in the prevention of drug resistance disease. To ensure that every dose is taken correctly and at the right time, the treatment is directly observed' by treatment supporters (health workers, family members etc) assigned to monitor the patient. The disease can be cured, but that means about six months of taking three or more types of medicine (42).

The Treatment of Pulmonary Tuberculosis

The treatment of pulmonary tuberculosis can reduce the transmission of *M.tuberculosis.* TB can be cured with proper drug therapy, but because the bacteria may become resistant to any single drug, combinations of anti-tuberculosis drugs are used to treat TB and normally required for effective treatment. Five major drugs are considered the first-line agents for the treatment of TB. The cases are divided into three categories: category I, category II and category III. Table 1 shows the type of case included in each kind of category, the treatment regimen and the duration of treatment.

Table 1 Alternative treatment regimens for each patient treatment category (7)

Category (CAT)	Regimen	Indication
	First line drugs	
1	2HRZE/4HR	: New sputum smear positive
	2HRZS/4HR	: Severe sputum smear negative
		:Severe extra-pulmonary
2	2SHRZE/1HRZE/5HRE	: Relapse and failure
3	2HRZ/4HR	: New, sputum smear negative
4	Second line drugs	: Chronic case

Isoniazid (H), Rifampicin (R), Pyrazinamide (Z),

Streptomycin (S), Ethambutol (E)

There are standard codes for TB treatment regimens. Each anti-TB drug has an abbreviation. The number before a phase is the duration of that phase in months.

Adverse effect of anti-TB drugs (7, 43)

Essential anti-TB drugs are those used in as first line therapy. The adverse effect of essential anti-TB drugs are given in table 2.

Reserve anti-TB drug are those used in second line drug (chronic case, drug-resistant TB) treatment. The adverse effects of reserve anti-TB drugs are given in table 3.

Table 2 Adverse effect of essential anti-TB drugs

Drug	Main effects	Rare effects
Isoniazid (H)	- Peripheral neuropathy - Skin rash - Hepatitis - Sleeping and lethargy	- Convulsions - Psychosis - Arthalgia - Anaemia
Rifampicin (R)	- Gastrointestinal: Abdomen pain, nausea vomiting - Hepatitis - Generalised cutaneous reactions - Thrombucytopenic purpura	- Osteomalacia - Pseudomembronous colitis - Pseudoadrenal crisis - Acute renal failure - Haemolytic anemia
Pyrazinamide (Z)	- Artralgia - Hepatitis - Gastrointestinal	- Cutaneous reactions - Sideroblasstic anemia
Ethambutal (E)	- Retrobulbar neuritis	- Generalised cutaneous reactions - Arthalgia - Peripheral neuropathy - Hepatitis (very rare)

Table 2 Adverse effect of essential anti-TB drugs (Cont.) (44)

Drug	Main effects	Rare effects
Streptomycin (S)	-Vestibular and auditory nerve damage - Renal damage - Cutaneous hypersensitivity	- Pain, rash, induration at injection site - Numbness around the mouth and tingling soon after the injection
Kanamycin (Km)	- Vestibular (vertigo) and auditory nerve damage - Nephrotoxicity	- Cutaneous hypersensitivity - Clinical renal failure
4-Fixed Dose Combination (4-FDC) Contain: - Rifampicin 150 mg - Isoniazid 70 mg - Pyrazinamide 400 mg - Ethambutol 275 mg	See adverse effect of Rifampicin, Isoniazid, Pyrazinamide, Ethambutol	See adverse effect of Rifampicin, Isoniazid, Pyrazinamide, Ethambutol

Table 3 Adverse effect of reserve anti-TB drugs

Drug	Main effects	Rare effects
Ethionamide (Et)	- Gastrointestinal: anorexia, nausea, diarrhoea, adominal pain - Hepatotoxicity	- Convulsion - Mental symptoms - Impotence - Gynaecomastia
Cycloserine (Cs)	- Dizziness - Headache - Depression - Psychosis - Convulsion	- Suicide - Generalised hypersensitivity - Hepatitis
Para-aminosalicylic acid (Pas)	- Gastrointestinal: anorexia, nausea, vomiting - Hypersensitivity reactions (fever, rash, pruritus)	- Hypothyroidism - Haematotugical reactions

In summary, Anti – TB drug such as isoniazid(H), ethambutal(E), cycloserine(Cs) and 4-FDC are the cause of depression, psychosis and mental symptom.

Patient adherence is a key factor in the treatment success. In many countries, a significant proportion of patients stop treatment before completion, for various reasons. The premature interruption of treatment represents a problem for patients, their families and those who care for them, and those responsible for TB programs (7). Treatment adherence is a critical determinant of successful TB control; poor adherence may result in both treatment failure and development of resistance to TB medicines. Non adherence to TB treatment leads to serious results such delayed sputum conversion, higher relapse rates, and emerging drug resistance.

2.2 Depression and Tuberculosis

Depression is an affective illness characterized by symptoms such as disturbance in mood, cognition and behavior (45). People diagnosed with chronic illnesses must adjust to the demands of the illness itself, as well as to the treatments

for their condition. The illness may affect a person's mobility and independence, and change the way a person lives. For these reasons, a certain amount of despair and sadness is normal. In some cases, a chronic illness may actually cause depression, which, though treatable, is a serious medical condition by itself.

Depression is one of the most common complications of chronic illness (Chronic illness: An illness that persists for a long period of time. The term "chronic" come from the Greek chronos, time and mean lasting a long time. A chronic illness is one lasting 3 months or more by the definition of the U.S. National Center for Health Statistics.) (46). Depression is estimated that up to one-third of individuals with a serious medical condition experience symptoms of depression. Depression and illness may occur together because the physical changes associated with the illness trigger the depression, the individual has a psychological reaction to the hardships posed by the illness, or simply as a coincidence. Depression contributes to increased medical morbidity and mortality, diminished quality of life and increased healthcare costs (47), interaction of depression and chronic medical illness can considerable public health importance (48). An ongoing review of literature on prevalence of depression in people with physical disease conducted by WHO has indicated higher rates than those found in the general population, ranging from 22 % in recent myocardial infarction, 27% in diabetes, 29% in hypertension, 30% in epilepsy, 31% in cerebrovascular disease, 33 % in different types of cancer, to 44 and 46 % in people with HIV/AIDS and tuberculosis, respectively (49, 50). Some studies showed that common factor associated with depression are chronic illness. Prevalence of depression can rise from 10 to 30 % in patients with chronic illness such as diabetes, stroke, rheumatoid arthritis, Parkinson's disease, and renal failure (51).

Longitudinal study finds that a new diagnosis of certain medical conditions is associated with the risk of having significant depressive symptoms develop among adults in late middle age. The relative risk for development of significant depressive symptoms and the pattern of risk over time after a new diagnosis depend on the type of medical condition. The risk for early onset of significant depressive symptoms was the highest among persons with a diagnosis of cancer, followed by those with chronic lung disease (chronic bronchitis or emphysema, not including asthma) (52). High rates of depression are found among hospitalized patients with congestive heart failure,

Major depression is present in 17% to 37% of patients and minor depression in 16% to 22% (53). Depression is an important consequence of stroke, and it influences stroke recovery, study showed the prevalence of depression among stroke patients was 92%. Mild and Moderate depression were equal at 43%, while 6% had severe depression. It was found that sex, occupation, social support and ability to do activity of daily living were significantly correlated with the variation of depression (54). Many studies have showed that the risk of depression is higher among individuals with diabetes than in those without diabetes (55, 56) and with an increased risk for complications of the metabolic disorder (57). Depression is associated with poor glycemic control (58). In patients Rheumatoid arthritis found 15-17% of persons reported depressive symptoms each year; 4% in every year. Depression was associated with significantly poorer clinical characteristics and increased functional disability in Rheumatoid arthritis patients. Differences in utilization were less consistent, but generally the depressed group reported significantly more Rheumatoid arthritis related physician visits and hospitalizations (59). Depression in Rheumatoid arthritis patients is associated with increased levels of pain (60).

Tuberculosis like any other chronic infection needs prolonged treatment. It also carries a social stigma and results in adverse psychological reactions (61-64). Depression was a commonly mentioned consequence of tuberculosis. Providers emphasized that depression resulted from the isolation caused by quarantine and stigma or from being chronically ill and that depression rise particularly in the elderly (65). In studies, by Kelly – Rossini L et al. found in the US, due to the communicable nature of tuberculosis, patients with suspected tuberculosis are initially placed in respiratory isolation. Patient report feeling lonely and abandoned or suffer from depression and anxiety because of confinement and uncertainty about the future (66). G.D. Natani et al. study about Depression in tuberculosis patient: correlation with duration of disease and response to anti-tuberculous chemotherapy showed the severity of depression was directly related to the duration of illness, severity of disease and response to chemotherapy. Depression was present in 48% of freshly diagnosed patients. It decreased to 34% in those who responded favourable to chemotherapy, but those with persistently positive sputum had a significantly higher percentage (64%) (27), One studied using the Beck Depression Inventory for

diagnosing depression reported rates of depression 65% in tuberculosis patients (30). Ismail Orhan et al. reported depression and/or anxiety co-morbidity was 19% for the recently diagnosed tuberculosis group, 21.6% for defaulted tuberculosis group and 25.6% for the multi-drug resistant tuberculosis (32), and two studies reported incidence of depression in the multi-drug resistant tuberculosis group (32, 67). Study about incidence of depression in hospitalized tuberculosis patients found educational status of the patient had direct bearing on the incidence of depression. There was higher frequency of depression in the illiterate group and in patients having longest duration of illness (68).

In summary, depression is an important consequence of chronic illness, co-morbidity is an important clinical finding in depression and is associated with increased disease severity and poorer prognosis. Depression can co-exist with many medical conditions such as cancer, diabetes, congestive heart failure, hypertension, cerebrovascular disease, storke, HIV/AIDS, rheumatoid arthritis and the reported depression rate of pulmonary tuberculosis patients has rang from 21.6% to 65% , it different each place. However, from the literature review not found study about depression rate of pulmonary tuberculosis patients in Thailand. Thus, it merit attention.

2.3 Importance of treatment adherence and assessment for adherence

Treatment adherence means that a patient is following the recommended course of treatment by taking all the prescribed medications for the entire length of time necessary. Tuberculosis is nearly always curable if patients adhere to their tuberculosis treatment regimen. Adherence is important because non-adherence is the patient's inability or refusal to take tuberculosis drug consistently as prescribed. This behavior is one of the biggest problems in tuberculosis control and can lead to serious consequences. A non-adherence patient with tuberculosis disease may remain sick longer or have more severe illness, spread tuberculosis to others, develop, spread drug – resistant tuberculosis and the possibility of death (69, 70).

Patient adherence is a key factor to the successful of treatment in the individual patient as well as being the key to treatment to the control of TB in

community. If adherence is achieved, patient will be cured, prevented from the emergence of drug resistance. Therefore, adherence is the most importance determinant of the cure rate in the National Tuberculosis Program (70, 71).

Accurate assessment of adherence behavior is necessary for effective and efficient treatment planning and for ensuring that changes in health outcomes can be attributed to the recommended regimen (71). Adherence to treatment can be measured by variety of methods. However, these measures of adherence have different strengths and weaknesses in regard to practical application and identifying deficient adherence. Methods of assessment adherence can be categorized into direct and indirect measures. Direct method such as the detection of drug levels or drug metabolites in body fluid (urine, blood or saliva), and indirect method such as pill counts, patient interviews, rating by clinicians, and attendance at appointment. The most common measurements include serum or urine measurements for drug or drug metabolites, pill counts and patient interview (72-76). Each will be discussed in following.

1. Direct method

1.1 Observation

This approach would be limited to a few inpatient trails or those outpatient trails in which patients are required to come to the clinic to receive the medicine each time to be important of the health personal. Even in those situations, some patients are not compliant. For example, they may “check” their medicine or merely pretend to put it in their mouth. If this is suspected, it may be possible to assay blood or urine samples (77).

1.2 Detection of drug levels or drug metabolites

This method can help in assessing patient adherence but this measurement is affected by dose and timing and can be misleading if the patient takes the dose only just before clinical visits (72, 74). This method is not feasible in most practice settings and it is not available for many drugs. For example, urine assays, it is the method to detect the presence of TB drugs or their metabolites in a sample of the patient’s urine. The limitation of this test is that it shows only recent ingestion of medication (within the past 24 to 48 hours). It cannot be used to measure an ongoing

pattern of adherence. In addition, it is influenced by the patient's rate of metabolizing the medication (69, 78).

2. Indirect method

2.1 Pill counts

This method is frequently used to measure adherence. Patients bring their medicines for pill counts at each visit. This method is easy to perform and inexpensive (79). But drawbacks of pill counts include the well know problem of "pill dumping" in which patients dispose of pills to make their adherence appear than it may actually be (80), important information (e.g. time of dosage and patterns of missed dosages) is not captured using this strategy (71) and it is difficult to ensure that all pills are brought to the clinic for counting, which usually invalidates this measure because patients inventory of pills in a box with compartments for each dose or patients that often switch medicine in purse, which could affect the number counted (81).

2.2 Electronic monitoring

Electronic monitoring devices are the most sophisticated means of assessing adherence. The Medication Events Monitoring System (MEMS). These devices are pill bottles with caps that contain an electronic chip that records each time the bottle is opened. The caps can be scanned, therefore, facilitating download of data. The data include time of opening of the pill bottle and can be readily analyzed to determine the level of adherence and also patterns of timing of pill consumption (82). This procedure is expensive and does not assume ingestion of an appropriate number of tables at the time the bottle is opened (77).

2.3 Take-up follow-up appointment

Measure adherence and count the number of missed and canceled appointment.

2.4 Checking prescription records

Pharmacy records demonstrate whether patients refill their prescriptions at appropriate interval (83). When this method is available but sometimes patients stockpile medicines, especially those they obtain at low cost or obtain prescription drugs from others (77, 84).

2.5 Patient interviews

The questioning patient about their adherence is the most readily, available, valid method of measuring adherence in clinical practice. It may be useful to simply ask your patient whether he or she will be able or willing to take medications for the prescribed time and discuss barriers to adherence and ways of overcoming them (69, 85).

The disadvantages include both the reliance on recall and social desirability bias, with a tendency to overestimate adherence (79). Social desirability bias are patients that may lie to avoid the disapproval of their health care provider (86). Social desirability improve by researcher is a good relationship based on mutual understanding rapport and trust (87). Some consider it ideal that the questioner not be a healthcare provider (88). Interviewer don't behave in an empathetic manner of ask questions about compliance in a negative tone may not only obtain false data, but may encourage some patients to alter their degree of compliance with the clinical trial's requirements (77).

Patients have recall bias, to improve by supporting patients attempts to recall the information such as expanded the time for recall and the place of the interview is peaceful. And by assuring patient words and behaviors that they will not experience even "a minimal risk of embarrassment" (87). Non threatening questions about the patient's adherence will encourage answer from the patient (77).

Thus, measurement of adherence, there exits no gold standard (89). But rather a multiplicity of assessment approaches, each having its virtues and limitations.

Several studies showed a strong relationship of patient interview to other concurrent measures (75, 90-91). Fletcher et al.(75) found patient interview to be the best method for measuring adherence compared with pill count in predicting drug plasma levels. Haynes et al.(91) reported that combined self-report biochemical tests and urine drug levels were less accurately correlated to pill count than interview alone. The advantages of this method over other measures include its feasibility in all care setting, simplicity, speed and potential enhancement of validity (38).

In this study, the researcher used indirect method conducted for adherence measure by patient interviews. That is assessed with the structure questionnaires that comprise the medication-taking behavior.

2.4 The relevant research

Various factors have been identified in the literature as having important influences on adherence. These most commonly include socio-economic, behavioral factors and psychological factors. In many countries a significant proportion of patients stop treatment before the end represent a problem for those who care for the patients. There are selected factors found to have some relationship to adherence in literature review to consist of health behaviors, social support and depression.

2.4.1 Relationship between Demographic characteristics and treatment adherence

Age

Non-adherence and medication errors are correlated with age because the young are unable and more resistant to ingesting bad – tasting medicine and the older were often experience problems of forgetfulness or self neglect (92).

Kowathana found the same result on the studied about behavior of delay treatment in pulmonary tuberculosis patients (93). Assavachananon reported that age had significant negative correlation with self care capabilities of tuberculosis patients (94).

Bam found the younger age group had significantly higher percentage of compliance compared to the older age groups and there was significant relationship between age and patients compliance with Directly Observe Treatment Short course (DOTS) (95). M.S. AI-Hajjaj et al. studied factors that affect compliance rate found non-compliance tended to be positively related to patient's age, with young ($\leq$ 20 years) patients at the lowest risk of non compliance and elderly (> 60 years) patients more likely to default from the prescribed regimen (96).

In contrast, Kandel found the age of respondents range from 16-75 years, with average age of 38.69 years but the compliance with treatment was not significant different among different age groups (17). Kuekul Tanormkij found the average age of tuberculosis patient were 41 years old but age was not significantly associated with compliance to treatment (97).

Gender

Several studies research reported that gender was significantly associated with adherence to treatment. Kuekul Tanormkij and colleagues found treatment regularity significant correlated with gender (97). Jaruwan Kunteesuwon found 72% of tuberculosis patients were male who would have poor adherence to treatment (98). Colon and Zellweger assess the outcome of patients treated for pulmonary tuberculosis found that men had more compliance than women (99). Van Der Werf et al. studied patient compliance with tuberculosis treatment in Ghana: factors influencing adherence to therapy in a rural service program showed that male patients had a significantly higher default rate and likewise significantly lower cure rate than female patients (100). A retrospective study of compliance among tuberculosis patients with short course chemotherapy was conducted in National Tuberculosis Centre, Thimi, Bhaktapur, Nepal found male patients were more likely to default (101).

In contrast, Maneeruengdech studied the factors affecting the regularity on treatment of tuberculosis patients in Saraburi province found gender was not associated with the regularity on treatment (16). Theerapuncharoen and Thanapaisakhamas studied the receipt service of pulmonary tuberculosis patients at tuberculosis clinic Phanakronsriayutthaya Hospital, and they found that sex was not associated with the continuity of receiving services (102). Hari Bahadur Kunwar found that there was no significant association between gender and patient compliance with DOTS (103).

Marital Status

Patient who has spouse or family members might response to medical advice. Spouse or family members are a kind of special support. If they are concerned about the disease, They will help to be based for example, to give emotional, love and care, to help with daily chores in times of sickness, to help make plans for the future, to share some of the financial burden, and prevent transmission (33). Treatment success rate was lower among patients who were single, divorced or widowed (104).

In contrast, Kandel showed 65% of tuberculosis patients were married but there was not statistically significant difference in compliance among the different marital status group (17). Vander Werf TS et al. found marital status was not associated with compliance to treatment in pulmonary tuberculosis patients (100).

Education level

Education is a factor that affects health perceptions of individuals because education levels affect knowledge, skill and attitude of self-care (105). Assavachananon reported significant positive correlation between self care capabilities and education level of tuberculosis patients (94). Wilawan Somsong studied adherence to tuberculosis treatment and conversion rate in HIV infected tuberculosis patients found education level was divided into two group as primary level or lower and secondary level or higher. The analysis of education of respondents showed that more than two third (71.8%) had primary level or lower. But the patient's adherence in this groups was nearly as good as secondary level or higher (34). Hari Bahadur Kunwar reported who had a higher level of education had a higher proportion of compliance than those who had a lower level of education and that there was a significant association between education level and knowledge level (103). While, Van Der Werf et al.(100), Sichon Wongyou (106), Bam TS (95) and Intanai (107) found that there were no associated between education level and compliance of treatment and delay of treatment. Van Der Werf et al. studied patient compliance with tuberculosis treatment in Ghana: factors influencing adherence to therapy in a rural service program found no association between educational level and default from therapy (100).

Occupation

Jaruwoon Kunteesuwon found the patients who had permanent residence and need not to move to the various provinces showed less compliance (98). Working status with frequent traveling represents a higher risk to non-adherence than never traveling because they always forget the medication and missing clinic (108). Pattana Phokaew found 70% of tuberculosis with HIV were unemployed and compliance to treatment better than the employed patients (109).

In contrast, Kandel (17) and Sichon Wongyou (106) showed that was no significant different in adherence among different occupations.

Family Income

One very important reason why a patient may return to the clinic for his drugs is economic problems (110). Poungrat Kamutthamas found the causes for their failure

to obtain medication on a regular basis were economic problems (111). De Coster et al. who studied defaulting in smear positive tuberculosis patients in urban area of Cairo, Egypt found that the defaulter rate was 25.44% most of which gave the main reason of economic problem (112). Income is a good predictor of health status. The association between poor living conditions and poor health helps to explain why priority population, has higher rate of sickness and death (105). Anant Kumar Nepal (113), Shan WJ (114), Shrestha KB (115) found higher family income and higher economic sufficiency level seemed to affect treatment adherence. Kandel showed low monthly family income had higher compliance with treatment but there was no statistically significant difference in compliance among the different family income groups (17). Sichon Wongyou found income did not have significant relationship to medication adherence (106).

Duration of treatment

The report from Jaruwan (98) found that the patient who had the longer course of tuberculosis treatment revealed less adherence. According to the study of Howard AA et al. (116) showed that HIV infected woman were on antiretroviral therapy for two years or less were less likely to have worsening adherence than those who were more antiretroviral experiences. Nevertheless, A studied in 231 HIV-infection patients who were on treatment with antiretroviral drugs found that duration of having been infected with HIV was not significantly association with adherence to treatment regimens (117).

2.4.2 Relationship between health behaviors and treatment adherence

Smoking

Half of all long-term smokers die prematurely due to smoking, and half of these deaths occur in middle age (118). It is known that tobacco smoking is a major risk factor for premature mortality. As more research is conducted in developing nations, it is becoming evident that smoking is also a major risk factor for respiratory tract and other systemic infections (119). Smoking increases the risk of Mycobacterium tuberculosis infection, the risk of progression from infection to disease, and the risk of death among

TB patients. Nearly 61% of TB deaths are attributable to smoking. Among children living with a patient with active pulmonary TB, passive smoking accelerates the development of active TB. The risk of prevalence of TB infection is more among current or ex-smokers than never smokers. The risk of TB is more with the duration of smoking than the number of cigarettes smoked daily. Smoking influences the clinical progress of TB lesions. Smokers tend to have more cavitary disease, and greater severity despite diagnostic delays similar to those among non-smokers (120-121). There was a dose-response relationship between the number of cigarettes smoked daily and the risk of active pulmonary tuberculosis (122).

The data of some studies found smokers tend to be less adherence to medication. (96, 123-124) Moreover, some study showed a significant association between smoking, default and undesirable adherence patterns (125). The association between non-adherence and smoking has been reported previously; studies about the impact of smoking on adherence to treatment for tuberculosis patients found smokers are at higher risk for poor treatment adherence (126, 127), studies by Davidsion H et al. reported that previous TB, resistance to rifampicin, human immunodeficiency virus infection, psychiatric illness, homeless, smoking and drug use were related to non-adherence (128). In a rural area in the Northwest Part of Turkey found the adherence rate in non-smokers was significantly higher than that of smokers. (81.4 and 52.4 %, respectively, $p < 0.001$)(129) and Chaya Intarak studied factor related to interrupted treatment in patients with tuberculosis found smoking were significantly associated with interrupted treatment. It was found that the risk of interrupted treatment of the patients who smoked increased significantly (OR = 1.91; 95% CI = 1.14-3.20) (33). In contrast, Wilawan Somsong (34) found that smoking was not associated with the adherence to treatment.

Alcohol consumption

Alcohol consumption has important influences on adherence to medication (130, 131) and In support of previous research; Ferrer X et al. found that the profile of patients who dropped out of treatment was as homeless and alcoholic (132) and alcohol and homelessness were strongly associated with non-adherence in New York City (133). Similarly, studies in England (134), Denmark (135), all identified

alcoholism as the major factor associated with non-adherence and failure of tuberculosis therapy. Pablos – Mendez A et al. study to identify and analyze predictors and consequences of non adherence to antituberculosis treatment alcoholic was lower among non adherence patients (136), Zellweger JP et al. assess the results of treatment in patients with culture – positive pulmonary tuberculosis and to identify the risk factors for non adherence to treatment found the default rate was higher among immigrants, alcoholics, intravenous drug users and male patients (99). Sophia Vijay et al. found the males and alcoholics have predictive risk factor of default with DOT in urban setting (137). Chaya Intarak studied factor related to interrupted treatment in patients with tuberculosis found alcohol consumption were significantly associated with interrupted treatment. It was found that the risk of interrupted treatment of the patients who drank alcohol increased significantly (OR = 2.57; 95% CI = 1.51-4.37) (33), In contrast, Wilawan Somsong found no significant difference between alcohol consumption and the adherence (34), similar study in a rural area in the Northwest Part of Turkey found alcohol consumption was not associated with adherence to treatment in tuberculosis patients (130).

Drug addiction

Some study showed association with drug addiction and poor adherence to medication regimens.(129) Punnotok et al. (138) studies the treatment of pulmonary tuberculosis in patients with Human Immunodificiency Virus infection in Central Chest Hospital Nontaburi, Thailand and they reported that defaulter rate was 50% and the rate was up to 80% among addicted group. Zellweger JP et al. reported that the non-adherence of treatment was found greater in pulmonary tuberculosis patients who were addicted to drugs (99). Caminero and colleagues also found injection drug use to be an independent predictor of non-adherence to directly observed therapy for TB (139). In contrast, Wilawan Somsong reported that drug addition not significant associated with adherence to treatment (34). Chaya studied factor related to interrupted treatment in patients with tuberculosis found drug addiction was not significantly associated with interrupted treatment of pulmonary tuberculosis (33), and In New York City, Pablos-Mendez found that injection drug users were less likely to adhere to tuberculosis (TB) therapy, resulting in delayed conversion to negative

cultures. In that study, however, 35% of injection drug users were adherent to TB therapy (136).

In summary, although there were numerous studies have shown that there is significant association between non-adherence to treatment and health behaviors such smoking, alcohol consumption and drug addiction.

2.4.3 Relationship between social support and treatment adherence

Social support is a theory that has been study for more than 30 years (since the mid 1970s). The theory was previously used in concrete terms, referring to an interaction or personal relationship. However, in the past 15 years, the term has become more and more abstract, encompassing anticipation, conception, and quality of support, quality of supporting interaction, including abstract characteristic of a person, behavior, relationship or social system (140).

The term social support has been defined and measured in numerous ways. For comprehensive review of measurement and methodological issues, see Weiss, 1974 (141); Weinert and Brandt, 1987 (142); House, 1981 (143); Pender, 1996 (144); In summary, social support means that the person in society gives and shares their help and tender care with each other in many different ways, such as; tender loving care, participation in social activities, acceptance of their value, information received and a variety of help, such as material, financial, time spent in a working party. Thus social support would help a person to have better health behaviors for well being.

Social support involved the communication of positive affect. In a supportive relationship there was sense of warmth, caring, love and social integration, to have an opportunity for exchange with other, to share common experience, to know that there were other who would come to one's aid in time of need. Main effect was a term of providing service or information regarding the benefits of behavior that positively influenced health and well being, and by social integration to increase feeling of self-esteem, self - identity and control environment. Social support could protect people in crisis from a variety of pathological states (145).

In brief, Social support as an exchange of resources between at least two individuals perceived by the provider or recipient to be intended to enhance the well being of the recipient. Support-induced elevations in self-esteem, ability to cope, and

motivation to get well may similarly aid in recovery from mental health problems by directly influencing emotional and cognitive states associated with the disorder or by increasing adherence with medical regimens.

Type of social support

This study used instrument which was based on the social relationship dimensions described by Weinert and Brandt (142). Social support as being divided into the following six categories.

1. Attachment is an intimate relationship that creates feelings of being loved and cared for by close persons, such as a married couple or family members. If people lacked this feeling they would be lonely.

2. Opportunities for nurturance mean the feeling that occurs when people take responsibility in caring for others and the feeling to be needed and dependable. If people lose this support it makes feel that their life has no value.

3. Social integration means the opportunity to participate in social activities and sharing and exchanging ideas with each other. If people lack this support, they will have the feeling of social isolation and boredom.

4. Reassurance of worth means to be respected, esteemed and admired, that people can play acceptable roles in society and as family members. If people lack this support, they will lack self-confidence and feel useless.

5. Sense of reliable alliance is the support obtained from family or relatives, an expectation of continuous help and caring from each other. If people lack this support they will have a sense of vulnerability and abandonment.

6. Obtaining of guidance means obtaining sincere emotional support or obtaining information from credible trusted people in a stressful or critical period. If people lack this support they will feel hopeless or despairing.

Social support will put pressure on a person from the social norm to behave according to the standard that society define (146). Therefore, it will help a person to change or adjust his or her health behaviors and to take care of one's self. Social support can increase ability of caring for the patients.

Social support is important for the patient because the treatment will be long period of time and anti-tuberculosis have side effect. Social support may help to increase adherence to treatment. Many studies found associated social support and adherence to treatment, one of the strongest predictors of adherence is the level of social support one received from friends and family, but even this factor is not invariably related to compliance (86). Tekle showed that major factors contributing high rates of default were found to be lacking of family support (147). Sumalee Ammarinsangpen (148) found social support from family significant correlated with treatment. Similarly, Kuekul Tanormkij (97), and colleagues showed that the treatment regularity significantly correlated with social support. In Kathmandu, Nepal in 2003, by Bam (95) reported that compliance patients with DOTS had good emotional and informational support from family and friends. Chaya Intarak (33) found that low level of social support from family was a significant risk factor interrupted treatment. In India, showed that those females who received a high level of support from family are found to be more optimistic about cure and are also more mentally stable. The study also pointed out TB patient faced problem of no access to service in term of lack of support from health providers. On the other hand the rise of social stigma played a hindering role in access (149). Prayong Satchapong studied the relationship between health beliefs, social support, patient characteristics and self-care of pulmonary tuberculosis patients found positive significant relationship between total social support, emotional support, appraisal support, instrumental support and self-care of pulmonary tuberculosis patients at the 0.01 level and positive relationship between information support and self-care of pulmonary tuberculosis patients at 0.05 level of significant (150). In contrast, a study conducted by Chana Naruman found social support were not significantly associated with treatment adherence of pulmonary tuberculosis (21). Sichon Wongyou showed a significant relationship between social support and medication adherence, emotional support, appraisal support, information support, and instrumental support were not significantly related to medication adherence (106).

In summary, Social support is comprised of a multidimensional collection of resources available to an individual through social ties to other individuals and groups. Numerous studies have shown Successful TB control to be dependent on social support, lack of social support may increase poor adherence to treatment among

pulmonary tuberculosis patients. The importance of social support is recognized in relation to health behavior, prevention or otherwise. In the treatment of pulmonary tuberculosis, patients must take medication at home for a long time, so social support may be crucial, especially, social support from family because the role of member in family be able to help the patients take drug regularly.

2.4.4 Relationship between depression and treatment adherence

Depression may lead to a worsening of medical illness by direct and indirect routes, it may decrease adherence with self-care and other medical regimens (48, 151). In the case of depression co-morbidity, these is an accentuation of the negative impact in each disease, measured by a decrease in adherence with the prescribed treatment. (Figure 1)(49)

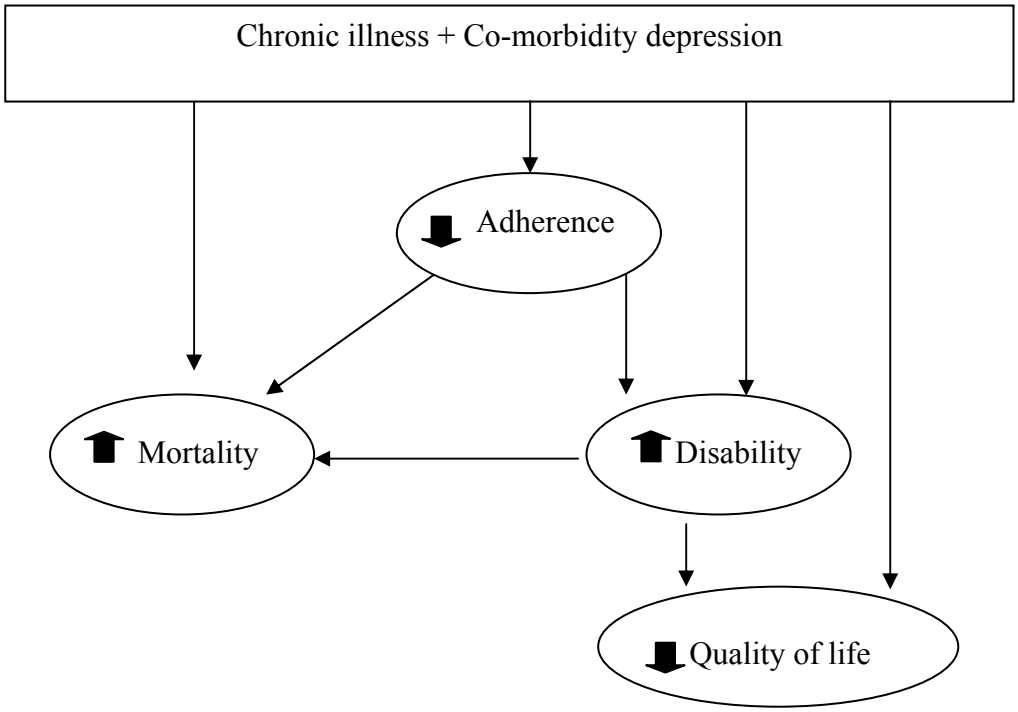


Figure 1 The impact of co-morbid depression on chronic disease outcome

Depression increase non-adherence because First, positive expectations and beliefs in the benefits and efficacy of treatment have been shown (152) to be essential to patient adherence. Depression often involves an appreciable degree of hopelessness, and

compliance might be difficult or impossible for a patient who holds little optimism that any action will be worthwhile. Second, considerable research (153, 154) suggests the importance of support from the family and social network in a patient's attempts to be compliant with medical treatments. Depression is often accompanied with considerable social isolation and withdrawal from the very individual who would be essential in providing emotional support and assistance. Third, depression might be associated with reductions in the cognitive functioning essential to remembering and following through with treatment recommendations (e.g. Taking medication) (151).

Other researchers have showed that depression is associated with poor adherence to medication and self – care regimens (151). Depression has additional importance in diabetes because of its association with poor compliance with diabetes treatment (155)., poor glycemic control (156, 157) Studies in patients using depressive symptom severity tertiles (low, medium, high), we performed regression analyses to determine the impact of depressive symptoms on adherence to diabetes self-care and oral hypoglycemic regimens found patients in the low-severity depression symptom tertile, those in the medium and high-severity tertiles were significantly less adherent to dietary recommendations. Patients in the high-severity tertile were significantly distinct from those in the low-severity tertile by having a higher percentage of days in non-adherence to oral hypoglycemic regimens (15% and 7%) (155). A study demonstrated the association between low compliance for inhalatory treatment and depression, the noncompliant group had a higher mean (SD) score for depression than the compliant group (158, 159). Some studies found depression associated with poor adherence of coronary artery disease (160, 161), major depression is associated with poor adherence to a regimen of prophylactic aspirin after the diagnosis of coronary artery disease (162). Depression is also a consistent predictor of non-adherence with antiretroviral therapy in patients with human immunodeficiency virus infection (163-165).

There are few studies testing for association between depression and adherence to treatment in tuberculosis patients. In Los Angeles study predictor of screening results for depressive symptom in homeless population with latent tuberculosis, given the importance of adherence to tuberculosis treatment regimens,

the high prevalence of positive screening for depressive symptoms in the homeless and the potential for depression to reduce adherence rate (166).

In summary, a depressed person has less propensity to follow the prescribed treatment regimen or medical instruction. And as consequence, has an increased risk of disability and mortality. In the case of co-morbidity with tuberculosis this can, in addition generate resistant strains of infectious agents, with serious and profound public health implication related to the control of these disease. From the literature review, various study of association between depression and adherence to treatment in other chronic illness (e.g. diabetes, coronary artery disease, AIDS) but have little research on association between depression and adherence to treatment in pulmonary tuberculosis patients. Thus association between depression and adherence to treatment in pulmonary tuberculosis patients merits attention.

CHAPTER III
MATERIALS AND METHODS

3.1 Research design

This research design is a cross – sectional study of prevalence of depression and the association between depression and treatment adherence among pulmonary tuberculosis patients at TB clinic, The Chest Disease Institute, Nonthaburi province, Thailand.

3.2 Study population

Participants in study are pulmonary tuberculosis patients who receive treatment at TB clinic in The Chest Disease Institute, Nonthaburi province, Thailand during May 25 to September 30, 2007.

3.3 Inclusion criteria for patients

1. All patients who registered and attended for treatment in TB Clinic for more than or equal to three months up to the date of interview.
2. Patients who were age above 15 years.
3. Patients who still under tuberculosis treatment.
4. Being willing to engage in an effective two – way communication with the researcher.
5. Accept to participate in the research.

3.4 Data collection period

The data will be collected during May 25 to September 30, 2007.

3.5 Sample size

Sample size estimation was based on the primary objective of the study to estimate prevalence of depression among tuberculosis patients. Previous studies reported prevalence of depression in tuberculosis patients for 65% (30). It was estimated that 95 percent confidence interval (CI) of the true (population) prevalence of depression in Thai tuberculosis patients would be 65% ± 5%. A sample of 350 patients were needed according to the following calculation.

$$n = \frac{Z^2_{\alpha/2} P(1-P)}{d^2}$$

Where n = Estimated sample size

α = Probability of type I error = 0.05, $z_{0.025} = 1.96$

P = Proportion of the depression in pulmonary tuberculosis patients = 0.65

d = Margin of error in estimating proportion of depression = 0.05

Thus, $$n = \frac{(1.96)^2(0.65)(0.35)}{(0.05)^2}$$

$$n = 349.59 = 350$$

3.6 Research instrument

The research instrument in this study which consist 5 parts as follows.

Part 1 Socio - demographic characteristics

This part consists of variables such as age, gender, education level, occupation, marital status, family income, duration of treatment, Anti-TB drug regimen. It comprised 6 questions with fill in the blank and multiple choices.

Part 2 Health behaviors

This part consists of variables such as smoking, alcohol consumption, drug addiction.

2.1 Smoking

Subjects were classified into 2 groups as follows:

Yes = The subject who current smoking every day for at least 3 months or used to smoked but had stopped for less than or equal 6 months.

No = Otherwise

2.2 Alcohol consumption

Subjects were classified into 2 groups as follows:

Yes = The subject who current drinking 2-3 times a week for at least 3 months or used to drink but had stopped for less than or equal 6 months.

No = Otherwise

2.3 Drug addiction

Drug addict means the habit of using analgesic, marijuana, heroin, opium and amphetamine.

Subjects were classified into 2 groups as follows

Yes = The subjects who has the habit of a using drug addict or used to do so and had stopped for less than or equal 6 month.

No = Otherwise

Part 3 Social support

An instrument measuring social support used in this study was Personal Resource Questionnaire (PRQ-85). The self-administered questionnaire was developed by Weinert and Brandt.(142) Part 2 is based on the social relational dimensions: it measures the respondents perceived level of social support. Part 2 has been used in numerous studies on social support of chronically ill patients. The PRQ-85 part 2 had high internal consistency reliability coefficient (Cronbach's Alpla = 0.89 to 0.92) (167-168) and translated into Thai by Chommanard wannapornsiri. Reliability of this instrument was already tested (Cronbach's Alpha = 0.87) (35). The instrument has 25 items. Each item's response is scored on a 7 point Likert scale with total score ranging from 25-175. The social support scores were divided into 2 levels as follows.

Good	=	> 128
Poor	=	≤ 128

This instrument measure social support among patients pulmonary tuberculosis treatment in terms of:

Attachment/intimacy	5	items	(item 1, 5, 10, 19, 22)
Social integration	5	items	(item 2, 6, 11, 20, 24)
Opportunity of nurturance	5	items	(item 7, 12, 13, 17, 21)
Reassurance of worth	5	items	(item 3, 8, 16, 18, 23)
Assistance	5	items	(item 4, 9, 14, 15, 25)

The questionnaires had both positive and negative statement. The positive statements comprised 21 items i.e., 1, 2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25. The negative statements comprised 4 items i.e. 4, 7, 10, 16, 24. The score assignment was as follows:

	Score	
	Positive statement	Negative statement
Strongly agree	7	1
Agree	6	2
Somewhat agree	5	3
Neutral	4	4
Somewhat disagree	3	5
Disagree	2	6
Strongly disagree	1	7

Part 4 Depression

Depression assessment instrument is The Center for Epidemiological Studies – Depression (CES-D) scale has been developed by the National Institute of Mental Health in America. The Center for Epidemiology Studies – Depression (CES-D) scale consists of 20 items, the items were selected to represent the major symptoms in the clinical syndrome of depression, as identified by clinical judgment, frequency of use in other questionnaire for depression, and factor analytic studies.

Components included in depressed mood are feeling of guilt and worthlessness, fearfulness, helplessness and hopelessness, psychomotor retardation, loss of appetite and sleep disturbance.

This instrument is completed by the patient and oriented around symptoms of depression. It asks for feelings during the week preceding the interview. The scale range of answers is from 0 to 3. A total score for the scale is made by summing all items for each patient. The total score has a possible range of 0 to 60, and this single total score is used as an estimate of the degree of depressive symptomatology. The questionnaires had both positive and negative statement. The positive statements were 4 items of the numbers 4, 8, 12, 16. The negative statements were 16 items of the numbers 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19, 20. For each item the patients are asked about their feeling during the past week and chose the suitable answer. The criteria were calculated as follows:

	Score	
	Positive statement	Negative statement
- Rarely or none of the time (less than 1 day).	3	0
- Some or a little of the time (1 – 2 days).	2	1
- Occasionally or a moderate amount of time (3 – 4 days).	1	2
- Most or all of the time (5 – 7 days).	0	3

This instrument had already been translated into Thai language by Kasantikul D. et al in 1986 and when they test the mean scores of 2 groups: depressed patient and student (non depressed) the result significantly different (p-value < 0.05) used a score of ≥ 16 as a cut off point (169). When they tested for reliability, by using Cronbach alpha method, the result was CES-D questionnaire was reliable with α-coefficient = 0.82. In 1997, The Study of the Center for Epidemiological Studies-Depression Scale (CES-D) in Thai People by Kuptniratsaikul V. and Pekuman P. , the objective of this study was to establish the optimal cut of point for Thai people. It was performed among 69 medical personals of Siriraj Hospital and 30 psychiatric patients from the department of Psychiatry. Everyone was evaluated by CES-D and DSM-IV method. The finding was that the average scores for normal, minor and major depression groups were 10.57 ± 4.96, 28.29 ± 8.36 and 37.15+10.65 with statistical significance (p-value < 0.001). Scores of 19 or higher was considered indicative of depression with 93.33 percent sensitivity, 94.2 percent specificity and reliability was 0.9154 (36). Thus, in this research used a score of ≥ 19 as a cut off point.

Part 5 Treatment adherence

Treatment adherence was assessed using a four item self – report scale (Morisky Adherence Score – MAS) based on an instrument developed by Morisky. The reliability of questions on adherence to treatment was analyzed by coefficient of alpha cronbach method was 0.61. The questions used in this part consists 4 questions

that evaluated medications and medication-taking behavior. The score criteria of treatment adherence were calculated as follows: (37)

1. Do you ever forget to take your medicine?
2. Are you careless at times about taking your medicine?
3. When you feel better do you sometimes stop taking your medicine?
4. Sometimes if you feel worse when you take the medicine, do you stop taking it?

If answer "Yes" = 1
If answer "No" = 0

In this study, the treatment adherence score were divided in to 2 levels as follows:

Good = 0
Poor = 1-4

3.7 Validity and Reliability

1. Content validity

The questionnaires were inspected by principle advisor and co-advisor to validate the content.

2. Reliability

A pre-test was done before real data correction in TB clinic at The Chest Disease Institute with 30 pulmonary tuberculosis patients. A reliable instrument as indicated by a Cronbach's alpha were as follow:

The Personal Resource Questionnaire (PRQ-85) = 0.92
The Center for Epidemiology Studies – Depression (CES-D)= 0.87
The Morisky Adherence Score (MAS) = 0.77

3.8 Data collection

Data collection were conducted through a interview by the researcher. The procedures conducted in the following sequences:

1. Identify the patients receiving TB treatment in the Chest Disease Institute based on the set inclusion criteria.

2. After being informed of the nature, rationale and requirement of the study, the patients were asked to indicate their willingness to and sign up on their informed consent to participate in this study.

3. Data were then collected using a set of questionnaires. Explanation was given to clarify any query. The procedure can be terminated upon the subjects' consent and this would not affect the treatment that the patients received.

4. Data were collected according to the above sequence, start from Part 1 Socio demographic characteristic, Part 2 Health behaviors, Part 3 Social support, Part 4 Depression, Part 5 Treatment adherence. The whole process take about 20 minutes.

5. The obtained data were then completed and analyzed.

3.9 Data Analysis

Data were verified before statistical analysis. The level of statistical significant was set at $\alpha < 0.05$. The statistics used in data analysis were:

1. Descriptive statistics: were frequency, percentage, mean and standard deviation.

2. Inferential statistics:

2.1 p - value from chi-square at < 0.05 were to compare each of the independent risk factors. This analysis was to test the relationship between factors and treatment adherence. Odds ratio and 95 percent confidence interval of odds ratio were to determine strength of association.

2.2 Multivariate analysis

Logistic regression analysis was used to test the association between the independent factors and the treatment adherence after controlling the confounding factor.

CHAPTER IV
RESULTS

The purpose of this study is to determine the relationship between depression and treatment adherence among pulmonary tuberculosis patients. The studied results were divided in to 3 parts.

1. General and demographic characteristics.

2. Characteristics of variables associated with treatment adherence by Univariate analysis

3. Characteristics of variables associated with treatment adherence after controlling other confounders by Multiple logistic regression analysis

4.1 General and demographic characteristics: general and demographic characteristics consisted of demographic characteristics, health behavior, social support, depression and treatment adherence.

4.1.1 Demographic of subject such as age, sex, marital status, education level, occupation, family income, duration of treatment, Anti-TB drug regimen. (See table4)

Age

The largest age groups of subjects were 15 – 30 years (26.6%). The second largest groups were 41 – 50 years (24.3%), 23.4% were 31-40 years, 14.3% were 51-60 years. Only 11.4% were >60 years. The mean age of subjects was 41.55 years.

Gender

About 64.0% of the subjects were male, whereas the minority were female (36.0%)

Marital status

Most of the subjects were married (58.9%), 29.1% were single, 12.0% were widowed/separated and divorced.

Education level

Most of the subjects were had no education and completed elementary school (38.6%), 21.7% were had completed senior high school, 20.3% were had completed diploma and bachelor's degree or higher than, 19.4% were had completed junior high school.

Occupation

Most of the subjects were employment (28.0%), 21.4% were government officer and office employee, 18.6% were housewife/unemployed, 14.6% were vender, 14.3% were agriculture, and only 3.1% were student.

Family income

The largest family income groups of subjects had less than 5,000 baht (38.0%). The second and third largest groups had 5,001-10,000 baht and higher than 10,000 baht (34.0% and 28.0% respectively).

Duration of treatment

The major of the subjects (94.6%) had been receiving Anti-TB drug for less than or equal to 6 months. The minimum duration of treatment was 3 months and the maximum was 48 months. The median duration of treatment was 4 months.

Anti-TB drug regimen

The major of the subjects (93.4%) had been receiving Anti-TB drug that association with psychosis, mental symptom and depression**.**

Table 4 Demographic characteristics of 350 pulmonary tuberculosis patients

Characteristics	Number and Percentage
Age (yrs)	
15 – 30	93 (26.6)
31 – 40	82 (23.4)
41 – 50	85 (24.3)
51 – 60	50 (14.3)
> 60	40 (11.4)
Mean ± SD (Min, Max) = 41.5 ± 14.2 (15,85)	
Gender	
Female	126 (36.0)
Male	224 (64.0)
Marital status	
Single	102 (29.1)
Married	206 (58.9)
Widowed/Separated/divorced	42 (12.0)
Education level	
No education/ Elementary school	135 (38.6)
Junior high school	68 (19.4)
Senior high school	76 (21.7)
Diploma/ Bachelor degree/higher than	71 (20.3)
Occupation	
Housewife/unemployed	65 (18.6)
Agriculture	50 (14.3)
Employment	98 (28.0)
Vendor	51 (14.6)
Government officer/ Office employee	75 (21.4)
Other (student)	11 (3.1)
Family income (Baht/month)	
> 10,000	98 (28.0)
5,001 – 10,000	119 (34.0)
≤ 5,000	133 (38.0)

Table 4 Demographic characteristics of 350 pulmonary tuberculosis patients (cont.)

Characteristics	**Number and Percentage**
Duration of treatment (month**)**	
≤ 6	331 (94.6)
> 6	19 (5.4)
Anti-TB drug	
H*	2 (0.6)
HR*	279 (79.7)
HE*	6 (1.7)
HRE*	5 (1.4)
HRZE*	4 (1.1)
Km,Pas,Et*	4 (1.1)
Et,E*	1 (0.3)
Et,Cs,Pas,OF*	11 (3.1)
Cs,E,OF*	1 (0.3)
Km,Et,Pas,Cs,Z,E,OF*	1 (0.3)
Km,HRZE,OF*	2 (0.6)
4-FDC (Rimstar)*	11 (3.1)
R	3 (0.9)
RE	7 (2.0)
RZE	9 (2.6)
Km,Pas	2 (0.6)
Km,E	1 (0.3)
Sm,E,OF	1 (0.3)
Anti-TB drug	
Non associate with depression	23 (6.6)
Associate with depression	327 (93.4)

* Anti-TB drugs such as isoniazid(H), ethionamide(Et), cycloserine(Cs) and 4-FDC (4-Fixed Dose Combination) are cause depression, psychosis and mental symptom (7, 41, 42).

4.1.2 Health behavior

Smoking

In this study most of subjects (88.3%) no smoke, 11.7% of the subjects still smoking. (See table 5)

Alcohol consumption

Most of subjects (90.9%) not taking alcohol, only 9.1% of the subjects still drinking alcohol. (See table 5)

Drug addiction

All of the subjects were non drug addict. (See table 5)

4.1.3 Social support

Most of the subjects (64.0%) were good social support, whereas 36.0% of the subjects were poor social support. (See table 5)

Table 5 Health behavior and social support of 350 pulmonary tuberculosis patients

Variable	Number and Percentage
Smoking	
No	309 (88.3)
Yes	41 (11.7)
Alcohol consumption	
No	318 (90.9)
Yes	32 (9.1)
Drug addiction	
No	350 (100)
Yes	0
Social support	
good	224 (64.0)
poor	126 (36.0)

4.1.4 Depression

Most of the subjects (66.9%) were non depression, whereas 33.1% indicated the presence of depression (95% CI = 28% - 38%) (See table 6).

4.1.5 Treatment adherence

Most of the subjects (60.6%) were poor adherence, whereas 39.4% indicated the presence of good adherence. (See table 6)

Table 6 Depression and treatment adherence of 350 pulmonary tuberculosis patients

Variable	Number and Percentage
Depression	
No (score < 19)	234 (66.9)
Yes (score ≥19)	116 (33.1)
Treatment adherence	
Good (score = 0)	138 (39.4)
Poor (score = 1-4)	212 (60.6)

The results show that the subject with depression has increasing score level of poor adherence to treatment. While the subject without depression has decreasing score level of poor adherence to treatment (p-value Linear by Linear = <0.001). (See table 7) It implies that the subject with depression has increasing severity of problem related to poor adherence to treatment.

Table 7 Depression and treatment adherence score of 350 pulmonary tuberculosis patients

	Treatment adherence score				
	Good adherence	Poor adherence			
	0	1	2	3	4
Depression					
No	104 (44.4%)	39 (16.7%)	34 (14.5%)	34 (14.5%)	23 (9.9%)
Yes	34 (29.3%)	6 (5.2%)	12 (10.3%)	28 (24.2%)	36 (31.0%)

4.2The association between interested factors and treatment adherence by Univariate analysis

4.2.1 Demographic characteristics

This section showed the association between demographic characteristics and treatment adherence. Exploration factors in this analysis included age, gender, marital status, education level, occupational, family income, duration of treatment, Anti-TB drug all of which were shown in table 8.

There was statistically significant association between age and treatment adherence. The subjects who had >60 years old were 3.76 times more to have poor adherence than 15-30 years subjects. (OR=3.76, 95%CI=1.56-9.00, p-value=0.002)

There was statistically significant association between gender and treatment adherence. The subjects who had male were 2.32 times more to have poor adherence than female subjects. (OR=2.32, 95%CI=1.48-3.63, p-value=0.001)

The Odd ratio and 95% confidence interval indicated that no education or elementary school and senior high school were associated with poor adherence. (OR=2.22, 95%CI=1.24-4.00 and OR=2.08, 95%CI=1.08-4.04 respectively)

There was statistically significant association between occupational and treatment adherence. The subjects who had agriculture were 2.40 times more to have poor adherence than government office or office employment subjects. (OR=2.40, 95%CI=1.13-5.10, p-value=0.022)

The Odd ratio and 95% confidence interval indicated that family income 5,001-10,000 baht/month and ≤ 5,000 baht/month were association with poor adherence. (OR=2.25, 95%CI=1.30-3.90 and OR=2.65, 95%CI=1.54-4.56 respectively)

There were no statistically significant association between marital status, duration of treatment, Anti-TB drug and treatment adherence.

Table 8 The association between demographic characteristics and treatment adherence

Variable	Poor adherence		Good Adherence		OR	95%CI of OR	p-value
	No.	%	No.	%			
Age (yrs.)							
15 – 30	48	51.6	45	48.4	1.00		
31 – 40	46	56.1	36	43.9	1.20	0.66-2.18	0.553
41 – 50	54	63.5	31	36.5	1.63	0.90-2.98	0.108
51 – 60	32	64.0	18	36.0	1.67	0.82-3.38	0.155
> 60	32	80.0	8	20.0	3.76	1.56-9.00	0.002*
Gender							
Female	60	47.6	66	52.4	1.00		
Male	152	67.9	72	32.1	2.32	1.48-3.62	< 0.001*
Marital status							
Single	56	54.9	46	45.1	1.00		
Married	128	62.1	78	37.9	1.35	0.83-2.18	0.223
Widowed/ Separated /divorced	28	66.7	14	33.3	1.64	0.76-3.48	0.193

Table 8 The association between demographic characteristics and treatment adherence (Cont.)

Variable	Poor adherence		Good Adherence		OR	95%CI of OR	p-value
	No.	%	No.	%			
Education level							
Diploma/Bachelor degree or higher than	33	46.5	38	53.5	1.00		
Senior high school	49	64.5	27	35.5	2.08	1.08-4.04	0.028*
Junior high school	41	60.3	27	39.7	1.75	0.90-3.42	0.103
No education/ Elementary school	89	65.9	46	34.1	2.22	1.24-4.00	0.007*
Occupation							
Government officer/ Office employee	37	49.3	38	50.7	1.00		
Housewife / unemployed	42	64.6	23	35.4	1.88	0.95-3.70	0.070
Agriculture	35	70.0	15	30.0	2.40	1.13-5.10	0.022*
Employment	60	61.2	38	38.8	1.62	0.88-2.30	0.118
Vendor	34	66.7	17	33.3	2.05	0.98-4.30	0.054
Other (student)	4	36.4	7	63.6	0.58	0.16-2.17	0.421
Family income (Baht/month)							
> 10,000	91	68.4	42	31.6	1.00		
5,001-10,000	77	64.7	42	35.3	2.25	1.30-3.90	0.003*
≤ 5,000	44	44.9	54	55.1	2.65	1.54-4.56	<0.001*

Table 8 The association between demographic characteristics and treatment adherence (Cont.)

Variable	Poor adherence		Good Adherence		OR	95%CI of OR	p-value
	No.	%	No.	%			
Duration of treatment (month)							
≤ 6	203	61.3	128	38.7	1.00		
> 6	9	47.4	10	52.6	0.57	0.22-1.43	0.226
Anti-TB drug							
No associate with depression	17	73.9	6	26.1	1.00		
Associate with depression	195	59.6	132	40.4	0.52	0.20-1.35	0.176

4.2.2 Health behavior

This section showed the association between health behavior and treatment adherence. This analysis included smoking, alcohol consumption and drug addiction. (see table 9)

There was statistically significant association between alcohol consumption and treatment adherence. The subjects who were still drinking were 2.50 times more to have poor adherence than no drinking subjects. (OR=2.50, 95%CI=1.05-5.96, p-value = 0.033)

There was no statistically significant association between smoking and treatment adherence.

Table 9 The association between health behavior and treatment adherence

Variable	Poor adherence		Good Adherence		OR	95%CI Of OR	p-value
	No.	%	No.	%			
Smoking							
No	182	58.9	127	41.1	1.00		
Yes	30	73.2	11	26.8	1.90	0.92-3.93	0.080
Alcohol consumption							
No	187	58.8	131	41.2	1.00		
Yes	25	78.1	7	21.9	2.50	1.05-5.96	0.033*

4.2.3 Social support

There was statistically significant association between social support and treatment adherence. The subject who had low social support were 1.67 times more to have poor adherence than who had high social support (OR=1.67, 95%CI=1.05-2.64, p-value=0.027).(see table10)

4.2.4 Depression

There was statistically significant association between depression and treatment adherence. The subject who had depression were 1.93 times more to have poor adherence than who had non depression(OR=1.93, 95%CI=1.20-3.11, p-value = 0.006). (see table 10)

Table 10 The association between social support, depression and treatment adherence

Variable	Poor adherence		Good Adherence		OR	95%CI of OR	p-value
	No.	%	No.	%			
Social support							
good (score > 128)	126	56.2	98	43.8	1.00		
poor (score ≤ 128)	86	68.3	40	31.7	1.67	1.05-2.64	0.027*
Depression							
No (score < 19)	130	55.6	104	44.4	1.00		
Yes (score ≥ 19)	82	70.7	37	29.3	1.93	1.20-3.11	0.006*

4.3 The association between interested factors and treatment adherence by Multivariate analysis

Multiple logistic regression was used to control potential confounders. It was used to evaluate interest factors of the treatment adherence, with the effects of confounding factors removed. The factors used in the multivariate analysis were the ones with significant association in the univariate analysis. There were age, gender, education level, family income, alcohol consumption, social support and depression.

Table 11 showed that, four variables had significant association with treatment adherence such as age > 60 years (Adjusted OR = 3.40, 95%CI = 1.31-8.84, p-value = 0.012), male (Adjusted OR = 1.68, 95%CI = 1.03-2.75, p-value = 0.030), Senior high school level (Adjusted OR = 2.03, 95%CI = 1.05-4.10, p-value = 0.049) and depression (Adjusted OR = 1.83, 95%CI = 1.10-3.07, p-value = 0.022). Hosmer Lemeshow chi squred test was used to test the goodness of fit of the logistic model (χ^2 = 10.23, df = 8, p-value = 0.250).

Table 11 Multiple logistic regression analysis between risk factor and treatment adherence

Factors	Adjusted OR	95%CI	p-value
Age (yrs.)			
15 – 30	1.00		
31 – 40	1.17	0.62-2.20	0.608
41 – 50	1.41	0.74-2.70	0.297
51 – 60	1.42	0.65-3.10	0.381
> 60	3.40	1.31-8.84	0.012*
Gender			
Female	1.00		
Male	1.68	1.03-2.75	0.037*
Education level			
Diploma/Bachelor degree/higher than	1.00		
Senior high school	2.03	1.05-4.10	0.049*
Junior high school	1.50	0.73-3.08	0.272
No education/Elementary school	1.64	0.83-3.20	0.150
Alcohol consumption			
No	1.00		
Yes	1.96	0.77-4.50	0.156
Social support			
Good (score > 128)	1.00		
Poor (score ≤ 128)	1.40	0.84-2.31	0.190
Depression			
No (score < 19)	1.00		
Yes (score ≥ 19)	1.83	1.10-3.07	0.022*

CHAPTER V
DISCUSSION

The findings from the study of treatment adherence of pulmonary tuberculosis patients in Chest Disease Institute, Nonthaburi province will be discussed as follows:

1. Discussion of the research methodology
2. Discussion of the research results

1. Discussion of the research methodology

This study was a cross-sectional analytic study to find out the association between depression and treatment adherence among pulmonary tuberculosis patients. The design was suitable for the study because it could attain the objective of this study. However, “Reverse Causality Bias” may have occurred in this study. Because the measurement of exposure and outcome was carried out at the same time, it could not distinguish either the factors or the treatment adherence to be happened firstly.

The interview questionnaires used in this study consistent of 5 parts: demographic characteristic, health behavior, social support, depression and treatment adherence. The instrument for measurement depression by CES-D (Center for Epidemiology Studies - Depression). It could be one of the most useful test for screening of depression.

In this study the researcher directly interview the subject which allows the research and information provider communicating to each other. Therefore, if the interviewee does not understand the question, the researcher will be able to give explanation. Moreover, it allows researcher to obtain appropriate and complete data as required. However, its disadvantage is that the accuracy of data depends mostly on the interviewee. If the interviewee distorts the information or misremembers it, the data will be inaccurate. Moreover, the interviewers should beware not to guide the interviewee’s answers to acquire data that they prefer.

Selection bias is possible because only TB patients who came into the TB clinics to receive treatment were eligible to be included in this study. Therefore health concern and cautiousness of these patients probably lead to their greater adherence to treatment. That may be difference from the patients who were not cooperate with this study or missed keep appointments or default or lost to follow up during data collection. These patients perhaps did not understand the important of taking all of the prescribed drugs for the full duration of the treatment or were not concern enough about their health.

2. Discussion of the research results

Multiple logistic regression analysis was conducted to control the confounding factors. It was found that age, gender, education level and depression were associated with treatment adherence.

Demographic characteristic

This study revealed that there was association between age and treatment adherence were age > 60 years (Adjusted OR = 3.40, 95%CI = 1.31-8.84, p-value = 0.012). The subject who were > 60 years old or older were poor treatment adherence (80.0%) compared to the other age groups. This study was similar previous studies (94 , 95, 113) they found that the level of treatment adherence was good among young age group. It is probably because the young subjects are able to access to health service and health knowledge resource better than the elders, and then they are more likely to care for their health than the elders. Male had poor adherence more than female (Adjusted OR = 1.68, 95%CI = 1.03-2.75, p-value = 0.030). This result is relevant with pervious studies (95-99). In contrast, previous studies (16, 100-101) reported that there were not associated between gender and treatment adherence. It is found that the male subjects have poorer adherence to treatment than the female subjects since most of male subject work as employees and then they are required to spend most of time outside. They earn for their families and then they mostly lack of attention for health care and medicine taking. As the result, they do not take medicine continuously. To consider about education level the most education level of the subjects had no education and only 38.6% completed elementary school. The result showed that

education level was significantly associated with treatment adherence. The subjects who had completed senior high school level had poorer treatment adherence rather than the subjects who had completed Diploma or higher education (Adjusted OR = 2.03, 95%CI = 1.05-4.10, p-value = 0.049). This result is relevant with pervious studies (113-115). It might be ignorance due to their lack of health knowledge in general and TB in particular which were the main cause of poor adherence.

Health behavior

Smoking

This study found that there was no significant association between smoking and treatment adherence. The result was consistent with previous study by Somsong (32). The result was inconsistent with previous study (31) that reported cigarette smoking had significantly increased the risk of interrupted treatment and reported that previous TB, resistance to rifampicin, human immunodeficiency virus infection, psychiatric illness, homeless, smoking and drug abuse were related to non-adherence (128). A limitation in this study was that the self - report of smoking status could have been by certain degree of social desirability from the respondent which may have underestimated the true prevalence of smoking and the subjects might have information bias.

Alcohol consumption

This study found that there was no significant association between alcohol consumption and treatment adherence. The result was consistent with previous study (32). The result was inconsistent with previous studies (31, 99, 132-137). The obtained data might be different from the actual data in the day of interview since they were recorded as consumption in usual manner. Therefore, this result might also be caused by the insufficient instrument. It had low reliability and had information bias. It could not directly measure quantity of alcohol consumption in the day of interview.

Social support

This study result showed that social support was not significantly associated with treatment adherence. This result was similar as the previous study (88). The result was inconsistent with previous studies (21, 31, 97, 106, 148, 150). They found that those who had high level of family support and social support correlated with self-care, interrupted treatment and treatment adherence to pulmonary tuberculosis patients. It's already a widely known fact that social support has an effect on physical health mental well-being and self-care behavior. It might be that poor treatment adherence patients were isolated with more poor relationship than the good treatment adherence patients. However, the subjects who had good level of social support had good treatment adherence (71.0%) compared to poor social support group.

Depression

This study result showed that depression was associated with poor treatment adherence (Adjusted OR = 1.83, 95%CI = 1.10-3.07, p-value = 0.022). This result is similar to more studies in chronic illness (155-166). In this study, the subjects with poor adherence to treatment, the frequency of cases with depression was higher than in good adherence to treatment subjects (38.7% and 24.6% respectively). It is found that the depression is an important factor which affects the adherence to treatment of pulmonary tuberculosis patient. Therefore, Screening for depression at early phase of treatment, initial phase, continuation phase and finishing phase can identify the patient and it is helpful to plan for further treatment.

The result of this study may be apply to improve planning and implementation of TB control and the problems will be solved regarding to the treatment adherence among pulmonary tuberculosis.

Limitation of the study

1. Although the subjects in this study have poor adherence to treatment on non-continuous medicine taking, they follow appointment with doctors. In this study, we do not study patients who miss appointment and lack of continuous treatment and probably have more increasing severity of depression and poor adherence to treatment than the subject in this study.

2. This study was cross-sectional design and the use of self-reported adherence measure that may underestimate or overestimate the actual prevalence of adherence.

3. The study cannot collect some type of data from the patients such as HIV infection which probably affects the adherence to treatment because we cannot categorize the HIV infected patient from the non-HIV infected patient since the patients was not undergo blood test for HIV infections.

4. In this study used the sample size calculation formula for the prevalence. It is not the sample size calculation formula for association between independent variable and dependent variables.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

Conclusion

This study was a cross-sectional analytical study aimed to study the prevalence of depression in pulmonary tuberculosis patients, to determine the relationship between adherence and demographic characteristic, health behavior, social support, depression and treatment adherence. The study population was 350 pulmonary tuberculosis patients who received treatment at TB clinic of Chest Disease Institute, Nonthaburi province. A structured questionnaire was use for interviewing and medical record reviewed. This study carried out period of May 25 to September 30, 2007.

In this study, the majority of the subjects were male (64.0%), age group 15 to 30 years (26.6%), married (58.9%), no education or elementary school level (38.6%), employment (28.0%), family income of less than or equal to 5,000 baht (38.0%). 94.6% of the subjects had receiving Anti-TB drug for less than or equal 6 months, 90.3% receiving Anti-TB drug that there were adverse effect such as psychosis, mental symptom and depression. Most of the subjects were non smoker, no alcohol, non of them was drug addicts (88.3%, 90.9% and 100% respectively). The result showed that 64.0% of the subjects had been good social support level. Finally, 33.1% of the subjects who had depression and only 39.4% of the subjects had good treatment adherence. Using multiple logistic regression analysis revealed that age (Adjusted OR for age group > 60 years old = 3.40, 95%CI = 1.31-8.84, p-value = 0.012), gender (Adjusted OR for male = 1.68, 95%CI = 1.03-2.75, p-value = 0.037), education level (Adjusted OR for senior high school = 2.03, 95%CI = 1.05-4.10, p-value = 0.049) and depression (Adjusted OR = 1.83, 95%CI = 1.10-3.07, p-value = 0.022) were associated with treatment adherence.

Recommendation

Recommendations based on study result

On the basis of the results of study, the recommendations can be made as follow:

1. It was found that depression was a very important variable factor that affected the adherence to treatment of pulmonary tuberculosis patients. Hence screening for depression might be a useful predictor of possible future non-adherence and closer monitoring and assistance are needed to achieve adherence.

2. The health personal working in TB clinics with the collaboration of the patients who had good adherence encourage, motivate the patients to treatment adherence.

3. The Center for Epidemiology Studies Depression Scale (CES-D) is useful for detecting depression in hospital and primary care. Screening for depression in beginning of treatment and during treatment once depression is detected appropriate active should intervene.

Recommendations for future study

1. This kind of study should be conducted in the general hospitals as well, since the Central Chest Institute TB clinic is to specific setting in treating TB patients. This finding might be of limited value in generalization for other health facilities.

2. Qualitative research is needed to explore more detailed causes of non-adherence.

3. Appropriate intervention to minimize to depression, specifically before treatment, in the initial phase and continuation phase may be useful.

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APPENDIX

แบบสัมภาษณ์โครงการวิจัยเรื่อง

ความสัมพันธ์ระหว่างภาวะซึมเศร้ากับความร่วมมือในการรักษาของผู้ป่วยวัณโรคปอด

เลขที่แบบสัมภาษณ์.....วันที่สัมภาษณ์.....

Registered TB No .....HN No.....

ที่อยู่.....

สูตรยาที่ใช้.....วันที่เริ่มรักษา.....

<u>คำชี้แจงในการตอบแบบสอบถาม</u>

แบบสอบถามประกอบด้วย 5 ส่วน คือ

ส่วนที่ 1 ข้อมูลทั่วไปของผู้ป่วยวัณโรคปอด

ส่วนที่ 2 ข้อมูลด้านพฤติกรรมสุขภาพ

ส่วนที่ 3 ข้อมูลด้านการสนับสนุนทางสังคม

ส่วนที่ 4 ข้อมูลเกี่ยวกับภาวะซึมเศร้า

ส่วนที่ 5 การประเมินความร่วมมือในการรักษา

ท่านกรุณาตอบตามความเป็นจริง เพื่อนำไปใช้ในการวิเคราะห์ในการศึกษานี้เท่านั้น จึงไม่มีผลกระทบกระเทือนต่อท่านแต่อย่างใดและจะนำข้อมูลที่ได้ไปใช้ในการปรับปรุงระบบการรักษาพยาบาลแก่ผู้ป่วยวัณโรคปอดให้ดียิ่งขึ้น

<u>คำชี้แจง</u> โปรดใส่เครื่องหมาย ✓ ลงใน ( ) และกรอกข้อความลงในช่องว่างตามความเป็นจริง

<u>ส่วนที่ 1 ข้อมูลทั่วไปของผู้ป่วยวัณโรค</u>

1. อายุ.....(ปี)

2. เพศ ( ) 1.ชาย ( ) 2.หญิง

3. สถานภาพสมรส

( ) 1.โสด ( ) 2.คู่

( ) 3.หม้าย ( ) 4.หย่า/แยกกันอยู่

4.ระดับการศึกษา.....

5. อาชีพ

( ) 1. ไม่ได้ประกอบอาชีพ ( ) 2. เกษตรกรรม

( ) 3. รับจ้าง ( ) 4. ค้าขาย

( ) 5. รับราชการ ( ) 6. พนักงาน/ลูกจ้างบริษัท/รัฐวิสาหกิจ

( ) 7. อื่นๆ ระบุ.....

6. รายได้ของครอบครัว..... (บาท/เดือน)

<u>ส่วนที่ 2 สถานะสุขภาพและพฤติกรรมสุขภาพ</u>

8. ท่านสูบบุหรี่เป็นประจำหรือไม่ (เป็นประจำ หมายถึง สูบทุกวันติดต่อกันอย่างน้อย 3 เดือน)

( ) 1. สูบ ..... มวน/วัน ( ) 2. ไม่สูบ

( ) 3. เคยสูบ แต่เลิกมาแล้ว.....เดือน/ปี

9. ท่านดื่มสุราเป็นประจำหรือไม่ (เป็นประจำ หมายถึง ดื่ม 2-3 ครั้งต่อสัปดาห์ติดต่อกันอย่างน้อย 3 เดือน)

( ) 1. ดื่ม ..... ครั้ง/สัปดาห์ ( ) 2. ไม่ดื่ม

( ) 3. เคยดื่ม แต่เลิกมาแล้ว.....เดือน/ปี

10. ท่านติดติดสิ่งเสพติดเหล่านี้หรือไม่ (ตอบได้มากกว่า 1 อย่าง)

1. ยาแก้ปวด 2. กัญชา 3. กระท่อม

4. ฝิ่น 5. เฮโรอีน 6. ยาม้า

( ) 1. ติด ระบุ.....

( ) 2. ไม่ติด

( ) 3. เคยติด ระบุ.....แต่เลิกมาแล้ว.....เดือน/ปี

<u>ส่วนที่ 3 ข้อมูลด้านแรงสนับสนุนทางสังคม</u>

<u>คำชี้แจง</u>

แบบสอบถามนี้เป็นเรื่องเกี่ยวกับการได้รับการช่วยเหลือสนับสนุนจากสังคมท่านมีความรู้สึกต่อข้อความในแบบสอบถามนี้อย่างไร โปรดตอบตรงกับความรู้สึกของท่านมากที่สุด โดยคำตอบจะมี 7 ตัวเลือก คือ

7 เห็นด้วยอย่างยิ่ง หมายถึง ผู้ตอบมีความรู้สึกเห็นด้วยอย่างยิ่งกับข้อความในประโยคนั้น

6 เห็นด้วย หมายถึง ผู้ตอบมีความรู้สึกเห็นด้วยกับข้อความในประโยคนั้น

5 ค่อนข้างเห็นด้วย หมายถึง ผู้ตอบมีความรู้สึกค่อนข้างเห็นด้วยกับข้อความในประโยคนั้น

4 ไม่แน่ใจ หมายถึง ผู้ตอบมีความรู้สึกว่ายังไม่แน่ใจว่าจะเห็นด้วยหรือไม่เห็นด้วยกับข้อความในประโยคนั้น

3 ค่อนข้างไม่เห็นด้วย หมายถึง ผู้ตอบมีความรู้สึกค่อนข้างไม่เห็นด้วยกับข้อความในประโยคนั้น

2 ไม่เห็นด้วย หมายถึง ผู้ตอบมีความรู้สึกไม่เห็นด้วยกับข้อความในประโยคนั้น

1 ไม่เห็นด้วยอย่างยิ่ง หมายถึง ผู้ตอบมีความรู้สึกว่าข้อความในประโยคนั้นไม่ตรงกับความรู้สึกของท่านเลย

โปรดทำเครื่องหมาย ✓ ลงช่องว่างที่ตรงกับความคิดเห็นของท่าน

คำถาม	7	6	5	4	3	2	1
1.ฉันมีใครคนหนึ่งที่เมื่อได้อยู่ใกล้ชิดแล้ว ฉันรู้สึกมีความอบอุ่นและปลอดภัย							
2.ฉันรู้สึกเป็นคนที่สำคัญในกลุ่มที่ฉันอยู่							
3.คนอื่นมักจะบอกให้ฉันรู้สึกว่า ฉันทำงานได้ดี							
4.เมื่อฉันมีปัญหาฉันไม่สามารถที่จะพึ่งพาญาติพี่น้องหรือเพื่อนฝูงให้ช่วยเหลือได้							
5.ฉันมีโอกาสมากเพียงพอในการพบปะกับบุคคลที่ทำให้ ฉันมีความความรู้สึกว่าฉันเป็นคนพิเศษ							
6.ฉันใช้เวลากับคนที่มีความสนใจตรงกับฉัน							
7.มีโอกาสน้อยมากในชีวิตของฉันที่จะให้ความช่วยเหลือและดูแลผู้อื่น							

8.คนอื่นทำให้ฉันรู้สึกว่าพวกเขาชอบทำงานกับฉัน							
9.ฉันพอจะหาความช่วยเหลือได้ ถ้าฉันต้องการความช่วยเหลือในระยะยาว							
10.ไม่มีใครที่จะรับฟังความรู้สึกของฉัน							
11.ภายในกลุ่มเพื่อนของฉัน เราต่างช่วยเหลือซึ่งกันและกัน							
12.ฉันมีโอกาสที่จะกระตุ้น ให้กำลังใจคนอื่น ให้พัฒนาความสนใจและทักษะของพวกเขา							
13.ครอบครัวของฉันทำให้ฉันรู้สึกว่า ฉันมีความสำคัญในการดำเนินชีวิตของครอบครัว							
14.ฉันมีญาติหรือเพื่อนที่จะให้ความช่วยเหลือแกฉัน แม้เขาจะรู้สึกว่า ฉันไม่อาจจะตอบแทนเขาได้							
15.เวลาที่ฉันอารมณ์เสีย จะมีคนบางคนที่ฉันสามารถระบายความรู้สึกให้ฟังได้							
16.ฉันรู้สึกว่าไม่มีใครมีปัญหาเหมือนฉัน							
17.ฉันชอบที่จะทำอะไรเป็นพิเศษเล็กๆ น้อยๆ ที่ทำให้ชีวิตของคนอื่นมีชีวิตชีวา							
18.ฉันรู้สึกว่าคนอื่นรู้สึกนิยมชมชอบในตัวฉัน							
19.มีคนบางคนที่รักและห่วงใยฉัน							
20.ฉันมีผู้ร่วมทำงาน เข้าสังคมและร่วมในกิจกรรมต่างๆ ด้วย							
21.ฉันมีหน้าที่รับผิดชอบในการให้ความช่วยเหลือในสิ่งที่บุคคลอื่นต้องการ							
22.ถ้าฉันต้องการคำแนะนำ จะมีคนมาช่วยวางแผนที่จะจัดการกับสถานการณ์นั้นๆ							
23.ฉันมีความรู้สึกว่าฉันเป็นที่ต้องการของคนอื่น							
24.คนส่วนมากทำให้ฉันคิดว่าฉันไม่ใช่เพื่อนที่ดีเท่าที่ควรจะเป็น							
25. ถ้าฉันเจ็บป่วยจะมีคนมาแนะนำฉันเกี่ยวกับการดูแลตนเอง							

<u>ส่วนที่ 4 การวัดภาวะซึมเศร้า</u>

ต่อไปนี้เป็นความรู้สึกที่อาจเกิดขึ้นกับท่านได้ โปรดอ่านแต่ละข้อแล้วกา ✓ ในช่องที่ตรงกับความรู้สึกของท่านมาที่สุด ในรอบ 1 สัปดาห์ที่ผ่านมา

ไม่เลย หมายความว่า ความรู้สึกนั้นเกิดขึ้นน้อยกว่า 1 วัน

นาน ๆ ครั้ง หมายความว่า ความรู้สึกนั้นเกิดขึ้นน้อยกว่า 1-2 วัน

ค่อนข้างบ่อย หมายความว่า ความรู้สึกนั้นเกิดขึ้นน้อยกว่า 3-4 วัน

บ่อยครั้ง หมายความว่า ความรู้สึกนั้นเกิดขึ้นน้อยกว่า 5-7 วัน

ไม่มีคำตอบที่ถูกหรือผิด แต่เป็นเพียงการทดสอบความรู้สึกของท่านเท่านั้น

ความรู้สึก	ไม่เลย (< 1 วัน)	นานๆครั้ง (1-2 วัน)	ค่อนข้างบ่อย (3-4 วัน)	บ่อยครั้ง (5-7 วัน)
1.ฉันรู้สึกหงุดหงิดง่าย				
2.ฉันรู้สึกเบื่ออาหาร				
3.ฉันรู้สึกว่า ฉันไม่สามารถขจัดความหม่นหมองออกไป แม้จะมีคนในครอบครัวหรือเพื่อนคอยช่วยเหลือ				
4.ฉันรู้สึกตนเองมีความดี ทัดเทียมกับคนอื่นๆ				
5.ฉันรู้สึกลำบากในการตั้งสมาธิเพื่อทำสิ่งใดสิ่งหนึ่ง				
6.ฉันรู้สึกหดหู่ใจ				
7.ฉันรู้สึกว่าทุกๆสิ่งที่ฉันกระทำต้องฝืนใจทำ				
8.ฉันรู้สึกมีความหวังเกี่ยวกับอนาคต				
9.ฉันรู้สึกว่าชีวิตฉันมีแต่ความล้มเหลว				
10.ฉันรู้สึกหวาดกลัว				

11.ฉันนอนไม่ค่อยหลับ				
12.ฉันมีความสุข				
13.ฉันพูดคุยน้อยกว่าปกติ				
14.ฉันรู้สึกอ้างว้าง เดียวดาย				
15.ฉันรู้สึกว่าผู้คนทั่วๆไปไม่มีความเป็นมิตร				
16.ฉันรู้สึกว่าชีวิตนี้สนุกสนาน				
17.ฉันมักจะร้องไห้				
18.ฉันรู้สึกไม่มีความสุข				
19.ฉันรู้สึกว่าผู้คนรอบข้างไม่ชอบฉัน				
20.ฉันรู้สึกท้อถอยในชีวิต				

ส่วนที่ 5 การประเมินความร่วมมือในการรักษา

คำชี้แจง : โปรดใส่เครื่องหมายถูก ✓ ลงใน ( ) ที่ตรงกับความเป็นจริงมากที่สุด

1. ท่านเคยลืมกินยาหรือไม่

☐ ไม่เคย

☐ เคย

2. ท่านไม่ได้สนใจ หรือไม่ได้เอาใจใส่ เวลาที่ต้องกินยาวัณโรค

☐ ไม่ใช่

☐ ใช่

3. เมื่อท่านมีอาการดีขึ้น ท่านเคยหยุดกินยาเองหรือไม่

☐ ไม่เคย

☐ เคย

4. ในบางครั้ง ถ้าท่านกินยาแล้วมีอาการแย่ลง ท่านหยุดกินยาหรือไม่

☐ ไม่เคย

☐ เคย

BIOGRAPHY

NAME	Miss.Boonyarat Punta
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