การพัฒนาเครื่องมือคัดกรองภาวะซึมเศร้าชื่อ Khon Kaen University Depression Inventory (KKU-DI) สำหรับคนไทยในชุมชน ภาคตะวันออกเฉียงเหนือ

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บทคัดย่อ

วัตถุประสงค์ เพื่อพัฒนาเครื่องมือที่เที่ยงและเชื่อถือได้เพื่อคัดกรองภาวะซึมเศร้าในคนไทยภาคตะวันออกเฉียงเหนือ โดยตั้งชื่อแบบคัดกรองภาวะซึมเศร้านี้ว่า KKU-DI

วิธีการศึกษา ข้อคำถามในแบบคัดกรองภาวะซึมเศร้า KKU-DI ได้รวบรวมมาจากหลายแหล่งได้แก่ การประชุมระดมความคิดเห็นและแลกเปลี่ยนประสบการณ์ในคณะของจิตแพทย์จำนวน 5 คนเกี่ยวกับอาการสำคัญของผู้ป่วยโรคซึมเศร้าร่วมกับการทำกลุ่มอภิปรายเกี่ยวกับประสบการณ์ของชาวบ้านที่มีอาการซึมเศร้า ความเข้าใจและการแสดงออกเมื่อมีภาวะซึมเศร้า ได้แบบคัดกรองชุดแรกมีคำถาม 80 ข้อและกำหนดมาตรวัดเป็น 4 ระดับตามความรุนแรงและความถี่ของอาการต่างๆ จากนั้นส่งให้ผู้เชี่ยวชาญซึ่งเป็นจิตแพทย์จากสถาบันอื่นๆ 10 ท่านและนักจิตวิทยา 3 ท่านช่วยพิจารณาความตรงด้านเนื้อหา ผลการพิจารณาทำให้ลดข้อคำถามลงไป 35 ข้อ จึงนำไปวิเคราะห์สถิติรายข้อโดยใช้กับกลุ่มตัวอย่าง 270 คน แบ่งเป็นกลุ่มคนปกติ 135 คนและกลุ่มผู้ป่วยจิตเวชอีก 135 คน นำผลการวิเคราะห์รายข้อมาปรับปรุงเป็นแบบคัดกรองภาวะซึมเศร้าชุดที่ 2 มีข้อคำถาม 30 ข้อตั้งชื่อว่าเป็น KKU-DI ให้คำตอบเป็นมาตรวัด 4 ระดับตั้งแต่ 0-3 มีค่าคะแนนตั้งแต่ 0-90 จากนั้นนำแบบคัดกรองนี้ไปใช้ในชุมชน 8 หมู่บ้านในเขตอำเภอเมือง จ.ขอนแก่นโดยใช้ผู้ช่วยนักวิจัยที่ผ่านการฝึกอบรมการใช้เครื่องมือและการสัมภาษณ์มาก่อนลงพื้นที่สัมภาษณ์รายบุคคล จากนั้นผู้ที่ได้ค่าคะแนนแบบคัดกรองเป็น 0 จะสุ่มเลือกมาร้อยละ 10 ส่วนผู้ที่ได้ค่าคะแนนระหว่าง 1-20 สุ่มเลือกมาร้อยละ 20 ผู้ที่ได้ค่าคะแนนมากกว่า 20 ทุกคนส่งมาพบจิตแพทย์จำนวน 1 คน จากจำนวน 3 คนที่ผ่านการตรวจสอบวัดค่าความสอดคล้องตรงกันสำหรับการวินิจฉัยโรค (Kappa > 0.80) เพื่อสัมภาษณ์โดยใช้แบบสัมภาษณ์เชิงโครงสร้างเพื่อการวินิจฉัยโรคซึมเศร้าชนิด Composite International Diagnostic Interview (CIDI) schedule ซึ่งกำหนดให้เป็นเกณฑ์มาตรฐานทองคำเปรียบเทียบกับผลที่ได้จากแบบคัดกรองภาวะซึมเศร้า KKU-DI แล้ววิเคราะห์ทางสถิติหาค่าความไว ความจำเพาะและจุดตัดที่เหมาะสม

ผลการศึกษา กลุ่มตัวอย่างทั้งหมดที่ใช้ในการศึกษาครั้งนี้มี 951 คน ลักษณะประชากรศาสตร์มีความหลากหลายในแต่ละขั้นตอนของการพัฒนาเครื่องมือ อาสาสมัครที่เข้าร่วมประชุมกลุ่มอภิปรายมีทั้งหมด 24 คนเป็นชาย 11 และหญิง 13 คน ค่ามัธยฐานของอายุคือ 28 ปี อาสาสมัครในขั้นตอนทดสอบความเที่ยงของเครื่องมือมีจำนวน 270 คน เป็นชาย 95 คน หญิง 175 คน ค่ามัธยฐานของอายุคือ 35 ปี อาสาสมัครในชุมชน 8 หมู่บ้านที่ไปสำรวจและทดลองใช้เครื่องมือนี้มีทั้งหมด 677 คนเป็นชาย 292 และหญิง 385 คน ค่ามัธยฐานของอายุคือ 39 ปี จะเห็นว่ากลุ่มตัวอย่างเป็นผู้หญิงมากกว่าส่วนมากเป็นวัยกลางคน สมรสแล้ว (ร้อยละ 83-84) เศรษฐานะต่ำ ระดับการศึกษาน้อย มีอาชีพเกษตรกรรม จากการวิเคราะห์ค่าความสอดคล้องภายในของข้อคำถามทั้ง 30 ข้อ ได้ค่า Cronbach alpha coefficient = 0.95 ค่าความสอดคล้องระหว่างผู้ช่วยนักวิจัยทั้ง 7 ในการใช้แบบคัดกรองได้ค่า Fleiss generalized kappa 0.80(95%CI = 0.75-0.86, p<0.001) ค่าความสอดคล้องระหว่างจิตแพทย์ 3 คน ในการใช้ CIDI วินิจฉัยโรคซึมเศร้า มีความสอดคล้องกันมากด้วยค่า Fleiss generalized kappa 0.85 (95%CI = 0.74-0.98, p <0.001) ค่าความไวและความจำเพาะของแบบคัดกรองภาวะซึมเศร้า KKU-DI คิดเป็นร้อยละ 88 (95% CI= 86-90%) เท่ากัน ค่าคะแนนที่เป็นจุดตัดคือ 20 อัตราความชุกโรคซึมเศร้าในชุมชนพบร้อยละ 3.9 ผู้หญิงเป็นมากกว่าผู้ชาย 8.4 เท่า

สรุป แบบคัดกรองภาวะซึมเศร้า KKU-DI มีความเที่ยงตรงสำหรับคัดกรองโรคซึมเศร้าในชุมชนภาคตะวันออกเฉียงเหนือ ค่าความไวและความจำเพาะร้อยละ 88 มีค่าจุดตัดอยู่ที่ 20 คะแนนขึ้นไป

คำสำคัญ แบบคัดกรองภาวะซึมเศร้า KKU-DI ความเที่ยงตรง ความไว ความจำเพาะ

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Development of Khon Kaen University Depression Inventory (KKU-DI) as a Depressive Measurement for Northeastern Thai Population.

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Abstract

Objective: to develop a valid and reliable screening instrument [Khon Kaen University Depression Inventory (KKU-DI) for depressive disorders in Northeastern Thailand.

Method: Items in KKU-DI were developed using a mixture of focus group and experts panel discussions. The first draft of KKU-DI consisted of 80 items and scaling response was rating from 1 to 4 based on direct estimation technique. Content validity testing was done using experts opinions from other 10 psychiatrists and 3 psychologists. Thereby, items had been reduced into 35 items. Then reliability study was done to examine internal consistency (Cronbach alpha coefficient) by using 270 subjects (135 psychiatric cases and 135 normal subjects). Finally, items were tailed into 30 items, each scored on 0-3 scale, final score ranging between 0-90. KKU-DI -30 items was tested in field study using two stage screening procedure in 6 rural and 2 urban villages of Amphur Muang, Khon Kaen. First stage, home visit interview and the KKU-DI tests were administered by 7 research assistants with well trained in using KKU-DI. Then they randomly selected 10% of the subjects who had score of KKU-DI as 0, 20% of the subjects who had score of KKU-DI as 1-20 and subjects who had score of KKU-DI more than 20, all these samples were sent to the second stage. This stage, psychiatric interview by anyone of three psychiatrists for probable depressed cases were carried out independently. Inter-rater reliability among the three psychiatrists was also examined and adjusted until accepted. We compared the KKU-DI score to a clinical diagnosis made by an experienced psychiatrist using Composite International Diagnostic Interview (CIDI) as the gold standard for diagnosis of depressive disorders, to examine sensitivity, specificity and optimum cut-off point of this instrument.

Results: The 951 subjects were recruited to this study. Demographic characters of subjects varied. Participants in the two focus groups were 11 males and 13 females [median 28 years], while subjects in the reliability study were 95 males and 175 females with [median 35 years], and subjects in the field study were 292 males and 385 females [median 39 years]. Female was predominated and the majority of samples were in the middle to late adulthood, married (83-84%), low to middle socioeconomic status, low educational attainment and were engaged in agricultural work. Internal consistency of the instrument was high [Cronbach alpha coefficient 0.945]. Inter-rater reliability among 7 research assistants was good [Fleiss generalized kappa 0.80(95%CI = 0.75-0.86, p<0.001). The 3 psychiatrists had a high inter-rater reliability in diagnosis [Fleiss generalized kappa 0.85 (95%CI = 0.74-0.98, p <0.001)]. The sensitivity of the KKU-DI was 88% (95% CI= 86-90%) and specificity was 88% (95% CI=86-90%) under optimum cut-off point scores of 20. Prevalence of depressives disorders in the community was 3.9% with female predominance and ratio 8.4 :1.

Conclusion: The KKU-DI is a valid and reliable screening instrument for depressive disorders in Northeastern, Thailand. Sensitivity 88% (95% CI= 86-90%), specificity 88% (95% CI=86-90%) under optimum cut off point scores of 20.

Key words: Khon Kaen University Depression Inventory (KKU-DI), screening instrument, validity, reliability, sensitivity, specificity

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Introduction

Depressive disorders are among the most common problems in general practice. It is a disabling disease that places an enormous burden on patients and society. Weissman et al.(1996)[1] had reviewed to summarize data on the prevalence of major depression based on epidemiological community surveys conducted in 10 countries using the Diagnostic Interview Schedule version II (DIS) and the Diagnostic and Statistical Manual for Mental Disorders, 3rd Edition (DSM-III). The major findings were the different lifetime prevalence rates of major depression with range of 1.5% in Taiwan, 2.9% in Korea, 4.3% in Puerto Rico, 5.2% in USA, 9.2% in West Germany, 9.6% in Canada, 11.6% in New Zealand, 12.4% in Italy, 16.4% in Paris, to 19% in Beirut and annual rate varied from 0.8% in Taiwan to 5.8% in New Zealand. Depression is also associated with lost productivity in the workplace (Broadhead et.al.,1990)[2], a high incidence of co-morbid psychiatric disorders (e.g., anxiety disorders), and a high rate of healthcare resource utilization (Kessler et al.,1994)[3]. It has been estimated recently that depression and other mood disorders account for $43.7 billion in direct (i.e.,treatment) and more ten times in indirect (i.e., lost productivity, absenteeism, suicides) costs (Greenberg et.al,1993)[4]. The most important problem is that many patients with depression remain under-diagnosed, under-treated and unlikely to receive parity under any of the proposed healthcare reform plans. In one study of 265 primary-care outpatients, the diagnosis of depression was missed in 64% of patients, and 14% of without depression were misdiagnosed as depressed (Perez-Stable et.al.,1990)[5].

In Thailand at the present people are living in a rapidly changing social and physical environment that often gives rise to acute or prolonged psychosocial stress and may lead to depressive reactions. Moreover, the traditional protective mechanisms of social groups are breaking down and many people are exposed to the unsettling effects of annihilating, family disintegration, and social isolation, the prevalence of depressive disorders is arising as a response to stressful psychosocial factors. From these reasons, the prevalence of depressive disorders in Thai community might be higher than previous studies. However, the information about this illness is lacking because of no accurate measurement to apply in community. There was one study about the prevalence of depression in junior high school students in Bangkok by using the Children's Depression Inventory. This study found 40.8% of the 1,264 subjects in this sample having significant depressive symptoms (CDI score >= 15) and related to stresses such as broken family, poor parent-child relationship, low socioeconomic status and mental problems of parents (Trangkasombat U.& Likanapichitkul D.,1996)[6]. This study found that depression was an important mental health problems but unable to clearly identify diagnosis.

There is a problem of caseload for health care personnel in general hospitals. They have limited time to interview and detect any mental disorders in physically ill patients (Abiodun & Ogunremi, 1990)[7]. Time-efficient valid and reliable screening instruments that can be used in the clinical context to probable psychiatric cases are required. Many popular instruments for assessment of depression were developed from Western societies that the way of depression to express and manifest was different across cultures. Some depressive scales/ inventories were going through a process of back translation into Thai language, including Beck Inventory, Clinical

Epidemiological Studies for Depression (CES-D). There are many obstacles such as language translation, communication, and copyright laws.

Objectives of the Study

1. Primary objectives

1.1 To construct items of the Khon Kaen University Depression Inventory (KKU-DI).

1.2 To examine internal consistency and test-retest reliability of the scale for determining the reliability of the Khon Kaen University Depression Inventory (KKU-DI).

1.3 To examine content validity for depression and test criterion validity in term of sensitivity and specificity of the Khon Kaen University Depression Inventory (KKU-DI) for screening depressive cases in Khon Kaen community.

2. Secondary objectives

2.1 To estimate prevalence of depressive disorders in Khon Kaen community.

2.2 To determine the significant factors associated with depressive disorders in Khon Kaen community.

Materials and Methods

1. Study design was tool development and diagnostic test study. There were 2 phases (see figure 1): Phase I: Multistage development of the Khon Kaen University Depression Inventory (KKU-DI) questionnaire during December, 1994 to February, 1996.

Stage 1 Items selection based on three resources: 1) psychiatrists' panel discussions about the common presenting symptoms of depressive patients in Northeastern Thai population. The five psychiatrists had been working in Department of Psychiatry, Faculty of Medicine, Khon Kaen University for 3 years at least. 2) focus group discussion on the topic of "How do you know when you feel depressed?" were conducted in both psychiatric cases group and normal subjects group to understand the community concept and symptoms of depression on which be influenced by local culture and beliefs, and to describe symptoms of depression from ideas of Northeastern Thai people. 3) Research findings from previous standardized depressive scales such as General Health Questionnaire(GHQ-28), Symptoms Checklist 90 items (SCL-90), Centers for Epidemiological Studies-Depression Scale (CES-D), Beck Depression Inventory (BDI), Hamilton Rating Scale for Depression (HDRS), Hospital Anxiety and Depression Scale(HADS), Zung Self-Rating Depression Scale(SDS) to get model or theory of depression and scale construction.

Stage 2 Item reduction based on experts' opinions from 10 senior psychiatrists in different centers, 3 clinical psychologists, and 1 local Thai linguist to give comments about content relevance and content coverage of depression in the first draft of Khon Kaen University Depression Inventory (KKU-DI). Checklist forms were recommended that all domains be covered by at least one question, and that there were no irrelevant items. The second draft of KKU-DI had been used in stage 3.

Stage 3 Item revision based on reliability testing to establish that the KKU-DI questionnaire be measuring depressive symptoms in a reproducible and consistent fashion. Measures of internal consistency based upon Cronbach's alpha coefficient by using 270 subjects (135 psychiatric subjects and 135 non psychiatric populations. If alpha coefficient increases significantly when specific item is left out, this would indicate that its exclusion would increase the homogeneity of the

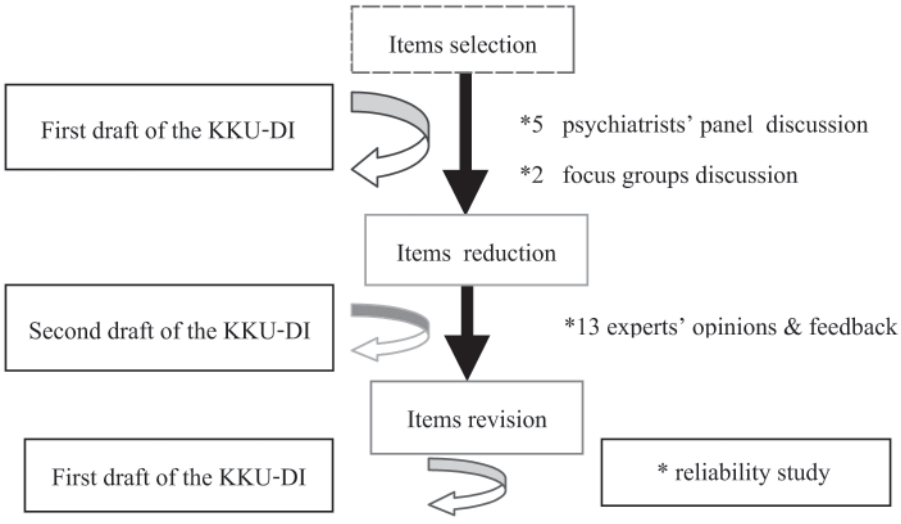
scale. Adequate alpha coefficient is greater than 0.7. Items with lower correlations should be discarded (Streiner & Norman, 1993)[8]. The scaling responses were used on a rating scale that subjects had been required to indicate their response on 4-point scale ranging from a score of 0 indicated 'almost never occurred' to a score of 3 indicated 'nearly everyday occurred' by a mark in a box. The final draft of KKU-DI had been used to test test-retest reliability and concurrent validity.

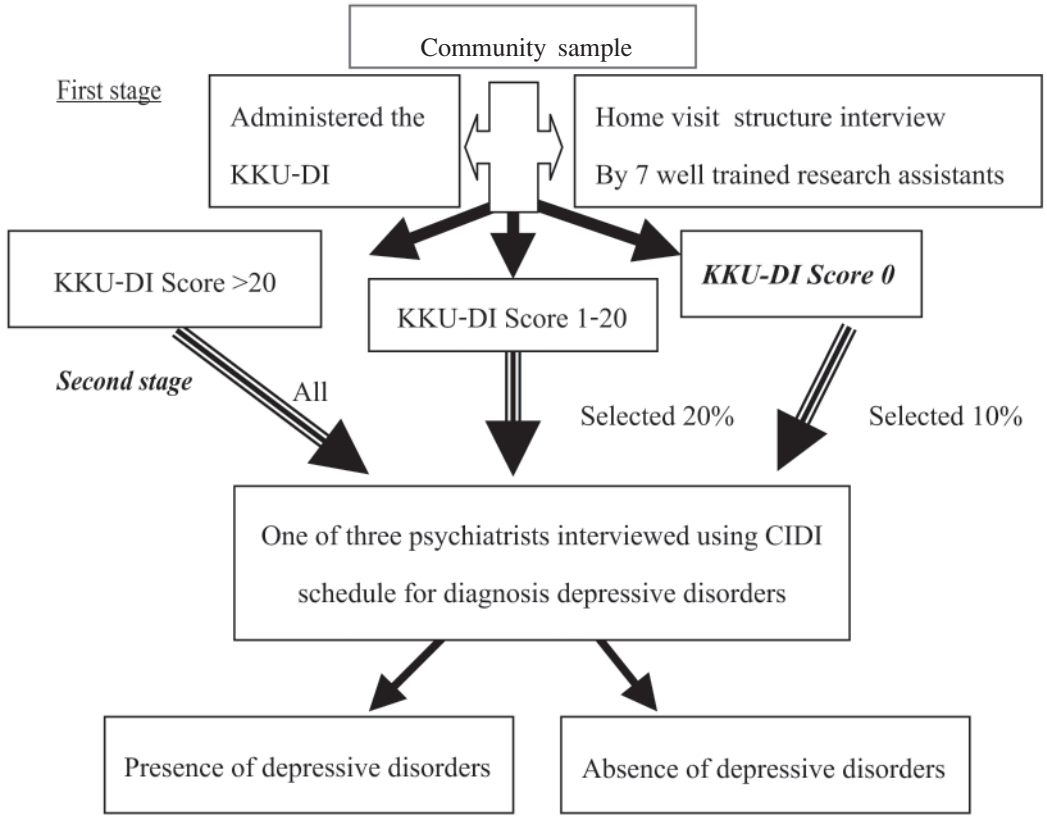
Stage 4 Test-retest reliability was conducted to detect any changes in 20 depressive patients from passage of time (2 weeks)

Phase II: Diagnostic test study to determine concurrent validity of KKU-DI questionnaire during February 1996 to May 1996. Field survey using two-stage screening procedure was conducted and correlated the KKU-DI with the "gold standard", both of which were given at the same time or within a short time period of each other. Stage 1 the 3 psychiatric nurses, 1 clinical psychologist and 3 research assistants who had trained to interview with the KKU-DI and then randomly selected 10% of the subjects who had score of KKU-DI as 0, 20% of the subjects who had score of KKU-DI as 1-20, and all subjects who had score of KKU-DI more than 20 sent to the second stage. The second stage as the "Gold standard" was the clinical diagnosis by one of three psychiatrists who had trained to used Composite International Diagnostic Interview (as a clinical structured interview) and had high inter-rater reliability to diagnose depressive disorders (generalized Fleiss

Figure 1 The schema of study design

Phase I Development of Khon Kaen University Depression Inventory (KKU-DI) questionnaire





Kappa at least 0.80).

2. Study area

2.1 Construction of items of KKU-DI was conducted at Department of Psychiatry, Faculty of Medicine, Khon Kaen University.

2.2 Reliability study was conducted at psychiatric outpatient clinic at Srinagarind Hospital and Khon Kaen Psychiatric Hospital.

2.3 Validity study was conducted in community level at 6 rural and 2 urban villages in Tambol Sila, Amphur Muang, Khon Kaen. Tambol Sila as study field because of these criteria: 1) It is a characteristic village comprising urban, suburban and rural areas. 2) Feasible to visit each subject at home due to not too far or too dangerous to go in the evening. 3) Subject's compliance included not too busy and available to interview and answer the KKU-DI questionnaire, agree to participate. There were 17 villages in Tambol Sila of which were selected with odd number. Total selected population from 8 villages were 9,620 persons (male 4,764 and female of 4,856).

3. Target population.

3.1 In phase I of the study:

All individuals who had eligible criteria for the study and came to Srinagarind Hospital during July-October 1995. Subjects coming for psychiatric care were selected as "cases". Relatives of inpatients or personnels of Khon Kaen University and without previous history of

mental disorders were selected as "normal volunteer".

3.2 In second stage of the study:

All individuals who had eligible criteria and been residing in the 6 rural and 2 urban villages of Tambol Sila, Amphur Muang, Khon Kaen province. Eligible criteria for recruitment were 1) Northeastern Thai, either sex with age 17-65 years old 2) spoken language comprehensible and without hearing difficulty. 3) Absence of severe psychopathological symptoms indicative of Schizophrenia or other psychosis. 4) Agree to participate 7) No geographic mobility. Subjects from six rural and two urban villages were selected by simple random sampling.

4. Sample size calculation

4.1 Sample size estimation for reliability study

Formula for intraclass correlations derived from the Pearson correlation. Since the distribution of *r* was not normal so that it was first necessary to normalize it using Fisher's *z*' transformation, where :

r= expected the smallest correlation coefficient (effect size)

$$z'(r) = \frac{1}{2}\log_e \frac{(1+r)}{(1-r)}$$

N = Total number of subjects required Then

$$N = \frac{\left(Z_\alpha + Z_\beta\right)^2 + 3}{z'(r)}$$

Two-tailed $\alpha = 0.05$

$\beta = 0.10$

Using Table-1, reading across from r. = 0.20 in the leftmost column, and down from a (two-tailed) = 0.05 and b = 0.10, 259 subjects would be required.

Table-1 Sample size for revealing a correlation

One-tailed a =	0.005			0.025			0.05		
Two-tailed a =	0.01			0.05			0.010		
b =	0.05	0.10	0.20	0.05	0.10	0.20	0.05	0.10	0.20
r									
0.05	7118	5947	4663	5193	4200	3134	4325	3424	2469
0.10	1773	1481	1162	1294	1047	782	1078	854	616
0.15	783	655	514	572	463	346	477	378	273
0.20	436	365	287	319	259	194	266	211	153
0.25	276	231	182	202	164	123	169	134	98
0.30	189	158	125	139	113	85	116	92	67

4.2 Sample size estimation for diagnostic test study Formula is

$$N = \frac{4 Z_{a/2}^2 p(1-p)}{W^2}$$

$Z_{a/2} = 1.96$

p = expected proportion = 0.05 (because 0.95 is more than half, sample size is estimated from the proportion expected to have negative result (1-.95=0.05)

W = 0.10

$$N = \frac{4(1.96)^2(0.05)(0.95)}{(.10)^2}$$

N = 73 = Estimate cases of Depressive disorders

Estimate prevalence of Depressive disorders in community 10%

$$\text{TOTAL SAMPLE SIZE} = \frac{73 \times 100}{10} = 730 \text{ SUBJECTS}$$

5. Measurement

5.1 Khon Kaen University Depression Inventory (KKU-DI) : a self-rating questionnaire was designed to measure adolescent and adult depressive disorders with episode lasting at least two weeks. Subjects wrote down the answers after they read or listen the questions. The scaling responses were used on a rating 4- point scale by a mark in a box, ranging from a score of 0 indicated 'almost never occurred this symptom during two weeks including today, 1 if the subject has sometimes (1-3 days) occurred this symptom, 2 if the subject has more usually (4-7 days) occurred this symptom, and 3 if the subject has mostly (>7 days) occurred this symptom.

5.2 Demographic questionnaire and screening schedule for assessment of psychiatric history and mental status. We used a structured interview questionnaire. The interviews were taken at field by anyone of 1 psychologist, 3 psychiatric nurses and 3 research assistants. They were well trained to use the questionnaire. Demographic variables included gender, age, socioeconomic status, occupation, education, marital status, family size, religious practice and previous occurrence of serious stress during the past six months.

5.3 Composite International Diagnostic Interview (CIDI) schedule: a clinical structured interview using diagnostic criteria for research of The ICD-10 was applied by well trained 3 psychiatrists to give diagnosis.

6. Data analysis

6.1 Descriptive statistics for demographic variables and KKU-DI scores were computed by frequency distribution, percent, mean, median and standard deviation.

6.2 Analytic statistics for reliability analysis, factor analysis and diagnostic performance of the KKU-DI were computed by Cronbach's alpha coefficient for internal consistency, Pearson correlation coefficient for test-retest reliability, Generalize Fleiss Kappa statistics for inter-rater reliability, sensitivity, specificity and predictive value for diagnostic performance, multivariate analysis for other factors correlation with the KKU-DI scores.

Depressive disorder

		Present	Absent
KKU-DI	High	a	b
Scores	Low	c	d

Sensitivity = a/(a+c) (95%CI),

Positive Predictive Value = a/(a+b) (95%CI)

Base rate = (a+c)/(a+b+c+d)

Specificity = d/(b+d) (95%CI)

Negative Predictive Value = d/(c+d) (95%CI)

Misclassification rate = (b+c)/(a+b+c+d)

7. Ethical aspect The Research Ethic Committee of Khon Kaen University had reviewed and approved the study protocol. Many questions had the potential to invade subjects' privacy, and the results had to be handled with strict confidentiality. All subjects had been informed about the study procedure and had to agree to participate. Subjects who need psychiatric care, they were informed or refer to proper treatment.

Results

Phase I: Based on multi-stage to develop the KKU-DI as mentioned earlier. There were 80 items pool as the first draft. Then items had been reduced to 35 items as the second draft by experts consensus and checking content validity. Reliability testing had been conducted in 270 participants (135 psychiatric out-patient cases and 135 normal volunteers). Female predominated (64.8%) with mean age of 37.9 (SD=16.9). Most of them were married (85.1%). Patients had lower educational attainment, and had more agricultural work than normal volunteers (Table-2). The item mean and scale mean of KKU-DI-35 from cases was higher score than normal (2.4 vs 1.7, 80.3 (SD 23.4) vs 60.6(12.7)) (Table-3). Standardized item Cronbach's alpha coefficient of KKU-DI-35 was 0.95. The 5 items were excluded due to alpha coefficient slightly increases when these items had been left out, so that its exclusion would increase the homogeneity of the scale. Final KKU-DI contained only 30 items.

Table-2 Sample characteristics in reliability testing.

Variable	Cases(%)	Normals(%)	Total(%)
Sex Male	50(37.0)	85(36.0)	45(33.3)
Female	90(66.7)	95(35.2)	175(64.8)
Age(years) 17-25	13(9.6)	43(31.9)	56(20.7)
26-35	30(22.2)	56(41.5)	86(31.9)
36-45	54(40.0)	22(16.3)	76(28.1)
46-55	22(16.3)	3(2.2)	25(9.3)
56-65	13(9.6)	2(1.5)	15(5.6)
Missing 13(9.6)	3(2.2)	9(6.7)	12(4.4)
Mean age (years,sd)	39.8,10.8	30.1,8.4	37.9,16.9
Median age (years)	37	28	35
Marital Single	10(7.4)	17(12.6)	27(10.0)
Married	117(86.7)	113(83.7)	230(85.1)
Divorced	3(2.2)	2(1.5)	5(1.9)
Widowed	3(2.2)	2(1.5)	5(1.9)
Separated	2(1.5)	1(0.7)	3(1.1)
Education Illiterate	2(1.5)	0	2(0.7)
Primary school	76(56.3)	8(5.9)	84(31.1)
Secondary school	22(16.3)	23(17.0)	45(16.7)
Vocational school	10(7.4)	31(23.0)	41(15.2)
Graduate	22(16.3)	68(50.4)	90(33.3)
Postgraduate	0	4(3.0)	4(1.5)
Missing	3(2.2)	1(0.7)	4(1.5)
Occupation Agriculture	70(51.9)	35(25.9)	105(38.9)
Labour	5(3.7)	5(3.7)	10(3.7)
Faculty worker	7(5.2)	3(2.2)	10(3.7)
Government officer	30(22.2)	60(44.4)	90(33.3)
Commercial	3(2.2)	2(1.5)	5(1.8)
Student	0	15(11.1)	15(5.6)
Housemaid	11(8.1)	14(10.4)	25(9.3)
Unemployee	9(6.7)	1(0.7)	10(3.7)

Table-3 Descriptive statistics and reliability estimates for the KKU-DI 35 items

Samples	Scale mean	S.D.	Item mean (min/max)	Inter-item correlation mean (min/max)	Cronbach's alpha internal consistency reliability coefficient (standardized item alpha)
Case	83.2	23.4	2.4 (1.5/2.8)	0.30 (-.21/.84)	0.9353(0.9388)
Normal	60.6	12.7	1.7(1.1/2.9)	0.20(-.26/.64)	0.8810(0.8997)
Total	71.9	21.9	2.1(1.3/2.7)	0.33(-.22/.78)	0.9423(0.9459)

Phase II: A total of 677 community subjects were recruited for the study (Table-4). There were 292(43.1%) men and 385 (51.9%) women, with a ratio of 1:1.3. The mean age was 40.2 (SD=12.5), median age of 39, with a range of 17-65 years. Psychiatric cases were older with a mean age of 47.5. Most of them were married (85.1%), having a few children with nuclear family. Almost all subjects were Buddhist and had regular practice. Most of respondents had lower educational attainment, low socioeconomic and engaged in agricultural work. Psychiatric interviewed group was the suspected depressive cases had more stressful events and enduring stress than community sample. The score of KKU-DI-30 ranged between 0-90 and highly skewed to the left. Depressive cases rated KKU-DI higher score than normal subjects (Table-5, Figure-2). The average scores for KKU-DI-30 was 41.25 (SD=12.47). The correlation between items range from 0.16 to .82. The average correlation was 0.37 (σ^2= 0.01). This indicated that all thirty items on the KKU-DI were positively correlated with each other (Table-6). Cronbach's alpha reliability coefficient of the KKU-DI was 0.9447 (standardized item alpha of 0.9464). Eliminating each item from the KKU-DI scale changed alpha very little (Table-7). The paired samples of 17 depressive cases had been analyzed test-retest reliability with Pearson correlation coefficient that was 0.679 (p = .003) which indicated that KKU-DI had fair test-retest reliability. Factor analysis yielded 4 factors with eigenvalue greater than 1 (cover 55.1% of total variance) (Table-8). The factor structures after varimax rotation appears in Table-9. The first factors was "depressive mood" , the second was "psychomotor retardation" the third factor was "somatic symptoms" and the fourth factor was "poor appetite".

Table-4 Sample characteristics of community study (n=677) compare with suspected psychiatric cases (n=68).

Variable	Total (n=677) (%)	Psychiatric interview (n=68)(%)
Sex		
Male	292(43.1)	20(29.4)
Female	385(56.9)	48(70.6)
Age groups (years)	40.2(12.5), 39,29	47.5(11.0), 48, 46
Mean(SD), Median, Mode		
17-25	99(14.6)	1(1.5)
26-35	166(24.5)	11(16.2)
36-45	167(24.7)	17(25.0)
46-55	151(22.3)	20(29.4)
56-65	94(13.9)	19(27.9)
Missing	0	0

Table-4 Sample characteristics of community study (n=677) compare with suspected psychiatric cases (n=68).

Variable	Total (n=677) (%)	Psychiatric interview (n=68)(%)
Marital status		
Single	87(12.9)	5(7.3)
Married	560(82.7)	61(89.7)
Divorced	5(0.7)	1(1.5)
Widowed	23(3.4)	1(1.5)
Separated	2(0.2)	0
Educational level		
Illiterate	4(0.6)	0
Primary school	438(64.7)	62(91.2)
Secondary school	111(16.4)	3(4.4)
Vocational school	81(11.9)	1(1.5)
Graduate	37(5.5)	2(2.9)
Postgraduate	4(0.6)	0
Missing	2(0.3)	0
Occupation		
Agriculture	178(26.3)	52(76.5)
Labor	51(7.5)	3(4.4)
Faculty worker	50(7.4)	0
Government officer	115(17.0)	0
Commercial	74(10.9)	0
Student	19(2.8)	0
Housemaid	122(18.0)	10(14.7)
Unemployed	68(10.1)	3(4.4)
Religion		
Buddhism	676(99.9)	68(100)
Christian	1(0.1)	0
Stress		
Present	428(63.2)	40(59)
Absent	249(36.8)	28(41)
Grief		
Yes	101(14.9)	25(37)
No	576(85.1)	43(63)
Previous depression		
Yes	168(24.8)	45(66)
No	509(75.2)	23(34)
Chronic illness		
Present	234(34.6)	35(51)
Absent	443(65.4)	33(49)

Table-5 KKU-DI(30 Items) Scores comparison between 26 cases and 651 normal subjects

KKU-DI Score	Cases (n=26)	Normal (n=651)
0	0	83
1-10	1	349
11-20	2	143
21-30	4	42
31-40	11	22
41-50	5	6
51-60	2	3
61-70	1	2
71-80	0	0
81-90	0	1
91-100	0	0
Min-max score	3-66	0-83
Mode, Median	32,33	0,7
Mean, S.D.	35.8,13.2	9.6,10.7

Table-6 Descriptive statistics and reliability estimates for the KKU-DI 30 items (n=677)

Samples	Scale mean	S.D.	Item mean (min/max)	Inter-item correlation mean (min/max)	Cronbach's alpha internal consistency reliability coefficient (standardized item alpha)
677	41.25	12.47	1.36(1.10/1.75)	0.37(0.16/0.82)	0.9447(0.9464)

Table-7 Item-Total correlation statistics estimates for the KKU-DI 30 items (n=677)

Item no.	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Alpha if item deleted
1	39.1034	126.8502	.5369	.3389	.9441
2	39.2585	131.8961	.3617	.2384	.9454
3	39.0458	129.4077	.4842	.3820	.9442
4	39.2541	128.4649	.6204	.4925	.9426
5	39.2575	131.5052	.4898	.3562	.9438
6	39.2408	129.3132	.5758	.4797	.9430
7	39.4712	132.3738	.4333	.3585	.9443
8	39.1625	126.8404	.6635	.5787	.9421
9	39.4343	130.0478	.6493	.4899	.9425
10	38.9498	126.5981	.6077	.4615	.9429
11	39.4077	130.3217	.5862	.4455	.9429
12	39.3855	130.4414	.5817	.4287	.9430
13	39.2157	126.8735	.6664	.5396	.9421
14	39.4934	130.8332	.5876	.4459	.9430
15	39.3501	128.1716	.6339	.4460	.9424
16	39.4092	129.2954	.6594	.5360	.9423
17	39.0620	125.9044	.6872	.5623	.9418
18	39.2245	126.7838	.6993	.5836	.9417
19	39.3619	130.4295	.5519	.3968	.9432
20	39.4018	128.7821	.6834	.6117	.9420
21	39.3412	129.4411	.6098	.4866	.9427
22	39.3663	127.7384	.7289	.6171	.9415
23	39.4165	131.2345	.5522	.3814	.9433
24	39.4609	130.3228	.6053	.4608	.9428

Table-7 Item-Total correlation statistics estimates for the KKU-DI 30 items (n=677)

Item no.	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Alpha if item deleted
25	39.2467	127.2689	.6735	.5450	.9420
26	39.3205	127.7240	.6869	.5594	.9419
27	39.5953	133.4720	.5114	.3553	.9438
28	39.3767	130.7322	.5052	.7069	.9437
29	39.4269	130.3634	.5636	.7394	.9431
30	39.5214	132.1020	.5476	.4276	.9434

Table-8 Factor analysis of the KKU-DI(30) with total variance explained

Component	Initial Eigenvalue			Final Eigenvalue		
	Total	% of var.	Cum %	Total	% of var.	Cum %
1	12.45	41.5	41.5	11.25	37.5	37.5
2	1.67	5.6	47.1	1.90	6.3	43.8
3	1.39	4.6	51.7	0.73	2.4	46.3
4	1.02	3.4	55.1	0.83	2.8	49.0

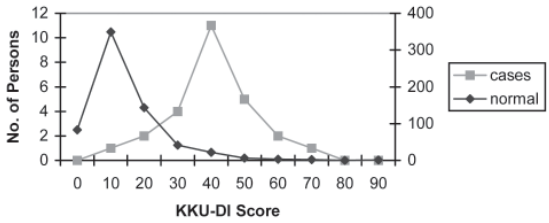
Table-9 Factors and factor loading of KKU-DI 30 items among 677 respondents

FACTOR NO.	SYMPTOMS	FACTOR LOADING
1	I16 I feel nervous and unable to get some rest.	.714
Depressive	I18 Everything in life is boring.	.699
symptoms	I25 I worry with everything.	.684
	I17 I get angry easily.	.680
	I21 People aren't sympathetic understanding to me	.680
	I26 I thought obsessively about my unpleasant past experiences.	.647
	I22 There is no joy or pleasure.	.645
	I24 I do not have any hope for the future.	.611
	I23 I feel guilty and always blame myself.	.591
	I20 I do not want to talk with anyone.	.578
	I15 I feel sad and cry easily.	.572
	I14 I feel lonely and empty.	.559
	I19 I do not want to do anything.	.504
	I9 I can't concentrate on work or study.	.479
	I27 I wish I were dead.	.471
	I13 I want to be alone in a quiet place.	.460

Table-9 Factors and factor loading of KKU-DI 30 items among 677 respondents

FACTOR NO.	SYMPTOMS	FACTOR LOADING
2	I5 I talk and move sluggishly.	.598
Retardation	I11 I can't make any decisions including ordinary things.	.565
	I12 I try very hard to fulfil my daily activities	.473
3	I3 I feel ache on my whole body.	.688
Somatic symptoms	I6 I am fatigue and exhausted.	.597
	I4 My thoughts come slowly.	.567
	I2 I feel that my stomach is full of gas.	.561
	I8 I am tired easily.	.532
	I10 I am forgetful	.488
	I1 I have difficulty in falling or staying asleep at night.	.392
4	I29 I do not enjoy my meal.	.840
Appetite	I28 I have to force myself to take food.	.832
	I30 Someone told me that I looked unhappy.	.583
	I7 I lost my weight.	.495

Figure-2 Linear graph of scores comparison between 26 cases and 651 normal subjects



To compare the KKU-DI score with the "Gold Standard" to diagnose Depressive Disorders in community samples, the performance of the KKU-DI screening diagnostic test had shown in Table-10,11 and Receiver Operating Characteristic Curve analysis (ROC curve) was shown in Figure-3. The optimum cut-off point score of 20 was suitable for screening depressive cases in the community setting because of the optimum sensitivity of 88% and specificity of 88%. However, the positive predictive value of this point was small (only 23%) but highly negative predictive value (99.5%). Therefore, the KKU-DI may be used for rule out the depressive disorders.

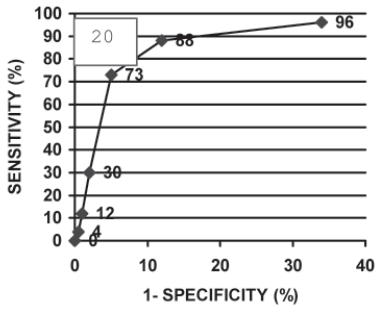
Table-10 Show Sensitivity and specificity of KKU-DI 30

KKU-DI Score cut-off point	Cases n = 26		Normal n=651		Sen. (%)	Spec (%)	PPV (%)	NPV (%)
	True Pos.	False Pos.	False Neg.	True Neg.				
10	25	1	219	432	96	66	10	99.8
20	23	3	76	575	88	88	23	99.5
30	19	7	34	617	73	95	36	98.9
40	8	18	12	639	30	98	40	97.3
50	3	23	6	645	12	99	33	96.6
60	1	25	3	648	4	99.5	25	96.3
70	0	26	1	650	0	99.8	0	96.2

Table-11 show 95% CI of Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value

Cut-off point of 20	Sensitivity (%)	Specificity (%)	Positive predictive value(%)	Negative predictive value(%)
One-point	88	88	23	99.5
SE	0.0125	0.0125	0.0197	0.0027
95% CI	86-90	86-90	19-27	99-100

Figure-3 ROC curve of the KKU-DI 30 items



The estimated prevalence of depressive disorders in community sample was 3.9%, which was lower than expectation. Subtypes of depressive disorders were presented with Table-12. Scores could not differentiate type of depressive disorders. The most common subtype of depressive disorders from this study was dysthymia (38.5% of total depressive disorders cases). Factors correlated with KKU-DI scores included sex (SEX), marital status(MAR), genetic predisposing (RTI),mood disorders in relatives (RTD), chronic illness (ILL), previous psychiatric ill (PSY), frequent alcohol use (ALC), previous depression (PSD), early childhood separated from parent (SEP), traumatic experience (TRU), enduring stress (STS), grief reaction (GRF), conflicts with relatives (QUR), marital conflict (MAC), work stress (WKS), financial problem (MON), financial loss (FNL), child delivery (BIR), income (INC) and educational level (EDU). All factors were analyzed by stepwise logistic regression model. Factors correlated with KKU-DI scores in statistically significance ($p<0.0001$) were chronic illness, previous depressive illness, enduring stress condition especially during working, and having marital conflict. However, educational

level, female sex, alcohol user, and child delivery were also correlated with the scores but no statistically significance (Table-13).

Table-12 Subtypes of Depressive Disorders in Community Sample.

Type	Cases (%) (n=26)	Mean score KKU-DI	Std	Min/Max
Dysthymia	10(38.5)	37.2	12.7	15/55
Severe depressive episode	7(26.9)	36.4	11.4	15/47
Moderate depressive episode	3(11.5)	41.6	21.2	27/66
Mild Depressive episode	2(7.7)	32.5	0.7	32/33
Brief recurrent depressive	4(15.4)	28.5	17.1	3/38

Table-13 Factors correlated with KKU-DI scores in the last Equation of logistic regression model.

Variable	B	SE	Wald	df	Sig.	R	Exp.(B)
Having chronic illness	-2.20	0.38	34.33	1	0.00	-0.31	0.11
Previous depressive illness	-1.20	0.37	10.70	1	0.00	-0.56	0.30
Enduring stress condition	-1.02	0.36	7.77	1	0.01	-1.29	0.36
Having marital conflict	-2.17	0.61	12.59	1	0.00	-0.18	0.11
Job stress	-1.13	0.36	10.13	1	0.00	-0.15	0.32
Constant	3.17	0.69	20.92	1	0.00		

Discussion

The KKU-DI has been developed for Thai people especially in Northeastern region. Items were generated from statements about depressive symptoms by local people (psychiatric patients, normal volunteers and psychiatrist's panel discussion). All dimensions of depressive symptoms had been explored in both provider and client view. However, to cover concept of depression, a review of the previous studies of depression scale development had been done. This process, could ensure that total selected items were relevant to depressive symptoms. The first draft of the KKU-DI had total 80 items, but it had been reduced to 35 items according to other 13 experts' opinions. The advantage of this approach was confirmed the 35 items of KKU-DI were representative of the most recent experts' thinking about depressive symptoms, but the disadvantage might arise if the experts opinion had been skewed in some way, and did not reflect the full range of depressive symptoms. Ignoring the full range of depressive symptoms and their related to the patients' own beliefs and expectation of the illness seem inappropriate. Thereby, the final selection of items might represent one particular viewpoint, and there might be

glaring gaps in the final product. Further study of 80 items of the first KKU-DI should bring to re-examine with factor analysis and reliability testing to reduce items. Comparison each selected item from both techniques should be done.

Content in the KKU-DI had been validated by experts' judgment (each with many years of clinical practice and with international psychiatric knowledge). During the past twenty years, there have been a number of refinements in the definition of depression, especially with the advent of the American Psychiatric Associations Diagnostic and Statistical Manual on Mental Disorders, 3rd edition Revised (1980), Diagnostic Criteria International Classification of Mental and Behavioral Disorders, 10th edition (1997). Contents of the KKU-DI were compared against ICD-10 Depressive disorders criteria. KKU-DI reflected only 8 of 11 criteria of ICD-10. Symptoms of increasing appetite, hypersomnia and loss of libido were absent in this KKU-DI-30. Because symptom of increased appetite usually occurred in normal subjects, and symptom of hypersomnia had low correlation with other items. If we recruited both symptoms, the result finding of the KKU-DI would have been erroneous. Item of 'loss of libido' had also low correlation with total items and reluctant to response because there is negative attitude and prohibited about sex in Thai culture. Almost all subjects answered in good manner of sexual activity. Thereby, including of sexual problem in the KKU-DI would produce a high false negative rate. Moreover, negative response items cannot be used in this community subject because they produced low reliability and high respondent's confusion.

The internal consistency of the KKU - DI both 35 and 30 items appears to be very good with Cronbach's alpha coefficient above 0.9. High internal consistency of the scale means that all of the items were correlation in positive way and tapping almost different aspects of the depressive symptoms. Some biases in the reliability design might affect the results optimistically. These called response biases that inflate internal consistency reliability estimates. For example, some respondents may perceive that acknowledging suicidal symptom is socially undesirable and may systematically underreport. Especially the more bizarre problems may fall into a pattern of denying everything. Other bias might occur from the halo effect. It was possible for respondents to rapidly rate on the basis of a global impression, paying little attention to the individual categories. People also rarely commit themselves to be at the extreme categories on the scale, effectively reducing the precision of measurement. However, serious biases had not been found, so internal consistency testing of the KKU-DI could be accepted and need further research to reduce some items which are unnecessary and redundancy. Cronbach's alpha coefficient of both KKU-DI-35 and KKU-DI-30 items was above accepted levels. When the KKU-DI had been given directly to the depressive patients and non-psychiatric subjects, the most patients (95%) were willing to participate and most respondents (90%) complete the questionnaire. It was appropriate for depressive patients because of score difference between cases and non-cases, therefore it could discriminate between normal subjects and those with depressive cases. However, this was not our intention to quantified discriminate validity of the KKU-DI because we have not enough power to do this.

On the basis of factor analysis, Items of the Khon Kaen University Depression Inventory (KKU-DI) 30

items have been placed in four factors which are depressive symptoms, retardation, somatic symptoms, and poor appetite. Some items (1,8,10,and 13) had nearly equal factor loadings on two or more factors (factor 1, 2 and 3). Therefore the two factors (affective-cognitive depressive symptoms and somatic symptoms) were the main component of the KKU-DI. This finding was similar with Beck Depression Inventory and consistent with the theoretical model. All reported items had factor loading above the cutoff of 0.4 and this was consistent with Streiner's ideal (1993)8 of only one check mark per item in the content validity matrix.

As the result finding of concurrent validity testing, the sensitivity of KKU-DI was 88% and specificity 88%. Comparing with previous standard depressive inventories from Western society, the KKU-DI had higher sensitivity and specificity than CES-D cut-off of 16. Limitation of this KKU-DI screening test was low positive predictive value (only 23%). It means that only one of every four persons who had KKU-DI scores above 20 would be expected actually to have depressive disorder. Even increasing the KKU-DI cut-off to improve specificity would not dramatically change this result. Again, this was due to the constraint imposed by the low estimated prevalence of depressive disorder in the study population. In conclusion that the KKU-DI has excellent criterion validity as assessed using standard indices (namely, sensitivity and specificity) but the actual predictive value of the instrument could be much more limited depending on the prevalence of the depressive disorders in the community population.

The estimated lifetime prevalence of the depressive disorder was 3.9% which was lower than the previous studies from U.S. ECA (4.4%) Canada (8.6%) Finland (4% for men and 7.9% for women but higher rate than in Taiwan (1.7%) and Korea (3.4%). This suggests that there is a culturally mediated tendency to experience or report depression differently in the East than in the West . Many studies reported different rate of depressive disorder by sex in all ICD9 surveys which the ratio of rates in women to men were about 2:1 with range from 1.4:1 in urban Taiwan to 2.7:1 in the ECA and proposed explanations for this difference have been reviewed by Weissman and Klerman (1977)[9], who concluded that the difference is not simply due to a tendency for woman to report distress or to recall better or to seek help more readily than men. This study is also supported that evidence but different ratio. The ratio of rates in women to men were about 8.4:1 and proposed explanations for this difference is due to severe stress from socioeconomic strain, living alone or taking care of small nephews /neats due to her spouse or sons/daughters migrating to work in other regions for a long time. Moreover, our observed samples are missing the young adult men group due to migration. A further research on the THAI-ECA prevalence study should be done in the future.

Limitation of this study was limited data from male participants because of migration and negative attitude toward psychiatric stigma. Moreover, time and budget to conduct multistage study with large sample size in community survey also limited.

Conclusion

The 30 item- Khon Kaen University Depression Inventory had high internal consistency reliability and fair test-retest reliability. Criterion concurrent validity of the KKU-DI was good, optimum cut-off point $\geq$ 20,

sensitivity = 88% (95%CI =86-90%) and specificity = 88% (95%CI =86-90%). The estimated prevalence of depressive disorders in this study was 3.9%, female: male = 8.4:1. The KKU-DI rating scale for depressive disorders still need further investigation to validate the psychometric properties. Moreover, distribution of the KKU-DI to primary health cares and clinics would be helpful to look at applicability. And also, the items should be revised if it had redundancy.

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