The Comparison of Montgomery and Asberg Depression Rating Scale (MADRS Thai) to Diagnostic and Statistical Manual of Mental Disorders (DSM) and to Hamilton Rating Scale for Depression (HRSD): Validity and Reliability

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Objective: *To assess the validity and reliability of the Montgomery and Asberg Depression Rating Scale (MADRS Thai) by comparing DSM-IV TR criteria and Hamilton Rating Scale for Depression (HRSD).*
Material and Method: *Descriptive study. Subjects were recruited from the psychiatric out-patient clinic Siriraj Hospital. Subjects were assessed by MADRS Thai version and clinical interview.*
Validity: *Opinion from psychiatric and social science experts, evaluating 13 study cases and 27 control cases, compared to the Global Assessment Scale (GAS) and to the changed scale of HRSD.*
Reliability: *Inter-rater and Intra-rater reliability and Internal consistency.*
Results: *Content validity is above 0.5 except the item of Inner tension, Lassitude and Inablilty to feel. Criterion validity when compared to DSM-IV TR or HRSD, the sensitivity, specificity, PPV and NPV were all 100%. Pearson correlation coefficients sensitive to change were -0.49 (p -value = 0.11) and 0.679 (p-value = 0.025) when compared to 1) DSM-IV TR and 2) HRSD, respectively. ICC of Inter-rater and Intra-rater reliability were both 0.99 when compared to either 1) DSM-IV TR or 2) HRSD. Cronbach's alpha of Internal consistency was 0.96 and 0.92 when compared to 1) DSM-IV TR and 2) HRSD, respectively.*
Conclusion: *The result suggested that the Thai version of the Montgomery and Asberg Depression Rating Scale had a very good validity and reliability. Therefore, it can be used as a diagnostic test in Thai depressed patients.*

Keywords: *Montgomery and Asberg Depression Rating Scale -Thai, DSM-IV TR, Social function*

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Depressive disorder is one of the most common illnesses with a huge negative impact on patients and caregivers since it is a chronic disorder with a high frequency of relapses that result in impairment of the patient's body and social functions (Hirchfeld et al)[1-11]. According to a study by Kapland & Sadock[12], prevalence of depressive disorder of males is 15% and females is 25%. In Thailand, as per a report by Tawichachart in 1990[13], the prevalence of depressive disorder in the Bangkok Metropolitan area was 82%. Depression Rating Scale is one of the important tools to develop knowledge on depressive disorder. Most Depressive Rating Scales are for diagnostic and severity assessment of illness, not for illness follow-up study[3]. In 1979, Marie Asberg and

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Stuart A. Montgomery[14] developed the Montgomery and Asberg (MADRS) Depression Rating Scale for illness follow-up study[14,15]. MADRS has universal standard and has been translated into at least 24 languages worldwide[16].

In Thailand, there are many Depression Rating Scales development[17], such as Tongtang O et al[18] who developed Self-Assessment in the Thai elderly. There is also Lortakul M, Sukanich P[19,20] who developed the Thai Hamilton Rating Scale for Depression in comparison with Global Assessment Scale (a rating scale for evaluating the overall functioning of a subject during a specified time period on a continuum from psychological of psychiatric sickness to health)[21].

The authors realize that MADRS, with respect to its importance, should be developed for use in Thailand since it is a Rating Scale for diagnostic and follow-up of treatment response with adequate validity and reliability, using fewer items (10 items), thus a method that is simple, convenient, and time saving[15]. However, MADRS has not been properly translated into Thai[17], the authors translated it into Thai and evaluated its validity and reliability to use as a standard depression rating scale for diagnostic and follow-up on treatment response in Thailand.

Material and Method

The present descriptive study was to assess the validity of content, criteria and sensitivity to change, and reliability of inter-rater & intra rater and internal consistency of the Montgomery and Asberg Depression Rating Scale (MADRS Thai version) by comparing it to DSM-IV TR criteria and Hamilton Rating Scale for Depression (HRSD).

The target population: was 20-70 year old patients who could understand Thai well and had major depressive disorders diagnosed by DSM-IV TR criteria with HRSD scale of at least 23.50 but less than 28.00.

***Sample*:** Subjects were recruited from the psychiatric out-patient clinic Siriraj Hospital, had cooperated to participate in the research after they were informed about the research method, and signed consent forms.

Allocation of study sample

The subjects were divided into two diagnostic groups by DSM-IV TR criteria and Hamilton Rating Scale for Depression (HRSD) scores

A. Study subjects: 1.) Subjects with Major Depressive Disorder diagnosed by DSM-IV TR criteria and Hamilton Rating Scale for Depression (HRSD) scale of not less than 23.50 but less than 28.00 ($23.50 \leq HRSD < 28.00$) 2.) are new cases or first diagnosis or new episode cases that had an antidepressant free interval of at least 1 month.

B. Controlled subjects: normal subjects who had no Axis I diagnosis in DSM-IV TR criteria and Hamilton Rating Scale for Depression (HRSD) < 23.50.

Subjects in both groups had no 1) other Axis I diagnosis in DSM-IV TR criteria such as schizophrenia, anxiety disorder, except major depressive disorder 2) mental retardation 3) psychotic features 4) poor communication due to hearing impairment 5) difficult assessment interview due to physical illness and 6) could not be followed up.

Study processes

1. Translate the original English version (English Version 1) into a Thai version.

2. Translate the Thai version of MADRS into an English version (English Version 2).

3. Compared with the English Version 1 with the English Version 2 to find out incompatible parts. If any were found, the translation process would be repeated.

4. Four psychiatric experts and a social expert assessed the proposed MADRS Thai Version contents with the original English version (English Version 1) and the index of content validity (IC) to evaluate if each item's meaning was similar to the standard diagnosis, effective communication, and suitable for Thai culture.

5. Wording was suitably adjusted for interviews with keywords, which completely remained the same.

6. Interviewers practiced having the same understanding on how to use the Rating Scale, interview subjects and solve problems.

7. Subjects were randomly tried out whether the Rating Scale was communicated effectively. If not, those ineffective parts would be corrected.

8. Announcement to request an on-duty psychiatrist and subjects for cooperation in this research.

9. 'Diagnostic assessment psychiatrist' interviewed the subjects by using DSM-IV TR criteria and divided them into two groups (study subjects and control subjects).

10. After the study and control subjects were grouped,'Rater 1' interviewed subjects without knowing which group the subjects were in, and the interviews were recorded by VDO.

11. 'Rater 2' assessed the subjects using the MADRS Thai from the VDO record, without knowing which group the subjects were in.

12. 'Rater 1're-assessed Subjects using MADRS Thai Version from the VDO record 2 weeks after the first interview

13. Four weeks after the first interview, a 'diagnostic assessment psychiatrist' interviewed the subjects again to follow up the treatment since the appropriate duration to adjust individual doses and know treatment results in 2-4 weeks.

14. 'Rater 1' interviewed subjects by using MADRS Thai Version to follow up treatment response at four weeks after the first interview.

15. All data from the interviews were analyzed by frequency and percentage distribution, diagnostic test (sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) and correlation coefficient. Cronbach's alpha coefficient was used for internal consistency.

Table 1. Demographic data

Demographic data	MDD (n, %) n = 13	normal (n,%) n = 27	total (n, %) n = 40
1. Sex			
Male	6 (46.2)	11 (40.7)	17 (42.5)
Female	7 (53.8)	16 (59.3)	23 (57.5)
2. Age, year (mean ± SD)	47.23 ± 13.47	36.74 ± 10.05	40.15 ± 12.17
3. Status			
Married	8 (61.5)	18 (66.7)	26 (65.0)
Single	3 (23.1)	6 (22.2)	9 (22.5)
Widowed	0 (0)	2 (7.4)	2(5.0)
Divorced	1 (7.7)	1 (3.7)	2 (5.0)
Seperated	1 (7.7)	0 (0)	1 (2.5)
4. Nationalities			
Thai	13 (100)	27 (100)	40 (100)
5. Religous			
Buddhist	13 (100)	26 (96.3)	39 (97.5)
Muslim	0 (0)	1 (3.7)	1 (2.5)
6. Education			
Uneducated	1 (7.7)	0 (0)	1 (2.5)
Primary School	5 (38.5)	9 (33.3)	14 (35.0)
High School	4 (30.8)	6 (22.2)	10 (25.0)
Vocational School	1 (7.7)	8 (29.6)	9 (22.5)
Undergraduate	2 (15.4)	3 (11.1)	5 (12.5)
Others	0 (0)	1 (3.7)	1 (2.5)
7. Occupation			
Government Employees	1 (7.7)	5 (18.5)	6 (15.0)
State Enterprise Employees	1 (7.7)	0 (0)	1 (2.5)
Entrepreneur	4 (30.8)	4 (14.8)	8 (20.0)
Employees	3 (23.1)	5 (18.5)	8 (20.0)
Farmers	1 (7.7)	5 (18.5)	6 (15.0)
Students	1 (7.7)	0 (0)	1 (2.5)
Unemployed	1 (7.7)	1 (3.7)	2 (5.0)
Others	1 (7.7)	7 (25.9)	8 (20.0)
8. Income (baths/month)			
< 1,000	1 (7.7)	3 (11.1)	4 (10.0)
1,000-5,000	1 (7.7)	8 (29.6)	9 (22.5)
5,001-10,000	6 (46.2)	9 (33.3)	15 (37.5)
10,000-30,000	4 (30.8)	7 (25.9)	11 (27.5)
30,001-50,000	0 (0)	0 (0)	0 (0)
> 50,000	1 (7.7)	0 (0)	1 (2.5)

Table 2. Content validity

Item	Psychiatrist$_1$	Psychiatrist$_2$	Psychiatrist$_3$	Psychiatrist$_4$	Total - Psychiatrists	Total - Psychiatrists-IC	Social sciences experts	Total	Total-IC
1	1	1	1	1	4	1	1	5	1
2	1	1	1	1	4	1	-1	3	0.6
3	1	0	1	0	2	0.5	-1	1	0.2
4	1	1	1	1	4	1	1	5	1
5	1	1	1	1	4	1	1	5	1
6	1	1	1	1	4	1	1	5	1
7	1	1	0	1	3	0.75	-1	2	0.4
8	1	1	0	1	3	0.75	-1	2	0.4
9	1	1	1	1	4	1	-1	3	0.6
10	1	1	1	1	4	1	1	5	1

Table 3. Sensitivity, specificity, PPV and NPV

		Diagnosis		total
		MDD	Normal	
Test	≥ 16	13	0	13
	< 16	0	27	27
	total	13	27	40

Sensitivity = 100% = 13/13
Specificity = 100% = 27/27
PPV and NPV = 100%

Results

Demographic data

The authors studied only 40 subjects comparing 27 control subjects (67.5%) and 13 major depressive subjects (32.5%). One control subject was lost to follow up. Six study subjects were (46.2%) male and seven were female (53.8%). Of those 40 subjects, the average age was 40.15 years (20 to 69), 26 were married (65.0%), all of them were Thai; 39 were Buddhists and one was a Muslim; and 14 were primary school educated. Occupations and income are shown in Table 1.

1. Validity

1) Content validity: Four psychiatric experts and one social science expert assessed MADRS Thai. The result showed that most of the Index of Content validity (IC) was more than 0.5,except item 3 (Inner tension), 7 (Lassitude), and 8 (Inability to feel). However, the four psychiatric experts average shows that only Index of content validity of item 3 (Inner tension) was less than 0.5 as shown in Table 2.

2) Criterion validity: Correlation between Montgomery and Asberg Depression Rating Scale, Revised Thai Version (MADRS Thai Version) and gold standard: DSM-IV TR criteria has Sensitivity, Specificity, PPV and NPV equivalent to 100. Moreover, after HDRS was used as gold standard, the results were the same as shown in Table 3.

3). Sensitive to change: Correlation of scores different pre-post treatment of MADRS and GAS, Pearson' s correlation coefficient were equivalent to -0.486 (p-value = 0.109), and Pearson's correlation coefficient was equivalent to 0.697 (p-value = 0.025), after HDRS was used as the gold standard.

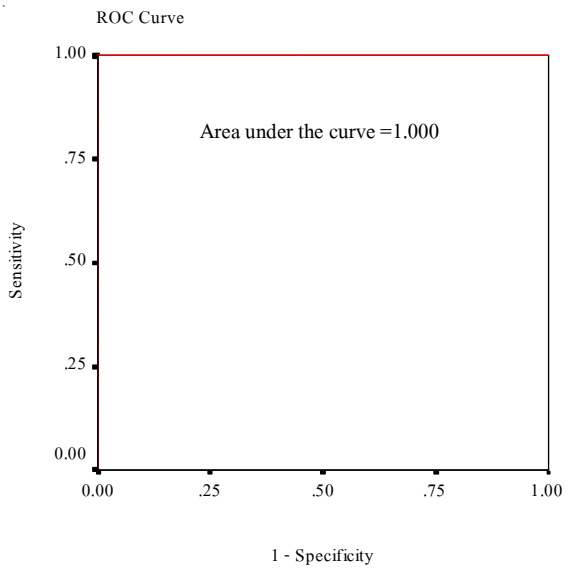

Fig. 1 ROC curve; between 8-24: Area under the curve = 1

Table 4. Sensitivity and specificity of each score

Positive if greater than or equal to (a)	Sensitivity	1-Specificity
-1.00	1.000	1.000
0.50	1.000	0.444
1.50	1.000	0.370
2.50	1.000	0.185
3.50	1.000	0.148
5.00	1.000	0.074
7.00	1.000	0.037
16.00	1.000	0.000
25.00	0.923	0.000
28.00	0.846	0.000
30.50	0.615	0.000
31.50	0.462	0.000
33.00	0.385	0.000
34.50	0.308	0.000
35.50	0.231	0.000
36.50	0.154	0.000
38.50	0.077	0.000
41.00	0.000	0.000

4) Cut off point of Montgomery and Asberg Depression Rating Scale, Revised Thai Version (MADRS Thai) was between 8-24 with an average of 16 shown in Fig. 1 and Table 4.

2. Reliability

1) Internal consistency: MADRS,Thai version has overall Cronbach's alpha internal consistency equivalent to 0.9637 and internal consistency in each item as shown in Table 5. Study populations had normal distribution where p-value MDD was equivalent to 0.441 and p-value (normal) was equivalent to 0.733.

Table 5. Internal consistency of each item

Item	Cronbach's alpha if item deleated
1. Apparent sadness	0.958
2. Reported sadness	0.9561
3. Inner tension	0.9596
4. Reduced sleep	0.959
5. Reduced appetite	0.9598
6. Concentration difficulties	0.962
7. Lassitude	0.9565
8. Inability to feel	0.9579
9. Pessimistic thoughts	0.9645
10. Suicidal thoughts	0.9641

2) Inter-rater reliability: MADRS Thai Version, has inter-rater reliability. When rater 1 was compared to rater 2: the ICC was equivalent to 0.9950 as shown in Fig. 2.

3) Intra-rater reliability: MADRS Thai Version has intra-rater reliability; rater 1, first time and second time (VDO), 2 weeks apart: ICC equivalent to 0.9952 as shown in Fig. 3.

Discussion

The researchers translated and developed Montgomery and Asberg Depression Rating Scale into Thai version and tested its qualification. The test results were as follows:

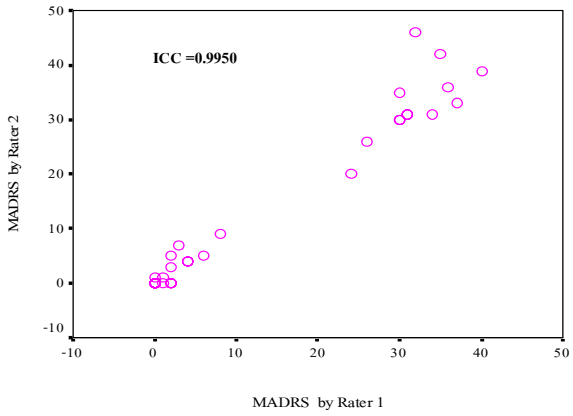

Fig. 2 Inter-rater reliability, MADRS; rater 1 compare with rater 2. ICC = 0.9950

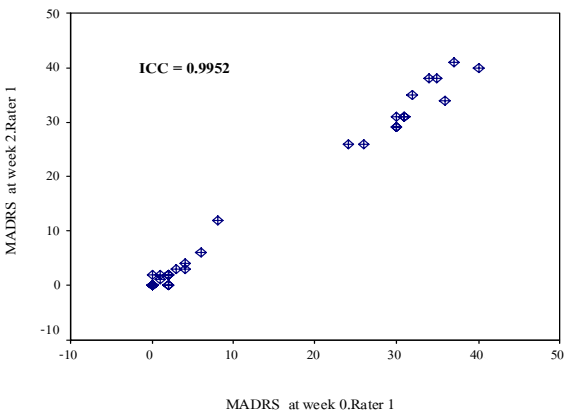

Fig. 3 Intra-rater reliability, MADRS in first and second interview: ICC = 0.9952

According to the evaluation of MADRS Thai version by Psychiatrist experts, only 1 item of questions has index of content validity of less than 0.5 (Inner tension), this result indicates that the content of that item is not representative of the measurement of depression. Consequently, it is possible that the inner tension is not specific for depression but could be found in other disorders. However, according to the joint evaluation by psychiatrist experts and social science experts, another two items with index of content validity of less than 0.5 were found. This could be because the result from the language of these three items was difficult to understand in Thai culture.

Criterion validity has Sensitivity, Specificity, Positive Predictive Value and Negative Predictive Value equivalent to 100, this result could be effectively used as an evaluation form to screen and diagnose Major Depressive Disorder. In addition, cut-off point of MADRS Thai version from the present study is in the range of 8-24 with average point of 16. The minimum score of 8 is approximate to the result of study from defining remission on the MADS[22].

Sensitive to change of MADRS Thai version from the present study compared with GAS, which changed after treatment, has Person's correlation coefficient equivalent to -0.486 at p-value equivalent to 0.109, representing the change after treatment evaluated by MADRS Thai version compared with Global Assessment Scale (GAS)[21]. These are not significantly correlated in terms of statistics possibly due to the following reasons: 1) Only 12 depressive samples (one sample of the 13 was lost to follow up) were not sufficient to indicate significant correlation. 2) GAS is a scale to display overall functions of the group's sample, including many related factors that are not specific for Major Depressive Disorder.

It is possible that the analytical GAS from the average range of score is not a good representation of GAS. For example, the score of 60 must be recorded at the interval scale of 5-60 with an average interval score of 55, this figure is different from the exact score of 60. As a result, a correlation from the present study was not found. From the present study, five Major Depressive Disorder patients from the 12 whose treatment results have been followed up had poor correlation between the changed score of MADRS and of GAS. While the score of MADRS varied significantly, the score of GAS did not. In the other eight Major Depressive Disorder patients, results are opposite. Consequently, the analytical correlation results are not in line with fact.

The MADRS Thai version is exceptionally reliable since it has a high score of inter-rater reliability with ICC equivalent to 0.9952, which is getting close to 1. In addition, it has a high score of intra-rater reliability with ICC equivalence to 0.9952. Furthermore, it has Cronbach's alpha equivalent of 0.9637 representing internal consistency. This is at a high level due to getting close to 1. In general, Cronbach's alpha of higher than 0.7 is considered as at high level[23].

Conclusion

Although the calculated sample size should have been 50 and the authors studied only 40 subjects, the result of the MADRS Thai-version had a high reliability, validity, and was statistically significant. The authors believe that MADRS Thai-version could be used as a standard depression rating scale for diagnostic and treatment response for follow up study in Thailand, similar to MADRS in other countries.

For further study, the authors should have more Major Depressive subjects to find sensitivity to change and compare with other scales that are specific to progression or response of Major Depressive Disorder. The present study compared between normal controlled subjects and Major Depressive subjects who are distinctly different. However, in practice, the Rating Scale for Depression could differentiate Major Depressive Disorder from other disorders that look like Major Depressive Disorder.Consequently, the authors should undertake a future study in other disorders that look like Major Depressive Disorders.

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การศึกษาความน่าเชื่อถือ และความแม่นตรงของเครื่องมือ แบบประเมิน Montgomery and Asberg Depression Rating Scale (MADRS) ฉบับภาษาไทย: แบบประเมินเพื่อวินิจฉัยและติดตามการเปลี่ยนแปลงโรคซึม เศร้าเปรียบเทียบกับ Diagnostic and Statistical Manual of Mental Disorders (DSM) และ Hamilton Rating Scale for Depression (HRSD)

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วัตถุประสงค์: เพื่อหาความแม่น และความน่าเชื่อถือ ของการใช้แบบประเมินที่เรียกว่า Montgomery and Asberg Depression Rating Scale (MADRS) ฉบับภาษาไทยโดย เปรียบเทียบกับแบบประเมินที่เรียกว่า DSM-IV TR criteria และ Hamilton Rating Scale for Depression (HRSD)

วัสดุและวิธีการ: เป็นการศึกษาเชิงพรรณนา โดยเก็บข้อมูลจากแผนกผู้ป่วยนอก ภาควิชาจิตเวชศาสตร์ โรงพยาบาลศิริราช โดยใช้แบบประเมิน MADRS ฉบับภาษาไทย เพื่อทดสอบหาความแม่น โดยผู้เชี่ยวชาญ ทางจิตเวชศาสตร์และทางสังคมศาสตร์ ทำการประเมินในกลุ่มตัวอย่างจำนวน 40 ราย แบ่งเป็นกลุ่มศึกษา 13 รายกับกลุ่มควบคุม 27 ราย และเปรียบเทียบกับ Global Assessment Scale (GAS) และค่าคะแนนของ HRSD ที่เปลี่ยนแปลงไปหลังการรักษา ส่วนการทดสอบหาความน่าเชื่อถือนั้นหาค่าInter-rater และ Intra-rater reliability และค่า Internal consistency

ผลการศึกษา: ความแม่นในปริมาณ มีค่า > 0.5 ยกเว้นเรื่องความตึงเครียดภายใน, ความอ่อนเพลีย, ความไม่สามารถที่จะรู้สึก ความแม่นในคำเฉพาะ มีค่า sensitivity, specificity, PPV & NPV = 100 ทั้งหมด และ เมื่อเปรียบเทียบกับ HRSD ก็ได้ผลเช่นเดียวกัน,ค่า sensitive to change พบว่ามีค่า Pearson correlation coefficient = -0.49 (p-value = 0.11) และ 0.679 (p-value = 0.025) เมื่อเปรียบเทียบกับ DSM-IV TR และ HRSD ตามลำดับ ค่า Inter-rater และ Intra-rater reliability ของแบบประเมินมีค่า ICC = 0.99 และ 0.99 ตามลำดับ เมื่อเปรียบเทียบกับทั้ง DSM-IV TR และ HRSD ค่า Internal consistency ของแบบประเมินมีค่า Cronbach's alpha = 0.96 และ 0.92 เมื่อเปรียบเทียบกับ DSM-IV TR และ HRSD ตามลำดับ

สรุป: พบว่าแบบประเมิน MADRS ฉบับภาษาไทยนี้ มีความแม่นและความน่าเชื่อถืออยู่ในเกณฑ์สูงมากและยืนยันว่าสามารถนำไปใช้วินิจฉัยโรคซึมเศร้าได้