Goran Mihajlović, Petar Vojvodić, Jovana Vojvodić, Ana Andonov, Darko Hinić

Validation of the Montgomery–Åsberg Depression Rating Scale in depressed patients in Serbia

University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia; Dr Laza Lazarević Clinic for Psychiatric Disorders, Belgrade, Serbia; Singidunum University, Faculty of Media and Communications, Department of Clinical Psychology, Belgrade, Serbia; University of Kragujevac, Department of Psychology, Kragujevac, Serbia

Received: April 1, 2020
Revised: November 6, 2020
Accepted: January 5, 2021
Online First: January 13, 2021
DOI: https://doi.org/10.2298/SARH200401004M

Accepted papers are articles in press that have gone through due peer review process and have been accepted for publication by the Editorial Board of the Serbian Archives of Medicine. They have not yet been copy-edited and/or formatted in the publication house style, and the text may be changed before the final publication.

Although accepted papers do not yet have all the accompanying bibliographic details available, they can already be cited using the year of online publication and the DOI, as follows: the author’s last name and initial of the first name, article title, journal title, online first publication month and year, and the DOI; e.g.: Petrović P, Jovanović J. The title of the article. Srp Arh Celok Lek. Online First, February 2017.

When the final article is assigned to volumes/issues of the journal, the Article in Press version will be removed and the final version will appear in the associated published volumes/issues of the journal. The date the article was made available online first will be carried over.

Correspondence to:
Darko HINIĆ
Radoja Domanovića 12, 34000 Kragujevac, Serbia
E-mail: dhinic@kg.ac.rs
**Validation of the Montgomery–Åsberg Depression Rating Scale in depressed patients in Serbia**

Увод / Циљ. Циљ ове студије била је валидација Монтгомери–Ашберг скале за процену депресије код депресивних пацијената у Србији, који болују од депресије.

**Методе** И тест и ретест ситуација су спроведени на 162 одрасла пацијента који имају дијагностикован депресивни поремећај, и на контролној групи од 110 особа које немају ниједан облик менталних поремећаја. Узрач је чинило 58,8% испитаника мушког и 41,2% женског пола, узраста између 20 и 79 година (M = 42.26, SD = 11.53), при чему није било разлике између испитиваних група по полу и годинама. Примењени су следећи инструменти: МАДРС, Хамилтонова скала за процену депресије, као и Кратка скала за психијатриску процену.

**Резултати** Психометријске карактеристике МАДРС-а, као што су интерна конзистенција, тест-ретест поузданост, екстерна валидност са Хамилтоновом скала и дискриминаторна валидност, показала су се као адекватне. Студија је такође потврдила једнофакторску структуру инструмента. Добијене су статистички значајне разлике у скоровима између група по узрасту и образовању, али су ови ефекти разлика мали.

**Закључак** МАДРС скала је показала добре психометријске карактеристике у нашој студији и као таква се може користити за процену депресивних стања код пацијената у Србији.

**Кључне речи:** депресија; Монтгомери-Ашберг скала; валидација инструмента

**INTRODUCTION**

According to the World Health Organization, in 2017, about 264 million people suffered from some form of depressive disorder [1], and depression is a leading cause of disability worldwide [2]. Data from Serbia suggest that in 2014, 4.1% of the population had depressive disorder [3].

Apart from the clinical interview, measuring the degree of depression is mainly based on using the psychodiagnostic scales for assessing symptoms. Using these instruments is...
important because of objectivity in psychodiagnostic, quantitative expression of values (especially in clinical studies), and information relevant to the assessment of a clinical course and pharmacotherapy. However, there are several reasons why it is hard to evaluate depression. It might be because of the personality traits influence, physical disorders, comorbidities, and because depression symptoms can be a part of some other diagnosis, like bipolar disorder or Parkinson disease [4, 5]. Finally, the results can also vary from one instrument to another, due to differences between self-assessment scales and clinician administrated scales, or some other methodological problem [6, 7, 8].

**Depression assessment scales**

Although various rating scales for depression are available (e.g. Hamilton depression rating scale – HDRS, Montgomery-Asberg depression rating scale – MADRS, and Beck depression inventory – BDI), MADRS is one of the most frequently used scales for assessing severity of depression in research settings, clinical trials and everyday primary care and clinical practice, and it has been translated into more than 24 languages [8, 9, 10]. The scale is applied and evaluated by psychiatrists in the form of a guided interview and it is suitable for monitoring change in the patient's state [9, 10]. Regardless if a structured interview is used or not, the scale has satisfactory reliability [11].

MADRS shows satisfactory psychometric characteristics, high agreement values between the examiners, and significant correlation with scores on HDRS, BDI and M.I.N.I. [9, 10, 12]. A moderate to high association was shown between the patient's scores and the physician's scores [6, 7]; moreover, the patients perceived the scale as a useful tool that “added something” to the consultation with physicians [13]. Compared to HDRS, MADRS has shown greater sensitivity when distinguishing moderate and severe depression [14], and higher specificity than BDI-II in distinguishing individuals without depression in the primary care context [9]. MADRS is also convenient when patients need to be tested efficiently and quickly, since the completion time takes from few to ten minutes [9].

There are various opinions on factorial structure, because different studies have shown different number of factors. A single-factor solution is the most frequent one [6, 15]. Other
studies have shown that MADRS may have two or three factors, which represents different symptoms of depression, such as sadness and melancholy [16], or a general depression factor and motivational factor [17]. Three factors solution was proved useful in examining Major Depression Disorder (MDD) and in isolating subgroups of depressed patients with more pronounced symptoms [5]. There was even the four-factor model, and in the given model the following factors were distinguished: covert sorrow, negative thoughts, alienation, as well as neurovegetative symptoms [18].

The main aim of this study was validation of the MADRS psychometric properties in Serbian patients suffering from depression, and evaluation of its factorial structure, discriminative power, as well as external validity.

METHODS

Procedure

The study was conducted during the six months period, between June and December of 2017, and the instruments were administered to the patients individually. The participation in the study was voluntary, anonymous, and the informed consent was provided according to the provisions of the Declaration of Helsinki. The study protocol received ethical approval from the Ethical Committee, Clinic for Psychiatric Disorders “Dr Laza Lazarević” in Belgrade, Serbia.

The first inclusion criterion for clinical group was diagnosis of unipolar depression without comorbidity (based on ICD-10 classification), diagnosis F32 and F33, except for diagnosis with psychotic symptoms (F32.3 and F33.3). Other criteria were: age of 18 years and above, stable state in the last 2 months, the treatment with antidepressants without modification of the therapeutic regimen in the last 2 months, and Serbian as native language.

The inclusion criteria for participants in control group were: absence of neurological and/or psychiatric disorders, age 18 years or above, Serbian as native language.
The clinical sample included patients from the psychiatric hospital “Dr Laza Lazarević” in Belgrade, Serbia. The diagnosis of mental disorder in this sample has been confirmed by the medical history records and anamnestic data. The absence of mental disorders in the control group has been established with the Brief Psychiatric Rating Scale - BPRS. Participants from both groups were included in the study only after they have read the information about the study and signed the consent to participate according to the Declaration of Helsinki. The control group sample was stratified and balanced based on sex and age data from the clinical sample. The sample was voluntary and consisted of the employees in public companies, such as Public Utility Company “Belgrade Road”, “Electric power distribution of Serbia”, Clinical Centre of Serbia. The remaining participants from this group were recruited via chain sampling.

Participants

Total number of the participants was 272, 162 from the clinical population (59.6%), and 110 participants in control group (40.4%). There were 58.8% male and 41.2% female participants, age between 20 and 79 (M = 42.26, SD = 11.53). There were no differences between groups in terms of sex and age. Most of the participant have completed secondary school (59.1%), or had bachelor’s degree (30% in control, and 11.3% in the clinical group). The majority of participants with only elementary school was from clinical group (10.6%), compared to the control group (2.7%). The 16.4% of the non-clinical and 9.2% of the clinical sample have higher education.

Instruments

The following instruments were used in the study.

Montgomery-Asberg Depression Rating Scale [11] – contains 10 items in the seven-point Likert scoring format (from 0 – without difficulties, to 6 – significant difficulties). The level of depression is determined by the total sum, and it is classified as following: 0-6
without symptoms, 7-19 mild depression, 20-34 moderate depression, 34+ severe depression. MADRS has significant correlations with HDRS and BDI [9, 10, 12]. We used an original version of MADRS that was previously slightly modified after language and content validity test.

Hamilton Depression Rating Scale (HDRS) - serves to assess the degree of depression [19]. We used a 17 items version, and depression estimates are determined according to the following scores: 0-7 without depression, 8-15 moderate depression, 16 and more is severe depression. The most recent validations of the instrument in Bangladesh and Poland showed satisfactory psychometric characteristics [16, 20]. Although it has long been considered as a "gold standard" in a clinical assessment, over the years there has been several major problems with the scale [10]. The scale proved to be longitudinally unreliable and with a suboptimal number of responses offered. Also, the validity of the content is considered unsatisfactory due to somewhat outdated conception of depression. As a result, new versions have been made, with slightly different classification system of scores [21].

Brief Psychiatric Rating Scale (BPRS) - a scale with 18 items, with a seven-point Likert scoring format (from 1 to 7). Studies have shown satisfactory reliability and validity, and it includes an assessment of the affects, thinking, anxiety, orientation, motor and behavioral manifestations [22]. The main requirement for selecting subjects from the control group was a low score (< 30 points) on the BPRS as an indicator of the lack of psychopathology [22].

In addition to these instruments, we also used data obtained from medical history records. Other data (sex, age, and education) of participants from both groups were collected by an interview before the start of the test.

**Statistical analyses and translation**

We followed the recommendations for psychometric studies in which instruments are tested and validated [23]. For the translation of the scale into Serbian, a linguistic expert translated MADRS from English to Serbian, and this version was compared with the original in order to resolve potential discrepancies. Then, the instrument was translated back to
English by another professional translator with a good command over Serbian and English. The back-translation was compared with the original instrument and, after the necessary modifications, the scale was forwarded to further procedure.

The next step was that items’ meaning and comprehensibility (content validity) were evaluated by two expert psychiatrists. All of the items were rated as appropriate and the final version of the scale was accepted.

Based on the recommendations for sample size [23, 24], we estimated that at least 100 respondents (minimum 10 subjects per item) were needed, since MADRS has 10 questions. When $\alpha = 0.05$, and the strength of the study $(1-\beta) = 0.80$, for testing the differences between two groups of t-tests (for example, subjects with or without depression), at least 51 subjects are needed per group, and for testing the difference between the three groups by the ANOVA test (e.g. respondents within the clinical group with mild, moderate and severe depression) requires a total of 156 respondents. Based on all this and the calculations in the G*Power program, the goal was to involve in the study of at least 160 subjects from the clinical population and at least 110 non-clinical respondents.

For the statistical analyses, we used exploratory factor analysis, t-test, Pearson correlation and Intraclass correlation coefficient (ICC) for the reliability.

RESULTS

Factor structure

We used exploratory factor analysis with Direct Oblimin factor rotation. The analysis of the main components distinguishes one factor that explains 58.45% of the total variance (Table 1; Figure 1). All items have loadings above .50. Kaiser-Meyer-Olkin (KMO) measure of representativeness was 0.90. Bartlett’s sphericity test was statistically significant ($\chi^2(45)=1698.03$, $p<.001$).
Analyzing individual items, item 6 (concentration difficulties) gives the largest share in the explanation of the variance with .72, item 2 with .71 (expressed sorrow), item 7 with .69 (difficulty in the commencement of activities) and item 1 with .69 (noticeable sorrow).

Basic descriptive statistics are shown in Table 2.

Reliability analyses

The Intraclass correlation coefficient technique (ICC) is used in cases where there are more examiners or more repeated measurements in the research, and therefore it was suitable for this study. All of the measures that are given in Table 3 are referred to the combined measures of test and retest.

It is considered that each value of the ICC between .75 and .90 is good, and over .90 represents excellent test-retest reliability [25]. Cronbach’s alpha values obtained at the first test (α = .84) suggests high internal reliability of the scale considering the small number of items. The total test and retest scores also showed significant correlation (r = .89, p < .01). Therefore, all items, as well as the overall result, give good indication of reliability in repeated measurements, which suggests that longitudinal measurements can be considered reliable.

Discriminative sensitivity

The t-test results support the fact that there are statistically significant differences with large effect size between the clinical and non-clinical populations in both test and retest situation (Table 4).

Discriminating power of the total score was shown to be satisfactory (Canonical Correlation .53; Wilk’s Lambda .52, p < .001; 77.2% of the participants correctly classified). The obtained results indicate that the area under the ROC curve is .878 (ranging from .837 to .919). Cut-off score of 7 and above suggests presence of depressive symptoms (mild
depression category in original classification), since it showed the best sensitivity (.636) and specificity (.955).

External validation

In order to test external or concurrent validity of the scale, the scores on the MADRS were correlated with the scores on the HDRS scale. There is statistically significant and very high positive correlation between these scores ($r = .96$, $p < .01$).

Demographic variables and MADRS scores

MADRS scores have shown no statistically significant differences between males and females (test: $t(272) = 1.80$, $p > .05$, retest: $t(272) = 1.78$, $p > .05$). A statistically significant difference in age groups was found ($F(3, 268) = 6.36$, $p < 0.01$), with medium effect size ($\eta^2 = 0.07$). The group of oldest participants (above 52 years old) shows highest scores ($M = 12.64$, $SD = 12.60$). Similar results are shown for the differences in education ($F(3, 248) = 9.68$, $p < 0.01$, $\eta^2 = 0.10$), where participants with the lowest education level (elementary school) shows highest scores ($M = 16.39$, $SD = 13.91$).

DISCUSSION

The research was conducted in order to validate the MADRS scale for Serbian patients, because it has wide application in assessing depressive disorders.

According to our findings, it can be concluded that MADRS has satisfactory internal reliability and psychometric characteristics in the test-retest situation. Other researchers have found that the MADRS scale has good psychometric characteristics, with the ICC varying from .89 to even .98, depending on the person who conducts an interview with the patient [12, 26]. The reliability of the entire instrument in our study was excellent (ICC = .93, $r = .000$), indicating that MADRS gives the same results on repeated measurements, and is good.
for monitoring, i.e., for use in longitudinal studies. The results show that all item intercorrelations in test and retest situation are also positive and strong (more than .60).

An analysis of the main components identified one factor explaining 58.45% of the variance, and it was confirmed that the MADRS measures a unique construct - depression. The one-dimensionality of the MADRS scale was previously confirmed in a large, multinational study involving depressed patients [6], as well as in the other similar studies [e.g. 12]. The items that proved to be most significant in factor analysis in both test situations in our study are: difficulty with concentration, expressed sorrow, difficulty in starting the activity, and noticeable sadness.

MADRS shows significant differences between the clinical and the non-clinical population, which supports the discriminatory validity of the scale, in both test and retest situation. Recent study confirms [12], with rather high values of sensitivity and specificity, that cut-off point for moderate depression is 20 (sensitivity, 98%; specificity, 96%), and the cut-off point for severe depression is 34 (sensitivity, 98%; specificity, 92%). Cut-off score of 7+ suggests presence of depressive symptoms in our study (mild depression category in the original classification).

What is particularly significant is the strong positive correlation between the MADRS and the HDRS-17, as it was also suggested by previous studies [cf. 8]. A number of studies comparing the MADRS and HDRS-17 have shown that the MADRS has a higher sensitivity to changes that occur under the effect of therapy [8, 27, 28].

It is important to note that there are certain differences in the scores in terms of demographic categories. No differences were found according to the sex criterion; however, the oldest participants and those with primary school education reported the highest scores. Medical conditions, cognitive deficits, loss of significant others and changes in social life associated with old age might decrease the applicability of some psychological treatments and influence the treatment outcome in elderly depressed people [29], but they can also influence the comprehension of the items, and an increased tendency towards depressive reactions upon testing. The prevalence of depression is greater in individuals with lower socio-economic status and lower qualifications [30], which may be the reason why our results
show that the participants with only primary school education report higher scores in comparison to other qualification levels.

Limitations

A possible confounding variable is the effect of pharmacotherapy, because the change in the scores may depend on the type of drug, the dose of the drug and the reactivity to the therapy. Other confounding variables relate to changes in the environment of respondents (improvement in relationships with fellowmen, the effects of psychotherapy, etc.).

CONCLUSION

The MADRS scale has shown good satisfactory psychometric characteristics in our study; thus, it may be used for the assessment of depressive disorders in Serbian patients.

Conflict of interest: None declared.
REFERENCES

1. GBD Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2017; 392:1789-858. https://doi.org/10.1016/S0140-6736(18)32279-7

2. World Health Organization. Depression. Geneva: World Health Organization, 2019.

3. Ministarstvo zdravlja Republike Srbije, Institut za javno zdravlje Srbije. Rezultati istraživanja zdravlja stanovništva Srbije 2013. Beograd: Institut za javno zdravlje Srbije, 2014. [In Serbian]

4. Shea SC. Psychiatric interviewing: the art of understanding, 3rd edition. US: Elsevier. 2017.

5. Ketharanathan T, Hanwella R, Weerasundera R, de Silva. Diagnostic validity and factor analysis of Montgomery-Asberg depression rating scale in Parkinson disease population. J Geriatr Psych Neurol. 2016; 29: 115–9. https://doi.org/10.1177/0891988715606232

6. Uher R, Perlis RH, Placentino A, Derovnovek MZ, Henigsberg N, Mors O, Maier W, McGuffin P, Farmer A. Self-report and clinician-rated measures of depression severity: Can one replace the other? Depress Anxiety. 2012; 29(12): 1043-49. https://doi.org/10.1002/da.21993

7. Cunningham JL, Wernoth L, von Knorring L, Berglund L, Ekselius L. Agreement between physicians’ and patients’ ratings on the Montgomery-Asberg Depression Rating Scale. J Affect Disord. 2011; 135:148-53. https://doi.org/10.1016/j.jad.2011.07.005

8. Bukumiric Z, Starcevic V, Stanisavljevic D, Marinovic J, Milic N, Djukic-Dejanovic S, Janjac V, Corac A, Ilic A, Kostic M, Nikolic I, Trajkovic G. Meta-analysis of the changes in correlations between depression instruments used in longitudinal studies. J Affect Disord. 2016; 190:733-43. https://doi.org/10.1016/j.jad.2015.10.054

9. Nejati S, Ariai N, Björkelund C, Skoglund I, Petersson EL, Augustsson P, Hange D, Svenningsson I. Correspondence between the Neuropsychiatric Interview M.I.N.I. and the BDI-II and MADRS-S self-rating instruments as diagnostic tools in primary care patients with depression. Int J Gen Med. 2020;13:177-83. https://doi.org/10.2147/IJGM.S243150

10. Carneiro AM, Fernandes F, Moreno RA. Hamilton depression rating scale and Montgomery-Asberg depression rating scale in depressed and bipolar I patients: psychometric properties in a Brazilian sample. Health Qual. Life Outcomes. 2015;13:42. https://doi.org/10.1186/s12955-015-0235-3

11. Montgomery SA, Asberg M. A new depression scale designed to be sensitive to change. Br J Psychiatry. 1979;134:382–9. https://doi.org/10.1192/bjp.134.4.382

12. Cano JF, Gomez Restrepo C, Rondon M. Validation of the Montgomery-Asberg Depression Rating Scale (MADRS) in Colombia. Rev Colomb Psiquiatr. 2016;45(3):146-55. https://doi.org/10.1016/j.rcp.2015.08.006

13. Wikberg C, Pettersson A, Westman J, Björkelund C, Pettersson EL. Patients’ perspectives on the use of the Montgomery-Asberg depression rating scale self-assessment version in primary care. Scand J Prim Health Care. 2016;34(4):434-442. https://doi.org/10.1080/02813432.2016.1248635

14. Mullerr MJ, Himmerich H, Kienzle B, Szegedi A. Differentiating moderate and severe depression using the Montgomery-Asberg depression rating scale (MADRS). J Affect Disord. 2003;77(3):255–60. https://doi.org/10.1016/s0165-0327(02)00120-9

15. Yee A, Yassim Abdul RM, Huai S, Chong GT, Kit-Aun T. Psychometric evaluation of the Malay version of the Montgomery-Asberg depression rating scale (MADRS-BM). BMC Psyh. 2015;15:200. https://doi.org/10.1186/s12888-015-0587-6

16. Soron TR. Validation of Bangla Montgomery-Asberg depression rating scale. Asian J Psychiatr. 2017;28:41-6. https://doi.org/10.1016/j.ajp.2017.03.019

17. Zuijdersma M, Sjoberg L, Pantzar A, Fratiglioni L, Wang H-X. A bi-factor model of the Montgomery-Åsberg depression rating scale and future cognitive impairments in older adults: A 6-year follow-up study. J Psych Res. 2019;109:1-9. https://doi.org/10.1016/j.jpsychires.2018.11.010

18. Quilty LC, Robinson JJ, Rolland JP, Fruyt FD, Rouillon F, Baghy RM. The structure of the Montgomery-Asberg depression rating scale over the course of treatment for depression. Int J Meth Psych Res. 2013;22:175–84. https://doi.org/10.1002/mpr.1388

19. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960; 23:56–62. https://doi.org/10.1136/jnnp.23.1.56
20. Wiglusz MS, Landowski J, Michalak L, Cubaha WJ. Validation of the Polish version of the Hamilton rating scale for depression in patients with epilepsy. Epilepsy Behav. 2016;62:81-4. https://doi.org/10.1016/j.yebeh.2016.06.030

21. Zimmerman M, Martinez JH, Young D, Chelminski I, Dalrymple K. Severity classification on the Hamilton depression rating scale. J Affect Disord. 2013;150:384–8. https://doi.org/10.1016/j.jad.2013.04.028

22. Leucht S, Kane JM, Kissling W, Hamann J, Etschel E, Engel R. Clinical implications of Brief psychiatric rating scale scores. Br J Psychiatry. 2005;187:366-71. https://doi.org/10.1192/bjp.187.4.366

23. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quinonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: A Primer. Front Public Health. 2018;6:149. https://doi.org/10.3389/fpubh.2018.00149

24. Anthoine E, Moret L, Regnault A, Sébille V, Hardouin J-B. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual. Life Outcomes. 2004;12:2. https://doi.org/10.1186/s12955-014-0176-2

25. Koo TK, Li MY. A Guideline of selecting and reporting Intraclass correlation coefficients for reliability research. J Chiropr Med. 2016;15:155-63. https://doi.org/10.1016/j.jcm.2016.02.012

26. Sajatovic M, Chen P, Young R, C. Rating scales in bipolar disorder in clinical trial design challenges. In: Tohen M, Bowden C, Nierenberg A, Geddes J. Mood Disorders. US: Elsevier; 2015. p. 105-36. https://doi.org/10.1016/B978-0-12-405170-6.00009-9

27. Mulder RT, Joyce PR, Frampton C. Relationships among measures of treatment outcome in depressed patients. J Affect Disord. 2003;76:127-35. https://doi.org/10.1016/S0165-0327(02)00080-0

28. Hengartner MP, Jakobsen JC, Sørensen A, Plöderl M. Efficacy of new-generation antidepressants assessed with the Montgomery-Asberg Depression Rating Scale, the gold standard clinician rating scale: A meta-analysis of randomised placebo-controlled trials. PLoS ONE. 2020;15(2):e0229381. https://doi.org/10.1371/journal.pone.0229381

29. Jonsson U, Bertilsson G, Allard P, Gyllensvärd H, Söderlund A, Tham A, Andersson, G. Psychological treatment of depression in people aged 65 years and over: A systematic review of efficacy, safety, and cost-effectiveness. PLoS ONE. 2016;11(8):e0160859. https://doi.org/10.1371/journal.pone.0160859

30. Gelder M, Mayou R, Geddes J. Psychiatry. Beograd: Data Status, 2009. [In Serbian]
Table 1. Factor weights and explained variance in test and retest situation

| Items   | Test   | Retest  |
|---------|--------|---------|
|         | Factor loadings | % of variance | Factor loadings | % of variance |
| MADRS1  | 0.830  | 0.689   | 0.836  | 0.698   |
| MADRS2  | 0.844  | 0.712   | 0.822  | 0.676   |
| MADRS3  | 0.692  | 0.479   | 0.584  | 0.341   |
| MADRS4  | 0.695  | 0.483   | 0.722  | 0.521   |
| MADRS5  | 0.652  | 0.425   | 0.647  | 0.418   |
| MADRS6  | 0.846  | 0.716   | 0.804  | 0.646   |
| MADRS7  | 0.832  | 0.693   | 0.852  | 0.726   |
| MADRS8  | 0.772  | 0.596   | 0.787  | 0.619   |
| MADRS9  | 0.727  | 0.528   | 0.732  | 0.536   |
| MADRS10 | 0.723  | 0.523   | 0.717  | 0.514   |
Figure 1. Diagram for MADRS
Table 2. Descriptive data for MADRS in clinical and control group

| MADRS        | n  | Mean | SD  | Min. | Max. | skewness | kurtosis |
|--------------|----|------|-----|------|------|----------|----------|
| clinical group | 162| 13.28| 11.8| 0    | 51   | 1.01     | 0.2      |
| control group | 110| 1.7  | 1.96| 0    | 8    | 1.31     | 0.46     |
Table 3. Intraclass correlation coefficient by items on MADRS (all the items of ICC (Intraclass Correlation Coefficient) are significant at the level 0.01)

| Items | M    | SD   | ICC  | 95% CI Lower bound | 95% CI Upper bound |
|-------|------|------|------|--------------------|--------------------|
| 1     | 2.06 | 2.93 | 0.87 | 0.83               | 0.9                |
| 2     | 2.01 | 2.83 | 0.84 | 0.8               | 0.88               |
| 3     | 2.18 | 2.48 | 0.88 | 0.85               | 0.91               |
| 4     | 1.75 | 2.78 | 0.9  | 0.87               | 0.92               |
| 5     | 0.78 | 2.01 | 0.86 | 0.82               | 0.89               |
| 6     | 1.45 | 2.52 | 0.87 | 0.84               | 0.9                |
| 7     | 1.55 | 2.54 | 0.86 | 0.82               | 0.89               |
| 8     | 1.41 | 2.65 | 0.88 | 0.84               | 0.9                |
| 9     | 1.39 | 2.19 | 0.84 | 0.80               | 0.88               |
| 10    | 0.56 | 1.72 | 0.87 | 0.83               | 0.9                |
| Total | 15.13| 19.37| 0.93 | 0.91               | 0.95               |
Table 4. Differences between clinical and control group test and retest scores

| Group         | Clinical | Control | t    | 95% CI       | Cohen’s d |
|---------------|----------|---------|------|--------------|-----------|
|               | M        | SD      | M    | SD           | Lower bound | Upper bound |         |
| MADRS test    | 13.28    | 11.8    | 1.7  | 1.96         | 12.25      | 9.72        | 13.45    | 1.37      |
| MADRS retest  | 10.23    | 10.27   | 1.08 | 1.42         | 11.18      | 7.53        | 10.76    | 1.25      |

* < 0.01