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# "RELIABILITY AND VALIDITY OF MONTGOMERY AND ASBERG DEPRESSION RATING SCALE COMPARED WITH HAMILTON DEPRESSION RATING SCALE TO ASSESS POST-STROKE DEPRESSION AMONG THE INDIAN POPULATION"

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**BACKGROUND & PURPOSE:** Stroke (cerebrovascular accident [CVA]) is the sudden loss of neurological function caused by an interruption of blood flow to the brain that leads to various impairments ends up in mood disorder [(1,2)] Post-Stroke Depression(PSD) is a common and serious emotional disorder that has frequently been overlooked and left untreated by the community. [(1,2)] There are multiple tools available to assess depression although there is a lack in availability of Culturally Constructed data. Montgomery And Asberg Depression Rating Scale(MADRS) is a tool that involves major aspects and consumes lesser time compared with other tools. **METHODOLOGY:** A total of 92 patients were included in this study, recruited from different places and institutions. On the first day, two different assessors (R1 &R3) assessed Montgomery And Asberg Depression Rating Scale. Prime assessor (R1) also assessed Hamilton Depression Rating Scale (HDRS) at that time. A follow-up assessment was taken by the R2 on the 3rd day, at that time, R3 only assessed Montgomery And Asberg Depression Rating Scale. **RESULT:** The data was analyzed by SPSS in that, MADRS has an excellent Test-retest Reliability that is, ICC= 0.980, and good Inter-rater Reliability that is, ICC=0.877. Cronbach's alpha >0.9 of both shows Excellent internal consistency. The Spearman's Correlation Value was 0.619 which shows a moderate correlation. **CONCLUSION:** Montgomery And Asberg Depression Rating Scale is a Valid and Reliable Tool to assess Post-stroke Depression.

**KEYWORDS:** Reliability, validity, Hamilton Depression Rating Scale, Montgomery, And Asberg Depression Rating Scale, Post-stroke depression, Indian population.

## INTRODUCTION:

Stroke is also defined by WHO as rapidly developing clinical signs of focal or global disturbances of cerebral function, with symptoms lasting more than 24 hours or longer, leading to death. [4,5] Stroke is the biggest public issue, leading to 1.2% of total deaths in India and disability. [6,7,8] Incidence of stroke values is higher than those of the United States and most European and Asian countries. [9] Stroke is the second leading cause of death after ischaemic heart disease, produces considerable morbidity, and it is an important public health problem all over the world. According to one piece of literature between 1990 and 2010, the number of strokes that occurred each year decreased by 10% in the developed world and increased 10% in the developing world. [10] Ischemic stroke is a more common type than Hemorrhagic stroke type, affecting about 80% of people. [11] Stroke is divided into three Phases, in which the Acute phase is considered timing within 72 hours, up to 6 months there is a subacute phase, and chronic phase defined to be more than 6 months of post-stroke. [1] Apathy, euphoria, depression, irritability, frustration, generalized anxiety, and suicidal tendency are seen mostly as altered emotional status in stroke. [32] Depression is called a mood disorder is commonly seen in stroke. [3] Once PSD has developed, numerous studies have documented its adverse effect on cognitive recovery, physical recovery, and mortality. [12] Depression has a mean duration of 9 months; however, some researchers found that some of the patients remain depressed for more than 3 years following a stroke, but according to **Neelanjana Paul** PSD showed higher prevalence beyond 3 months and up to 18 months. This study concluded that the overall frequency of depression remained stable over time. [13,14,15]Basal ganglia or left frontal lobe lesions played an important and structural role in the etiology of PSD.[16] Beck Depression Inventory, Hamilton Rating Scale for Depression, and Clinical Global Impression assessment by professionals, in addition to the Diagnostic and Statistical Manual of Mental Disorders 5th Edition, Revised diagnosis, are useful tools for assessment of depression. [17] Depression is higher age at first stroke, lower socio-economic status, physical disability, and comorbid cognitive dysfunctions are associated with PSD, whereas Education has a protective role. [19] One study concluded PSD is highly prevalent in both genders but appears slightly more in women than men as well untreated depression can lead to reduced quality of life, poorer prognosis, and increased mortality. [20] 31.9% of depressed patients were on anti-depressant drug treatment at 3-months of follow-up. [21] prevalence of major depressive disorder was highest in the stroke group that is, 34.1%. [22] **Rebecca w. Iannuzzo** et al conducted a study on the development and reliability of HAM-D/MADRS Interview: An integrated depression symptom rating scale in that, they did the Interclass correlation coefficient (ICC) for individual HAM-D17, MADRS, and HAM-D31 and found values of 0.98, 0.98, and 0.97 respectively. [23]**Adriana Munhoz** et al. conducted a study on the Hamilton depression rating scale and Montgomery -asberg depression rating scale in depressed and bipolar 1 patients: In this study, an interclass correlation for HAM-D was alpha=0.83(v0),0.71(v4),0.85(v8). MADRS has alpha = 0.89(v0),0.70(v4),0.80(v8) respectively showing excellent reliability. **Hu Ju King** et al, Conducted a study on the comparative ability of depression assessment scales for screening post-stroke depression in that, they concluded MADRS and HDRS both shows no major difference in screening but in the Acute phase of stroke individuals less somatic items may be recommended for the screening of PSD.[28]

## METHODOLOGY:

A Cross-sectional observational study is conducted in one year of duration from Ethical approval was given from Shri B.G. Patel college of physiotherapy. In this study, 18-80 years of sub-acute and chronic stroke patients were assessed from Shri B.G. Patel college, Jiwandeep Hospital, VINS Hospital, and community settings. The prior consent form was taken from all participants and witnesses. All explanation was given prior. Patients were selected based on Inclusion and Exclusion Criteria. A detailed history was taken by the prime assessor to recruit patients in this study. The inclusion criteria were as follows: age 18-80 years, The patients met the diagnostic criteria of the National cerebrovascular disease and were diagnosed as Ischaemic stroke by brain computed tomography (CT) or MRI, Sub-acute, and chronic stroke, MMSE scale ≥25, Patients who qualify through PHQ-9 criteria for at least minor depression, and Patients willing to participate in research. Patients were excluded if there is Other neurological disorders, Recurrent Stroke, did not qualify through PHQ-9 criteria, Cognitive impairments and perceptual impairments, Global Aphasia, Broca's Aphasia, Wernick's Aphasia, History of pre-stroke depression, and Drug abuse.

Sample size calculated according to success run theorem Which was published by the Institute of quality and reliability research patients required patients were 92-100 if the confidence interval is 95% and reliability is approximately 97%.[29]

**OUTCOME MEASURE:**

(1) Patient Health Questionnaire-9 (PHQ-9) [18,27,30,31]

PHQ-9 is a therapist-administered scale. there is a total of 9 questions in it and the 10th one is the sum of all questions. In that,1-4=minimal depression, 5-9=mild depression, 10-14=moderate depression,15-19=moderately severe ,20-27=moderately severe.

(2) Montgomery and Asberg Depression Rating Scale (MADRS) [18,23-26,35,36]

The rating should be based on a clinical interview in that, 0-6=Absent,7-19=Mild depression,20-34=Moderate depression, 35-60=Severe depression

(3) Hamilton Depression Rating Scale (HDRS) [18,22-26,31,33,34]

The HDRS (also known as the Ham-D) is the most widely used clinician-administered depression assessment scale. The original version contains 17 items (HDRS17) is used in this research. In that, 0-7= Normal , 8-13= Mild depression, 14-18=Moderate depression ,19-22=severe depression and ≥23= Very severe depression.

**PROCEDURE:**

Two different assessors are, R1 and R3 .R1 screened patients for eligibility criteria. All patients were screened for Drug and Medical history as well. Included patients assessed with Montgomery and Asberg Depression Rating Scale by two different raters (Rater R1 and Rater R3) on Day-1 for Interrater Reliability.R1 that is prime assessor also assessed Hamilton Depression Rating Scale on the same day. On Day-3 Montgomery And Asberg Depression Rating Scale was assessed by only one therapist i.e. Prime Researcher (Rater R2) for test-retest / intrarater Reliability. 1 st and 2nd observations were analyzed on the same time difference of the day to minimize variability in test-retest reliability. Data were analyzed by SPSS Version 26.

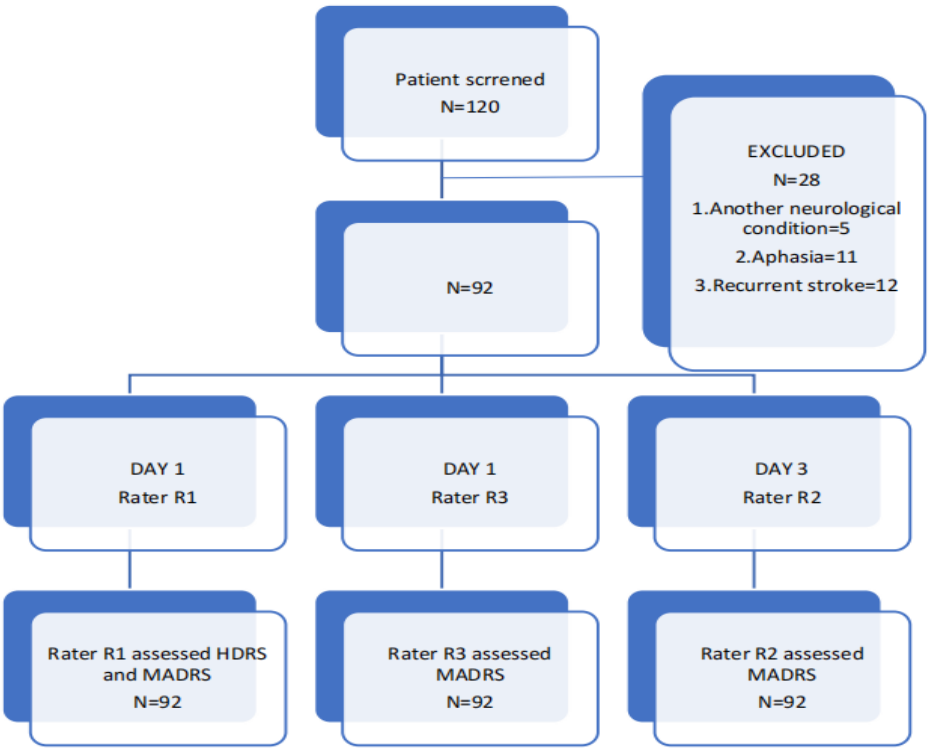


FIGURE 1: Shows Data collection flow chart

**DATA ANALYSIS:**

Data analysis was done in SPSS version 26. Baseline data was calculated. Reliability analysis was done by using a Two-way mixed test and 95% of Confidence Interval, in that internal consistency was assessed by Cronbach's Alpha and ICC was done which describes how strongly one test resembles another overtime that is test-retest reliability as a well different person which is inter-rater reliability. For concurrent validity, Spearman's Correlation co-efficient test was done to compare Montgomery And Asberg Depression Rating Scale with Hamilton Depression Rating Scale.

(1) BASELINE DATA

Table 1. Demographic of patients

| | |
|---|---|
| **Age (Mean ± SD)** | (62.03±11.43) |
| **Male(N)** | 72 |
| **Female(N)** | 20 |
| **Total(N)** | 92 |

Showing Gender(M/F) and (Age ± SD).

Table 2. Frequency distribution of Gender and Stage

| GENDER | TOTAL NO. | SUBACUTE | CHRONIC |
|---|---|---|---|
| MALE (M) | 70(100) | 50(71.42) | 20(28.57) |
| FEMALE (F) | 22(100) | 15(68.18) | 07(31.81) |
| TOTAL (M+F) | 92(100) | 65 (70.7) | 27(29.03) |

Showing Gender Distribution & Stage

(2) RELIABILITY ANALYSIS

(A) Table 3: TEST-RETEST RELIABILITY OF MONTGOMERY AND ASBERG DEPRESSION RATING SCALE

| | **ICC VALUE** | **95% CONFIDENCE INTERVAL** | | **CRONBACH'S ALPHA** | **P-VALUE** |
|---|---|---|---|---|---|
| | | **LOWER BOND** | **UPPER BOND** | | |
| TEST-RETEST | 0.980 | 0.969 | 0.987 | 0.990 | 0.000 |

*P<0.05shows a significant correlation present

(B) Table 4: INTER-RATER RELIABILITY OF MONTGOMERY AND ASBERG DEPRESSION RATING SCALE

| | **ICC VALUE** | **95% CONFIDENCE INTERVAL** | | **CRONBACH'S ALPHA** | **P-VALUE** |
|---|---|---|---|---|---|
| | | **LOWER BOND** | **UPPER BOND** | | |
| INTER-RATER | 0.877 | 0.820 | 0.917 | 0.935 | 0.000 |

*P<0.05 shows a significant correlation present.

(3) VALIDITY ANALYSIS

Correlation analysis was done with Spearman's correlation coefficient.

Table 5: CONCURRENT VALIDITY OF MONTGOMERY AND ASBERG DEPRESSION RATING SCALE COMPARED WITH HAMILTON DEPRESSION RATING SCALE

| | | HDRS |
|---|---|---|
| MADRS | Spearman's rho | 0.619* |
| | Significance (2-tailed) | 0.000 |
| | N | 92 |

.*Correlation is significant at the 0.01 level (2-tailed)

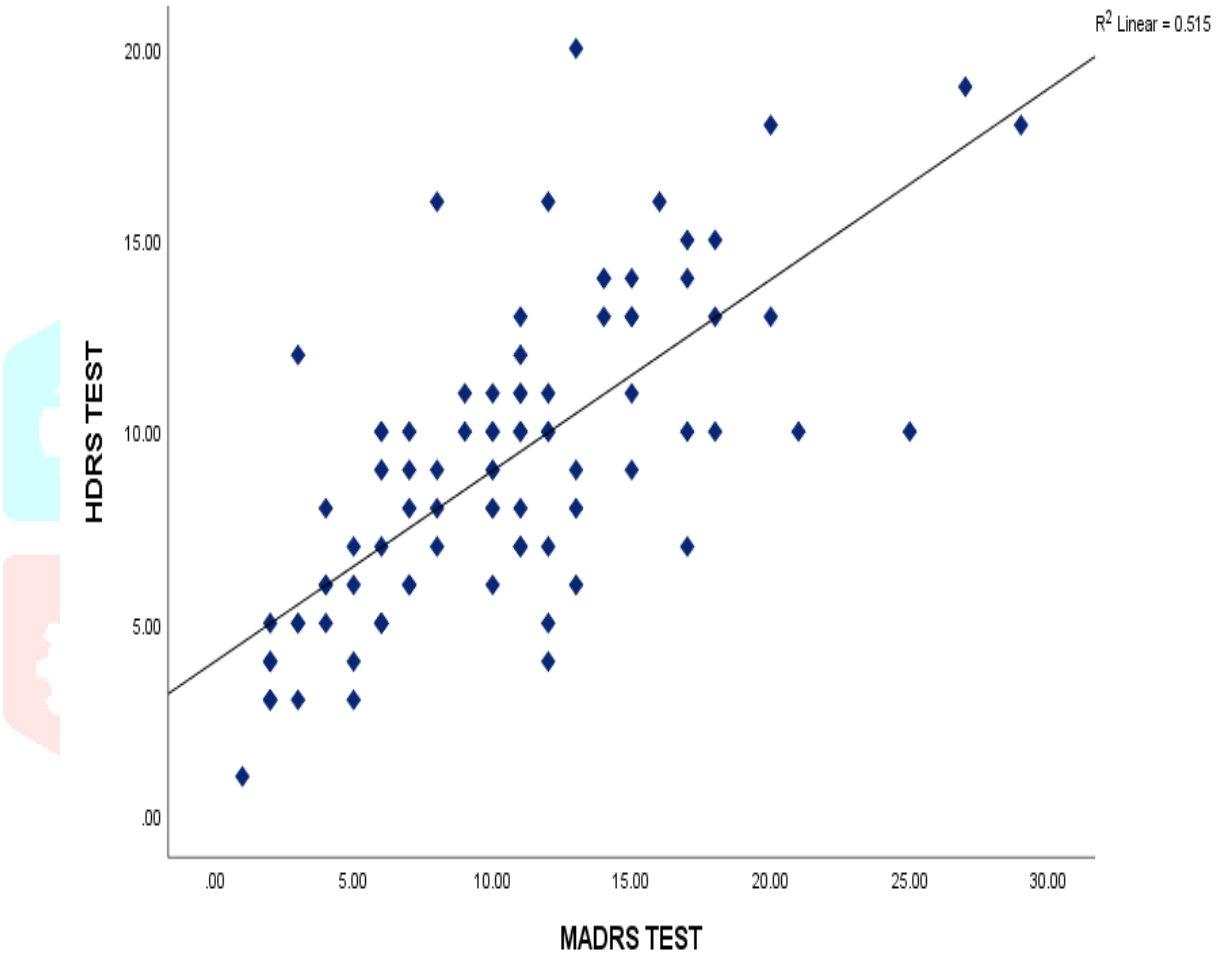


Figure 2. Scatter plot showing correlation of MADRS scores with HDRS scores.

**RESULTS:**

Test-retest Reliability of Montgomery And Asbeg Depression Rating Scale ICC Value is 0.980 which shows excellent test-retest reliability. Inter-rater Reliability of Montgomery And Asberg Depression Rating Scale ICC Value is 0.877 of which shows good inter-rater reliability. Cronbach's alpha >0.9 of both shows Excellent internal consistency. For validity, Montgomery And Asberg Scale were compared with Hamilton Depression Rating Scale, The Spearman's Correlation Value was 0.619 which shows a moderate correlation.

## DISCUSSION:

This study aims to find out the Test-retest Reliability and Inter-rater Reliability of Montgomery Depression Rating Scale as well as Concurrent Validity of it compared with the Hamilton Depression Rating Scale. Results concluded Montgomery And Asberg Depression Rating has Excellent test-retest and good Interrater reliability also it shows excellent internal consistency. Additionally, another objective of this study was to compare both scales for concurrent validity and we found 0.619 which is a moderate correlation.

PSD has regularly been failed to notice. Early observation of PSD leads to early prevention and facilitates successful intervention in the early phase may avert premature deaths and facilitate rehabilitation, reduce costs and refine Quality of life. [(12)] For detection and prevention sufficient tools are required that measures data precisely. Hamilton Depression Rating Scale is widely used and accepted globally as a tool for measuring Depression more precisely still it has many limitations. MADRS is a tool that doesn't take much time compared to HDRS. There are several studies already done to compare both of the scales globally[(23,24)].

**Marie Kmergar** et al conducted a study of the psychometric properties of Beck depression 2, the Montgomery And Asberg depression rating scale, The Hospital Anxiety and Depression Rating Scale in a sample from Healthy Population, they concluded MADRS has high internal consistency and MADRS was moderately correlated with both BDI-2 and HADS-total. [(26)]

**Rebecca w. Iannuzzo** et al conducted a study on the development and reliability of HAM-D/MADRS Interview: An integrated depression symptom rating scale. In this study, they included 50 patients, and an interview was taken. They did the Interclass correlation coefficient (ICC) for individual HAM-D17, MADRS, and HAM-D21 and found values of 0.98, 0.98, and 0.97 respectively. [(23)]

In my study, there is a moderate correlation of 0.619 was found between the two measures. One of the possible reasons for moderate correlation is HDRS contains Anxiety Somatic items & Genital symptoms that are not included in MADRS. so, when a patient's history doesn't represent that similar complaint then MADRS represents as a good tool.

Depression is a disability entity among stroke survivors on and average 1/3rd of stroke survivors developed PSD similar to developed countries as well women have a higher depression score compared with men. [(20)]Despite it was not objective in this study but women are having a higher prevalence of depression scores compared with men. In our study, there is N=20 are female so, gender bias is present. For a gender generalization study was done either with the female or male population.

This study was done at the Same geographical locations like Baroda and Anand as well nearby areas of it, which shows the same geographical distribution but doesn't show generalization of the Indian population. The subacute phase is considered timing after 72 hours of a stroke. [(1)]. Many of the patients I recruited were under observation and had ongoing medications which might affect the test-retest reliability that was one of the limitations. To minimize variability in test-retest reliability this study was conducted at the same time difference of the day. Additionally, at the Age of (62.03±11.43) may have an undiagnosed disease which may affect an individual's mood may impact results.

MADRS is a 10-item scale, which is feasible. It has ratings of 0-6 scores in that, there was no description given for the score of 1,3 &5. So, a therapist can ask the open-handed question to judge a better response. So, According to my personal experience, it is more feasible, easy to use, and takes lesser time compared to HDRS.

## CONCLUSION:

The positive finding of this study concluded that the MADRS scale has not only excellent test-retest reliability& good Interrater reliability but also moderate concurrent validity which shows that MADRS is a very good tool to assess depression in stroke patients.

**LIMITATIONS OF THE STUDY:**

Inter-rater reliability, there is a chance of Minimal bias due to the same experienced observer. It can be checked with people of different experiences. There is a possibility of a variation is due to patients being on medications, so it might affect the overall mood of an individual. The same rater (rater R1 and rater R2) assess the scales twice, overtime may
lead to chances of bias.

**FUTURE SCOPE**:

This study can be done to find out concurrent validity by comparing with a different tool that assesses depression. This study can be done by using the same tool by a different assessor as well in a specific Phase for more appropriate results. This study can be done in different neurological disorders to find out disease-specific cut-off point and reliability values and also done by controlling other variables that might affect the overall result of the Reliability and Validity of Montgomery And Asberg Depression Rating Scale.

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