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DIAGNOSTIC VALUE OF PHQ-9 AND HAMILTON DEPRESSION RATING SCALE IN CLINICAL DETECTION OF POST-STROKE DEPRESSION

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Abstract: *Post-stroke depression (PSD) affects 25-35% of stroke survivors and adversely impacts neurological recovery. This thesis compares the diagnostic accuracy of the Patient Health Questionnaire-9 (PHQ-9) and the Hamilton Depression Rating Scale (HDRS/Hamilton-17) in detecting PSD in acute and subacute stroke patients. A prospective comparative study was conducted involving 96 stroke patients assessed at 1 and 3 months post-stroke. Using a structured psychiatric interview (DSM-5 criteria) as the gold standard, PHQ-9 demonstrated sensitivity of 84.2% and specificity of 81.7%, while the Hamilton scale showed sensitivity of 88.6% and specificity of 79.3%. The Hamilton scale showed superior sensitivity, whereas PHQ-9 offered greater feasibility for routine clinical use. A combined screening protocol is recommended for optimal PSD detection.*

Keywords: *post-stroke depression, PHQ-9, Hamilton depression rating scale, HDRS, diagnostic accuracy, sensitivity, specificity, screening*

1. INTRODUCTION

Post-stroke depression (PSD) is the most prevalent neuropsychiatric complication of cerebrovascular disease, with an estimated prevalence of 25-35% within the first year following stroke onset (Robinson & Jorge, 2016). PSD is independently associated with increased morbidity, prolonged hospitalization, impaired functional recovery, and elevated mortality risk (Ayerbe et al., 2013).

Despite its high clinical significance, PSD is diagnosed in fewer than 30% of affected patients in routine neurological practice (Hackett & Pickles, 2014). A major contributor to this diagnostic gap is the lack of a universally adopted, validated screening instrument adapted for the neurological setting. Two scales are widely used: the Patient Health Questionnaire-9 (PHQ-9), valued for its brevity and self-report format, and the Hamilton Depression Rating Scale (HDRS), valued for its clinical depth and sensitivity to symptom severity.

However, the comparative diagnostic performance of these instruments in the specific context of acute and subacute stroke has not been sufficiently investigated. The present thesis addresses this gap by conducting a prospective head-to-head comparison of PHQ-9 and HDRS in a cohort of stroke patients, using a structured DSM-5 clinical interview as the reference standard.

2. MATERIALS AND METHODS

A prospective, single-center comparative study was conducted at the Neurology Department of Fergana Regional Multidisciplinary Clinical Hospital between January 2023 and June 2024. A total of 96 patients with confirmed ischemic stroke (MRI or CT verified) were enrolled consecutively.

Inclusion criteria: age 18-80 years; stroke diagnosis confirmed within 72 hours; Mini-Mental State Examination (MMSE) score ≥18; no prior psychiatric diagnosis; ability to participate in structured interview. Patients with severe aphasia, profound motor deficit limiting communication, or concurrent pharmacological depression treatment were excluded.

All participants underwent PHQ-9, HDRS-17, and a structured DSM-5 psychiatric interview (gold standard) at two time points: 1 month (subacute phase) and 3 months (early chronic phase) post-stroke. Diagnostic accuracy metrics — sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the ROC curve (AUC) — were calculated using SPSS v.26. Optimal cut-off scores were determined by Youden's index.

3. RESULTS

Of the 96 enrolled participants (mean age 61.4 ± 9.7 years; 54.2% male), 34 (35.4%) met DSM-5 criteria for PSD at 1 month and 29 (30.2%) at 3 months post-stroke. The two instruments were compared across sensitivity, specificity, PPV, NPV, and AUC.

Table 1. Comparative diagnostic accuracy of PHQ-9 and HDRS-17 for PSD detection

Parameter	PHQ-9 (1 mo.)	PHQ-9 (3 mo.)	HDRS (1 mo.)	HDRS (3 mo.)
Optimal cut-off	≥10	≥9	≥14	≥13
Sensitivity	84.2%	82.7%	88.6%	86.2%
Specificity	81.7%	83.9%	79.3%	81.4%
PPV	76.4%	77.1%	74.8%	76.3%
NPV	88.1%	87.6%	91.3%	89.7%
AUC (ROC)	0.872	0.861	0.891	0.879

The HDRS-17 demonstrated marginally superior sensitivity at both assessment points (88.6% vs 84.2% at 1 month), reflecting its capacity to capture somatic and psychomotor symptoms more comprehensively. However, PHQ-9 showed higher specificity at 3 months (83.9% vs 81.4%), suggesting better discriminability in the early chronic phase. Both instruments achieved clinically acceptable AUC values (>0.85), confirming adequate diagnostic performance.

Notably, PHQ-9 required a mean administration time of 4.1 ± 0.8 minutes compared to 18.3 ± 3.2 minutes for HDRS-17 ($p<0.001$), highlighting a significant practical advantage for routine screening in busy neurological wards.

4. DISCUSSION

The results of this study align with existing meta-analytic evidence supporting both PHQ-9 and HDRS as valid PSD screening tools, while revealing clinically meaningful differences in their performance profiles. The HDRS advantage in sensitivity is consistent with its multidimensional structure, which captures vegetative, psychomotor, and

cognitive depression features often prominent in neurological populations (Williams, 2001).

Conversely, PHQ-9's greater feasibility — demonstrated by its significantly shorter administration time and self-report format — renders it more suitable for systematic screening across all admitted stroke patients. Its self-report format also reduces inter-rater variability, an important consideration in multi-clinician settings. A tiered protocol is therefore proposed: PHQ-9 as a first-step universal screen, with HDRS reserved for cases requiring severity quantification or treatment monitoring.

Limitations of this study include its single-center design, the exclusion of patients with severe aphasia — who represent a high-risk PSD subgroup — and the relatively short 3-month follow-up. Future multicenter studies with longer follow-up and aphasia-adapted assessment tools are warranted.

5. CONCLUSION

Both PHQ-9 and HDRS-17 demonstrate clinically valid diagnostic accuracy for PSD detection. The following conclusions are drawn:

- HDRS-17 offers superior sensitivity (88.6%) and is preferable for in-depth clinical assessment and treatment response monitoring.
- PHQ-9 provides greater practical feasibility (4.1 min administration) and is recommended as a first-line universal screening tool in routine stroke neurology.
- A two-step combined protocol — PHQ-9 screening followed by HDRS confirmation — is proposed to optimize both sensitivity and clinical efficiency.
- Screening should be performed at 1 and 3 months post-stroke, as PSD prevalence and instrument performance differ across these time points.

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