Original Article

Comparison of Phq2 and Phq9 As A Screening Tool for Depression in Adolescents Admitted to Tertiary Care Centre

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ABSTRACT

Background: Depression is a significant concern in adolescents, especially in hospitalized patients. Efficient screening tools are critical to detect and manage depression in this population. This study aimed to compare the predictive value of PHQ2 and PHQ9 scores in detecting depression in adolescents in a tertiary care hospital setting.

Methods: A prospective cohort study was conducted involving 70 adolescent patients (aged 10-19 years) admitted in Bangalore Medical College and Research Institute hospitals from March to April 2023. Patients were assessed using PHQ2 and PHQ9 questionnaires during their hospital stay.

Results: Results demonstrated a strong positive correlation between PHQ2 and PHQ9 scores ($r=0.852$, $p<0.01$). Out of the total patients, 25.7% scored ≥ 3 on PHQ2, indicating a risk for depression. PHQ9 categories ranged from Minimal to Severe Depression, with 60.0% of participants falling under Minimal Depression and 14.3% under Mild to Severe Depression categories.

Conclusion: The study confirms the efficacy of both PHQ2 and PHQ9 as reliable screening tools for depression among adolescents in a tertiary care setting. Both tools are advantageous, with PHQ2 offering a rapid initial assessment and PHQ9 providing a detailed evaluation of depression severity. These findings underscore the importance of routine mental health screenings in hospitals.

Key Words: *PHQ2, PHQ9, Depression, Adolescents, Tertiary Care Centre, Mental Health Screening, Hospitalized Patients*
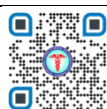
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INTRODUCTION

Depression is a debilitating psychiatric disorder characterized by persistently low mood, lack of interest in activities, and diminished ability to experience pleasure. Affecting individuals of all ages, it is a particularly concerning problem in adolescents, with studies indicating a high prevalence rate among this population [1]. Depression in adolescents is associated with considerable morbidity, including increased risk of substance abuse, academic underperformance, and suicide [2]. Despite the severity of these consequences, depression in adolescents often goes undiagnosed and untreated [3].

Screening tools play a critical role in the early detection and management of depression. Two such widely utilized tools are the Patient Health Questionnaire-9 (PHQ9) and Patient Health Questionnaire-2 (PHQ2) [4]. The PHQ9 is a comprehensive nine-item instrument, whereas the PHQ2 comprises the first two items of the PHQ9 that enquire about the frequency of depressed mood and anhedonia over the past two weeks [5]. Both tools have been validated in multiple settings, including primary and tertiary care, showing a robust correlation with major depressive disorder diagnosis [6].

In the context of a tertiary care center, where patient loads are high, and time is often limited, the shorter PHQ2 could offer significant benefits in terms of efficiency. However, concerns about its sensitivity and specificity in predicting depression in adolescents necessitate further examination. Conversely, while the PHQ9 is more detailed and potentially more sensitive, its length may be prohibitive in a busy tertiary care setting [7].

The objectives of this study are to determine and compare the predictive values of the PHQ2 and PHQ9 scores in predicting depression in adolescents admitted to a tertiary care hospital. The study aims to contribute to a better understanding of the diagnostic capacities of these tools and provide guidance for their use in time-constrained settings. This study also underscores the need for effective, reliable, and quick screening mechanisms in healthcare settings to improve the prognosis of adolescent depression.

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Objectives of the study:

To determine the predictive value of PHQ 2 score over PHQ 9 score in predicting the DEPRESSION of patients in in a tertiary care hospital.

MATERIALS AND METHODS
Study Design and Setting

This prospective cohort study was conducted in March to April 2023 in the pediatric wards of all hospitals attached to Bangalore Medical College and Research Institute (BMCRI).

Study Population and Sample Size

The study population comprised patients in the pediatric department of all hospitals associated with BMCRI. Based on a previous study by Paridhi Anand et al., considering the positive screening results for depression using the PHQ9 and PHQ2 scales, a sample size of 70 was determined [8]. The sample size calculation took into account a 10% attrition rate.

Inclusion and Exclusion Criteria

Included in the study were patients aged 10 to 19 years, who were hemodynamically stable and willing to provide informed consent. Patients with poor Glasgow Coma Scale (GCS) scores, history of head trauma, on antipsychotics or antidepressants, and with neurological issues were excluded from the study. Patients under the age of 10 who were not willing to provide informed consent were also excluded.

Data Collection

After approval from the institutional ethics committee, eligible patients were enrolled upon obtaining informed consent. During their hospital stay, PHQ2 and PHQ9 scores were calculated using health questionnaires. Clinical conditions upon arrival, vitals (including blood pressure, heart rate, temperature, pupillary reaction, and GCS) were documented. The duration of hospital stay, treatment course, and outcome were recorded. Both PHQ2 and PHQ9 scores were assigned to each record.

The screening questionnaire was administered during all visits for patients between the ages of 10 to 19 years. The patients self-administered the questionnaire, with clarifications provided as necessary. The scores were recorded in the patients' medical records. A PHQ-2 score of 2 or more and a PHQ-9 score of 10 or more was considered a positive screen for possible depression.

Statistical Analysis

The data in this study was analysed using descriptive and inferential statistics. The descriptive statistics such as frequencies, percentages, means, medians, and standard deviations were used to summarize and describe the characteristics of the sample, including their age, gender, weight, height, and the primary system affected. One of the central statistical tools utilized in this study was Pearson's correlation. It was used to determine the strength and direction of the relationship between PHQ2 and PHQ9 scores. Additionally, the results were evaluated for statistical significance at a p-value of less than 0.05, which indicates that the findings were unlikely to have occurred by chance. Finally, tables and graphs were utilized to visually represent the collected data, aiding in the clear interpretation and understanding of the results.

RESULTS

Table 1: Distribution of Participants by Age

Row Labels	Count of AGE [yrs] 2	%
10	6	8.57%
11	7	10.00%
12	6	8.57%
13	7	10.00%
14	9	12.86%
15	9	12.86%
16	14	20.00%
17	12	17.14%
Grand Total	**70**	**100.00%**

This table shows the distribution of participants by age in the study. The age of the participants ranges from 10 to 18 years. The smallest group of participants were aged 10 and 12 years, each comprising 8.57% of the total sample. The largest group of participants were aged 16 years, accounting for 20% of the total sample. The proportions of participants in the other age groups varied between 10 and 17.14%. In total, 70 adolescents were included in the study.

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Table 2: Distribution of Participants by Gender

GENDER		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	31	44.3	44.3	44.3
	Male	39	55.7	55.7	100.0
	Total	70	100.0	100.0	

This table presents the distribution of participants by gender in the study. Out of the 70 participants, 44.3% (31 individuals) were female, and 55.7% (39 individuals) were male. This data indicates a slight male predominance in the study sample.

Table 3: Distribution of Participants by Pupil Reflex

PUPIL REFLEX		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	equal	70	100.0	100.0	100.0

This table shows the distribution of pupil reflex among the participants in the study. All participants (100%) showed equal pupil reflex.

Table 4: Distribution of Participants by Primary System Affected

PRIMARY SYSTEM AFFECTED	Frequency	%
CARDIOVASCULAR	1	1.43%
CNS	3	4.29%
ENDOCRINE	2	2.86%
HEMATOLOGICAL	6	8.57%
HEPATOBILIARY	7	10.00%
IMMUNOLOGY	1	1.43%
INFECTIOUS	24	34.29%
MALINGERING	1	1.43%
OTHERS	2	2.86%
PARTIAL HANGING	1	1.43%
POISONING	9	12.86%
RENAL	8	11.43%
RESPIRATORY	4	5.71%
SNAKE BITE	1	1.43%
Grand Total	**70**	**100.00%**

This table represents the distribution of participants by the primary system affected. The majority of participants (34.29%) were affected by infectious diseases, followed by those affected by poisoning (12.86%), and hepatobiliary issues (10.00%). The least common primary system affected included cardiovascular, immunology, malingering, partial hanging, and snake bite, each contributing 1.43% to the total number of cases. In total, 70 patients with different primary systems affected were included in the study.

Table 5: Descriptive Statistics of Participants' Clinical Measures

Statistics										
		AGE[yrs]	WEIGHT[kg]	HEIGHT[cm]	PR[bpm]	TEMP[degree celsius]	RR[cpm]	GCS	SBP	DBP
N	Valid	70	70	70	70	70	70	70	70	70
	Missing	0	0	0	0	0	0	0	0	0
Mean		14.13	42.74	151.14	89.53	36.703	20.49	15.5	111.14	75.71
Median		14.5	42.975	155	90	36.7	20	15	110	80
Std. Deviation		2.29	12.72838	17.237	9.275	0.378	1.549	4.183	6.925	6.272
Range		7	70	121	47	1.9	12	35	20	20
Minimum		10	14	54	65	35.8	16	15	100	60
Maximum		17	84	175	112	37.7	28	50	120	80

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The table provides a comprehensive statistical overview of the participants' clinical measures. The age of the participants ranged from 10 to 18 years with a mean age of approximately 14.13 years and a median age of 14.5 years. The weight of the participants varied greatly, with the lightest weighing 14 kg and the heaviest weighing 84 kg. The mean weight was about 42.74 kg, with a median weight slightly higher at 42.975 kg.

The average height of the participants was around 151.14 cm, with the tallest individual measuring 175 cm and the shortest measuring 54 cm. The median height was 155 cm. The pulse rate (PR) of the participants ranged from 65 bpm to 112 bpm, with a mean rate of approximately 89.53 bpm and a median of 90 bpm.

Regarding body temperature, the participants had an average temperature of 36.703 degrees Celsius, with the median temperature very close to the mean at 36.7 degrees Celsius. The lowest recorded temperature was 35.8 degrees Celsius and the highest was 37.7 degrees Celsius.

The participants exhibited a mean respiration rate (RR) of 20.49 cycles per minute (cpm) with a median of 20 cpm. The Glasgow Coma Scale (GCS) scores were consistent, with both the mean and median score at 15. This indicates a generally good level of consciousness among the participants.

The systolic blood pressure (SBP) of the participants had a mean of 111.14 mmHg and a median of 110 mmHg. The diastolic blood pressure (DBP) showed a mean of 75.71 mmHg and a median of 80 mmHg.

Table 6: Distribution of Participants by PHQ2 Category

PHQ2 Category					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PHQ ≤3	52	74.3	74.3	74.3
	PHQ ≥3	18	25.7	25.7	100.0
	Total	70	100.0	100.0	

This table displays the distribution of participants according to their PHQ2 score categories. Among the participants, a majority (74.3%) scored 3 or less on the PHQ2, suggesting a lower likelihood of depression. In contrast, 25.7% of participants had scores of 3 or above, indicating a higher likelihood of depression. In total, 70 patients were evaluated using the PHQ2 scale in the study.

PHQ9 Category					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mild Depression	18	25.7	25.7	25.7
	Minimal Depression	42	60.0	60.0	85.7
	Moderate Depression	6	8.6	8.6	94.3
	Moderately Severe Depression	2	2.9	2.9	97.1
	Severe Depression	2	2.9	2.9	100.0
	Total	70	100.0	100.0	

This table illustrates the distribution of participants according to their PHQ9 score categories. The majority (60.0%) of participants fell into the "Minimal Depression" category, followed by 25.7% in the "Mild Depression" category. 8.6% of participants were categorized as having "Moderate Depression", while 2.9% each were categorized as having "Moderately Severe Depression" and "Severe Depression". In total, 70 patients were evaluated using the PHQ9 scale in this study.

The PHQ-2 and PHQ-9 results reveal a consistent trend where the majority of participants exhibit lower levels of depression or depressive symptoms. However, the PHQ-9's detailed breakdown further segments this majority, providing greater insight into the intensity of depressive symptoms among participants. Given these results, it seems that both PHQ-2 and PHQ-9 are valuable in identifying depression, albeit with different levels of granularity. The use of one over the other may depend on factors such as available resources, time constraints, and the need for a detailed assessment.

Table 8: Pearson Correlation Coefficients between PHQ2 and PHQ9 Scores

Correlations		
		PHQ9
PHQ2	Pearson Correlation	.852[**]
	Sig. (2-tailed)	0
	N	70

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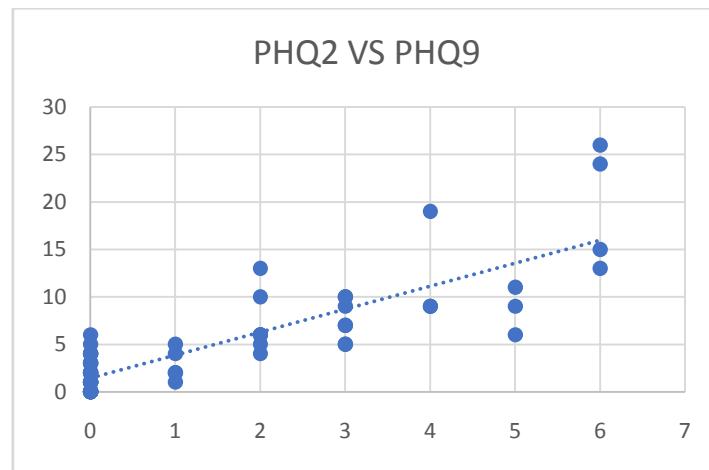
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Figure 1: Scatter diagram of Pearson Correlation Coefficients between PHQ2 and PHQ9 Scores

The Pearson correlation coefficient, a measure of the linear relationship between two variables, reveals a strong positive correlation (r=0.852, p<0.01) between PHQ2 and PHQ9 scores. This suggests that as PHQ2 scores increase, there is a corresponding increase in PHQ9 scores, and vice versa. This correlation signifies that both tools are potentially equally effective in screening for depression in adolescents in tertiary care centers, confirming the primary objectives of this study. Nevertheless, the strengths and limitations of each screening tool, as discussed earlier, should be considered in clinical decision-making.

DISCUSSION

The present study endeavored to compare the efficacy of the PHQ2 and PHQ9 screening tools in predicting depression among adolescents admitted to a tertiary care hospital. With a sample size of 70 participants, our results demonstrated a strong positive correlation between the PHQ2 and PHQ9 scores (r=0.852, p<0.01).

Our finding aligns with previous studies that have demonstrated a significant correlation between PHQ2 and PHQ9, suggesting that both can be reliably used for depression screening in diverse settings [9]. Moreover, the proportion of participants with PHQ2 scores of ≥3 (25.7%) and those categorized as having Mild to Severe Depression by PHQ9 (37.1%) aligns well with previous findings that have found a substantial prevalence of depression among adolescents in hospital settings [10, 11].

In line with Richardson et al. [12], our study showed that the PHQ9, with its multiple categories, offers a more detailed assessment of depression severity, thereby facilitating the development of targeted interventions. The PHQ2, on the other hand, offers an efficient and pragmatic approach to depression screening, particularly in settings where time or resources are limited [13].

It is noteworthy that the majority of the participants in our study exhibited lower levels of depression or depressive symptoms. This could be attributed to a variety of factors, including resilience, social support, or effective coping mechanisms among the adolescents. However, further research is needed to fully understand this trend.

This study adds to the growing body of literature advocating for routine mental health screening in hospital settings [14, 15]. Yet, it also underscores the need for thoughtful application of screening tools and mindful interpretation of results.

In conclusion, both PHQ2 and PHQ9 appear to be effective tools for the identification of depressive symptoms among adolescents in a tertiary care setting, with PHQ2 providing a rapid assessment and PHQ9 offering a more comprehensive evaluation of depression severity.

CONCLUSION

In conclusion, our study supports the use of both the PHQ2 and PHQ9 as effective screening tools for detecting depressive symptoms among adolescents in a tertiary care hospital. Both tools showed a strong correlation, and their individual features offer distinct advantages in diverse healthcare settings. The PHQ2 serves as a rapid, efficient tool for initial depression screening, while the PHQ9 offers a comprehensive assessment of depression severity, aiding in the formulation of targeted interventions. The findings affirm the importance of incorporating routine mental health screenings in hospitals to address the substantial prevalence of depression among adolescent patients. Future research is recommended to refine these screening tools further and to explore other factors influencing depression in adolescents. It is vital to continue striving for optimal mental health care strategies to address the needs of this vulnerable population.

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