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INTEGRATING RADIOLOGICAL FINDINGS INTO PSYCHIATRIC ASSESSMENT: A CROSS-SECTIONAL STUDY.

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ABSTRACT

Background
Psychiatric diagnoses are traditionally based on clinical interviews and behavioral observations, with limited use of neurobiological evidence. Radiological imaging, although underutilized in psychiatry, can reveal structural brain abnormalities that may aid diagnostic and therapeutic decisions. This study evaluates the prevalence and clinical relevance of such findings in psychiatric patients.
Objectives: To investigate the prevalence and types of structural brain abnormalities detected by non-contrast CT imaging in adult psychiatric patients and assess their impact on diagnosis and management.

Methods
A cross-sectional study was conducted with 100 adult psychiatric patients (mean age 38 years; 52% male, 48% female) at a tertiary care center. Psychiatric diagnoses were established using DSM-5 criteria. All participants underwent non-contrast brain CT scans. Radiological findings were analyzed for associations with psychiatric diagnoses and their influence on clinical management.

Results
The most common diagnoses were Major Depressive Disorder (34%), Schizophrenia Spectrum Disorders (26%), Bipolar Disorder (18%), and Generalized Anxiety Disorder (12%). Imaging was normal in 58% of cases. Abnormalities included non-specific white matter changes (17%), cortical atrophy (13%), ventricular enlargement (7%), and other incidental findings (5%). Significant correlations ($p < 0.05$) were found between schizophrenia spectrum disorders and ventricular enlargement and cortical atrophy. Radiological findings influenced diagnostic clarification or management in 18% of patients.

Conclusion
Structural brain abnormalities are present in a substantial minority of psychiatric patients, especially those with psychotic disorders. The prevalence of relevant imaging findings supports the integration of radiological evaluation in psychiatric assessments to improve diagnostic accuracy and guide treatment strategies.

Recommendations
It is recommended to integrate radiological imaging more frequently in psychiatric assessments, especially for psychotic disorders, to enhance diagnostic accuracy and guide treatment decisions, improving patient outcomes.

Keywords: *Radiology, Psychiatry, Brain Imaging, Psychiatric Assessment, Neuroimaging*
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INTRODUCTION

Psychiatric disorders have long been diagnosed through clinical interviews, behavioral assessments, and standardized diagnostic criteria, most notably the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*. While these frameworks remain the cornerstone of psychiatric evaluation, they largely depend on subjective interpretations of symptoms, often lacking integration with objective biological or neuroanatomical markers that could enhance diagnostic accuracy and understanding of disease pathology [1].
Advancements in radiological imaging, particularly computed tomography (CT) and magnetic resonance

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imaging (MRI), have transformed diagnostic practices in neurology and other specialties. However, the routine application of imaging in psychiatry remains restricted, typically reserved for excluding organic causes such as tumors, trauma, or infections [4]. This underutilization persists despite emerging evidence supporting the value of imaging in detecting structural abnormalities, such as cortical atrophy, ventricular enlargement, and white matter changes, in patients with psychiatric conditions [2][5].

The relevance of neuroimaging in psychiatry is increasingly recognized, especially in psychotic and mood disorders. In schizophrenia, imaging studies frequently report ventricular enlargement and reductions in gray matter volume, while in mood disorders, findings such as cortical thinning and white matter hyperintensities have been linked to illness severity and prognosis [6][7]. These abnormalities provide insight into the neurobiological underpinnings of psychiatric conditions and highlight the potential of imaging to aid in early detection, diagnostic clarification, and treatment planning [1][6].

Despite the expanding body of evidence, the absence of standardized protocols for incorporating neuroimaging into psychiatric practice has led to its inconsistent application across clinical environments. Moreover, novel imaging fields such as radiomics and artificial intelligence-enhanced imaging analytics are emerging as promising frontiers for psychiatric diagnosis and research, enabling the extraction of high-dimensional data from standard scans that may reveal subtle pathophysiological signatures [2][3].

Overall, there is a compelling need to bridge the gap between psychiatric diagnostics and neuroimaging. Doing so could transform clinical practice by shifting from a purely symptom-based model to one that incorporates objective, measurable brain-based markers, fostering precision psychiatry and reducing the risks of misdiagnosis and delayed treatment [1][2][4].

This study aims to explore the prevalence and nature of radiological abnormalities in a cohort of adult psychiatric patients and to assess the impact of these findings on clinical diagnosis and management. By investigating the associations between psychiatric diagnoses and structural brain abnormalities observed on non-contrast CT imaging.

METHODOLOGY

Study Design

A cross-sectional observational study was conducted to assess the integration of radiological findings into psychiatric assessment. The study aimed to identify structural brain abnormalities detected by non-contrast CT imaging and evaluate their association with various psychiatric diagnoses.

Study Setting and Duration

The study was carried out at the Department of Psychiatry in collaboration with the Department of Radiology, ESIC Medical College and Hospital, Sanath Nagar, Hyderabad. ESIC Medical College and Hospital is a tertiary care teaching hospital equipped with advanced radiological facilities and a multidisciplinary clinical team. The study duration was 12 months, from January 2024 to December 2024.

Study Population and Sample Size

The study enrolled 100 adult patients aged 18 years and above presenting to psychiatry outpatient or inpatient services for diagnostic evaluation. The sample size of 100 was determined based on previous similar studies assessing radiological abnormalities in psychiatric populations and logistical feasibility within the study duration. This sample size provides adequate power to estimate the prevalence of radiological abnormalities with reasonable precision and to explore associations with psychiatric diagnoses.

Inclusion Criteria

- Adults aged 18 years and above undergoing psychiatric evaluation.
- Patients willing and medically eligible to undergo non-contrast computed tomography (CT) brain imaging.
- Patients who provided written informed consent.

Exclusion Criteria

- Patients with pre-existing diagnosed neurological disorders such as epilepsy, stroke, or brain tumors.
- Patients with a documented history of moderate to severe traumatic brain injury.
- Patients with medical contraindications to CT imaging (e.g., pregnancy).
- Patients who declined or were unable to provide informed consent.

Bias

Blinding: Radiological scans were independently interpreted by two experienced radiologists blinded to the patients' psychiatric diagnoses and clinical details to reduce interpretation bias.

Standardized protocols: Imaging and clinical assessments were performed using standardized protocols to ensure uniformity.

Data entry and analysis were conducted by personnel not involved in patient evaluation to minimize observer bias.

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Diagnostic Procedure

Psychiatric diagnoses were established according to DSM-5 criteria through detailed clinical interviews performed by qualified psychiatrists. Sociodemographic and clinical information was collected using a structured proforma.

Radiological Assessment

Non-contrast CT brain scans were performed at the Department of Radiology using a standardized imaging protocol. Radiologists recorded findings including cortical atrophy, ventricular enlargement, white matter changes, and any incidental abnormalities.

Data Collection and Analysis

Data were systematically recorded and entered into Microsoft Excel, then analyzed using SPSS version 25.0. Descriptive statistics summarized demographic and clinical characteristics. The prevalence of radiological abnormalities and their distribution across psychiatric diagnoses were analyzed using Chi-square or Fisher's exact tests as appropriate. A p-value of < 0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Ethics Committee of ESIC Medical College and Hospital, Hyderabad. All participants were informed about the study objectives, procedures, and confidentiality safeguards, and written informed consent was obtained before enrollment. Patient anonymity and data confidentiality were strictly maintained throughout the study.

RESULTS

Participant Flow

A total of 130 adult patients presenting for psychiatric evaluation were initially screened for eligibility. Of these, 110 patients met the inclusion criteria and were approached for participation. Ten patients declined consent or were unable to undergo CT imaging due to medical contraindications, resulting in 100 patients enrolled in the study. All enrolled participants completed the imaging and clinical assessments and were included in the final analysis.

Sociodemographic Characteristics

The study population comprised 100 adult patients with a mean age of 35.4 years (SD ± 10.8), including 52% males and 48% females. The majority of participants were from urban backgrounds (65%), with the remaining 35% from rural areas. Educational levels varied, with 40% having completed secondary education, 30% higher secondary or above, and 30% with primary education or less. Socioeconomic status was distributed as 50% middle class, 30% lower class, and 20% upper class based on the Modified Kuppuswamy Scale.

Distribution of Psychiatric Diagnoses

The most common psychiatric diagnosis was Major Depressive Disorder (34%), followed by Schizophrenia Spectrum Disorders (26%), Bipolar Disorder (18%), Generalized Anxiety Disorder (12%), and other disorders including Obsessive-Compulsive Disorder (OCD) and Post-Traumatic Stress Disorder (PTSD) (10%) (Table 1).

Table 1: Distribution of Psychiatric Diagnoses (n = 100)

Psychiatric Diagnosis	Number of Patients (n)	Percentage (%)
Major Depressive Disorder	34	34%
Schizophrenia Spectrum Disorders	26	26%
Bipolar Disorder	18	18%
Generalized Anxiety Disorder	12	12%
Others (including OCD, PTSD, etc.)	10	10%

Radiological Findings

Non-contrast CT brain imaging was normal in 58% of participants. Among abnormal findings, non-specific white matter changes were most frequent (17%), followed by cortical atrophy (13%), ventricular enlargement (7%), and other incidental findings such as arachnoid cysts and calcifications (5%) (Table 2).

Table 2: Radiological Findings on Non-Contrast Brain CT (n = 100)

Radiological Finding	Number of Patients (n)	Percentage (%)
Normal	58	58%
Non-specific white matter changes	17	17%
Cortical atrophy	13	13%
Ventricular enlargement	7	7%
Other incidental findings	5	5%

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When stratified by psychiatric diagnosis, abnormal imaging findings were most frequently observed in patients with Schizophrenia Spectrum Disorders, where 69.2% (18 out of 26) of patients demonstrated either ventricular enlargement or cortical atrophy, a statistically significant relationship ($p < 0.05$) (Table 3, Figure No.1)

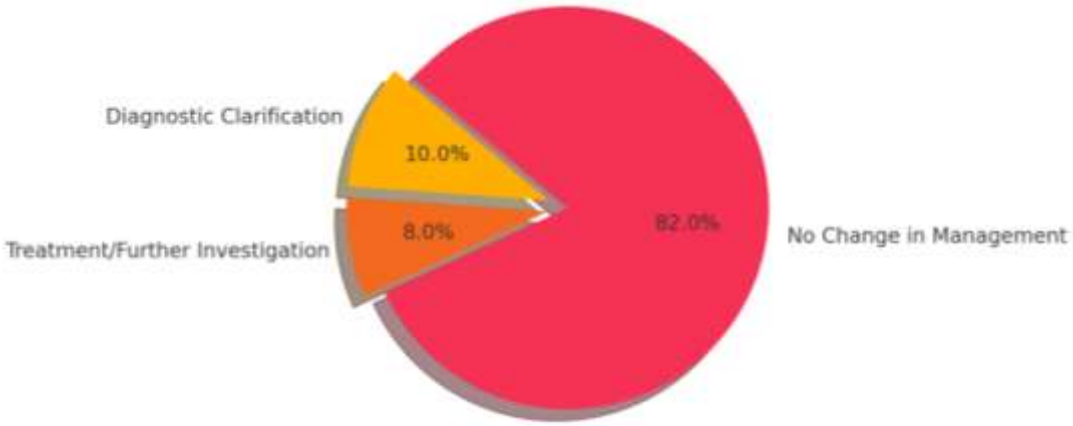

Figure No.1 Impact of Imaging on Diagnosis and Management

Association Between Radiological Abnormalities and Psychiatric Diagnoses

Abnormal imaging findings were most frequently observed in patients with Schizophrenia Spectrum Disorders; 69.2% (18/26) of these patients exhibited either ventricular enlargement or cortical atrophy, a statistically significant association ($p < 0.05$). Although some patients with Bipolar Disorder and Major Depressive Disorder exhibited abnormalities such as cortical atrophy and white matter changes, these did not reach statistical significance. Patients with Generalized Anxiety Disorder showed no consistent pattern of radiological abnormalities (Table 3).

Table 3: Association Between Radiological Abnormalities and Psychiatric Diagnoses

Diagnosis	Patients with Abnormal Imaging (n)	Key Abnormality Observed	Statistical Significance (p-value)
Schizophrenia Spectrum Disorders	18/26	Ventricular enlargement, cortical atrophy	$p < 0.05$
Bipolar Disorder	5/18	Cortical atrophy	Not significant
Major Depressive Disorder	9/34	White matter changes	Not significant
Generalized Anxiety Disorder	2/12	No consistent pattern	Not significant

Impact of Imaging on Diagnosis and Management

Radiological findings influenced diagnostic clarification in 10% of cases and led to changes in treatment or further neurological consultation in 8% of patients. However, in 82% of cases, imaging did not result in any change in clinical management (Table 4).

Table 4: Impact of Imaging on Diagnosis and Management

Clinical Utility of Imaging	Number of Cases (n)	Percentage (%)
Influenced diagnostic clarification	10	10%
Led to changes in treatment or further investigation	8	8%
No change in clinical management	82	82%

DISCUSSION

This cross-sectional study found that 42% of patients undergoing psychiatric evaluation exhibited radiologically detectable structural brain abnormalities, with the highest prevalence among those diagnosed with schizophrenia spectrum disorders. This finding suggests that structural brain changes are relatively common in psychiatric populations, particularly in psychotic disorders, and may reflect underlying

neurodevelopmental and neurodegenerative processes unique to these conditions. The elevated frequency of abnormalities in schizophrenia spectrum disorders supports the hypothesis that these conditions involve neurodevelopmental and neurodegenerative processes reflected in changes such as ventricular enlargement and cortical atrophy [8,12]. The detection of such abnormalities reinforces the role of neuroimaging as an adjunctive tool that may contribute objective biological evidence to complement clinical assessment in psychiatry.

Non-specific white matter changes were the most frequently observed imaging abnormality (17%), followed by cortical atrophy (13%) and ventricular enlargement (7%). These findings are consistent with prior neuroimaging studies that highlight the significance of white matter lesions and cortical thinning in both affective and psychotic disorders [9,12]. The presence of white matter changes in patients with Major Depressive Disorder, although not statistically significant in this study, aligns with literature linking such alterations to late-onset depression and vascular contributions to mood disorders [13]. The absence of significant associations in these cohorts may reflect sample size constraints, heterogeneity in diagnosis, or the limited sensitivity of CT imaging for subtle changes. Similarly, the sporadic occurrence of cortical atrophy in Bipolar Disorder without a definitive imaging pattern corresponds to the variability reported across different populations and imaging modalities [8].

The statistically significant association observed between schizophrenia spectrum disorders and specific imaging abnormalities, particularly ventricular enlargement and cortical atrophy ($p < 0.05$), underscores the translational relevance of neuroimaging when applied with clear diagnostic intent [8]. Importantly, imaging findings influenced clinical management in 18% of cases, either by clarifying diagnoses or prompting treatment modifications and further investigations. This demonstrates the practical utility of routine neuroimaging in psychiatric care, especially for atypical or treatment-resistant cases where conventional clinical evaluation alone may be insufficient [12,14]. Emerging advances in artificial intelligence and imaging analytics further augment this potential by enabling more individualized diagnostic approaches [10].

Despite these promising findings, 58% of patients showed normal CT results, emphasizing that structural abnormalities detectable by conventional imaging are not ubiquitous across all psychiatric disorders. This highlights the necessity of integrating imaging findings with comprehensive clinical evaluation rather than relying on imaging as a standalone diagnostic tool [13]. Additionally, incidental findings were identified in 5% of cases, which necessitates cautious interpretation to avoid overdiagnosis and unnecessary interventions, reflecting ongoing concerns regarding the responsible application of psychiatric neuroimaging [13].

While this study utilized non-contrast CT, which may lack sensitivity for subtle or functional neuroanatomical changes, it offers valuable insights, particularly relevant to resource-limited settings where advanced imaging modalities may not be readily accessible. The findings advocate for further research using magnetic resonance imaging (MRI), functional imaging techniques, and standardized protocols such as those recommended by recent initiatives to improve diagnostic accuracy and clinical translation in psychiatry [14].

GENERALIZABILITY

The study's findings are most applicable to adult psychiatric patients evaluated in tertiary care centers with similar clinical and demographic profiles. Variation in psychiatric diagnoses, imaging modalities, and patient populations in other settings may affect the prevalence and types of structural abnormalities detected. Therefore, caution should be exercised when generalizing these results to broader or more heterogeneous psychiatric cohorts, especially where different diagnostic criteria or advanced imaging tools like MRI are used.

CONCLUSION

This study demonstrates that structural brain abnormalities are prevalent in psychiatric patients, especially those with schizophrenia spectrum disorders, with 42% showing detectable changes on CT imaging. This prevalence supports the role of neuroimaging as a useful adjunct in psychiatric evaluation, aiding diagnosis and informing management in a substantial proportion of patients. However, the high proportion of normal imaging results also emphasizes that neuroimaging should complement, not replace, thorough clinical assessment. These findings support the adjunctive role of neuroimaging in psychiatric evaluation, guiding diagnosis and management in a significant subset of patients. However, the substantial proportion of normal imaging results underscores the importance of a multidisciplinary approach combining clinical expertise and neuroimaging to optimize psychiatric care.

LIMITATIONS

This study has several limitations. Firstly, it utilized non-contrast CT, which has lower sensitivity compared to MRI in detecting subtle neuroanatomical changes. Secondly, the sample size was modest, and the cross-sectional design does not allow for causal inferences. Finally, functional imaging modalities such as fMRI or PET, which might have provided deeper insight into neurobiological dysfunctions, were not included.

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IMPLICATIONS AND FUTURE DIRECTIONS

Despite these limitations, the study provides valuable preliminary evidence supporting the integration of structural imaging into psychiatric assessments. Future studies with larger cohorts, inclusion of MRI or multimodal imaging, and longitudinal follow-up may further elucidate the diagnostic and prognostic relevance of neuroimaging in psychiatry.

RECOMMENDATIONS

It is recommended that psychiatric practice incorporate radiological imaging, especially for patients with psychotic disorders, to improve diagnostic accuracy. Regular use of imaging, such as non-contrast CT, can reveal structural abnormalities that may support or refine diagnoses, particularly in conditions like schizophrenia. Collaboration between psychiatrists and radiologists should be encouraged to ensure a holistic approach to patient care. Additionally, further research is needed to explore the role of imaging in other psychiatric conditions and its potential impact on treatment planning and outcomes.

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LIST OF ABBREVIATIONS

DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
CT: Computed Tomography
OCD: Obsessive-Compulsive Disorder
PTSD: Post-Traumatic Stress Disorder
MDD: Major Depressive Disorder
MRI: Magnetic Resonance Imaging
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The study had no funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

DMS-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript. NNR- Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript, revision of the manuscript.AHP-Review of literature and preparing the first draft of the manuscript. Statistical analysis and interpretation.

DATA AVAILABILITY

Data Available

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