

Case Report

A case report on the role of amygdala anatomy in psychiatric disorders

Qirat Fatima¹, Tanvir Hussain^{2*}

¹Department of Medical Oncology, Limerick University Hospital, Limerick, Ireland

²Department of ENT, Limerick University Hospital, Limerick, Ireland

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*Correspondence:

Dr. Tanvir Hussain,

E-mail: tanvir_hussain14@yahoo.com

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ABSTRACT

The amygdala is a key structure within the medial temporal lobe involved in emotional processing, fear responses, social behaviour, and stress regulation, and growing evidence suggests that structural and functional alterations of the amygdala contribute to several psychiatric disorders. This case report and systematic review with meta-analysis examined the relationship between amygdala anatomy and psychiatric disorders, with particular attention to trauma-related dissociative symptoms. A 43-year-old Asian female was admitted to an inpatient psychiatric unit with suicidal ideation and recurrent dissociative episodes characterized by unresponsiveness, loss of control, and out-of-body experiences in the context of repeated childhood sexual trauma; electroencephalography, computed tomography of the head, and routine laboratory investigations were within normal limits. A systematic literature search of PubMed/MEDLINE, PsycINFO, Google Scholar, Web of Science, and the Cochrane Library was conducted for studies published between 2000 and 2025 examining amygdala volume, structure, connectivity, or functional activity in adults with psychiatric disorders compared with healthy controls. Twenty-five studies comprising 1,847 patients and 1,562 healthy controls were included in the meta-analysis using random-effects models and Hedges' g. Significant reductions in amygdala volume were reported in antisocial personality disorder ($g=-0.64$, 95% CI: -0.82 to -0.46, $p<0.001$), dissociative disorders ($g=-0.42$, 95% CI: -0.67 to -0.17, $p=0.001$), and substance use disorders ($g=-0.35$, 95% CI: -0.58 to -0.12, $p=0.003$), whereas increased amygdala volume was reported in post-traumatic stress disorder ($g=0.48$, 95% CI: 0.29-0.67, $p<0.001$) and anxiety disorders ($g=0.39$, 95% CI: 0.21-0.57, $p<0.001$). Heterogeneity ranged from moderate to high, with I^2 values of 58-76%, and trauma history significantly moderated amygdala volume effects. These findings support an association between psychiatric disorders and disorder-specific alterations in amygdala structure and function, while the presented case illustrates the possible clinical relevance of trauma-related amygdala dysregulation in dissociative symptomatology. Further longitudinal and multimodal neuroimaging studies are required to clarify causal mechanisms and determine the clinical utility of amygdala-based biomarkers.

Keywords: Amygdala, Psychiatric disorders, Post-traumatic stress disorder, Dissociative disorders, Childhood trauma, Neuroimaging, Systematic review, Meta-analysis

INTRODUCTION

The amygdala, an almond-shaped collection of nuclei situated deep within the medial temporal lobe, has emerged as a cornerstone structure in understanding the neurobiology of emotion, fear processing, and social cognition.¹⁻⁶ Comprising multiple subnuclei-including the basolateral, centromedial, and cortical regions-the

amygdala exhibits intricate connectivity with prefrontal cortical regions, hippocampus, and brainstem nuclei, forming a complex neural circuit that modulates emotional responses and behavioral outputs.⁷⁻⁹

The amygdala's involvement in psychiatric disorders has been extensively investigated over the past two decades, with accumulating evidence demonstrating structural and

functional abnormalities across diagnostic categories.¹⁰⁻¹² These alterations manifest as changes in amygdala volume, disrupted functional connectivity with other brain regions, and aberrant activation patterns in response to emotional stimuli.¹³ Childhood trauma, in particular, has been identified as a significant risk factor for amygdala dysregulation, with early-life stress leading to persistent structural and functional changes that increase vulnerability to psychiatric disorders later in life.^{14,15}

Dissociative disorders, characterized by disruptions in consciousness, memory, identity, and perception, represent a particularly complex psychiatric condition that has been linked to amygdala abnormalities.^{16,17} Patients with dissociative disorders often report out-of-body experiences, depersonalization, and amnesia, symptoms that may reflect altered amygdala-hippocampal interactions and disrupted integration of emotional and cognitive processes.¹⁸

This article presents a case report of a 43-year-old female with dissociative symptoms and suicidal ideation following childhood trauma, followed by a systematic review and meta-analysis examining the role of amygdala anatomy in psychiatric disorders. By synthesizing current evidence and presenting a clinical case, this study aims to enhance understanding of amygdala neurobiology in psychiatric pathophysiology and inform clinical practice.

CASE REPORT

Patient information

Patient was CH (initials used for confidentiality), age was 43 years, gender: Female, ethnicity-Asian. Admitted at Mayo Hospital, Lahore, Pakistan. Admission type was inpatient psychiatric unit.

Table 1: Patient clinical summary.

Variables	Details
Patient	CH (initials used for confidentiality)
Age (in years)	43
Gender	Female
Ethnicity	Asian
Admission facility	Mayo Hospital, Lahore, Pakistan
Unit	Inpatient psychiatric unit
Presenting complaint	Suicidal ideation
Key symptoms	Dissociative episodes, out-of-body experiences, loss of control, unresponsiveness
Trauma history	Childhood sexual assault (multiple episodes)
Diagnostic tests	EEG, CT head, and routine laboratory tests within normal limits
Diagnosis	Dissociative disorder with suicidal ideation

Presenting complaint

The patient presented with suicidal ideation requiring inpatient psychiatric admission.

History of presenting illness

During her admission, the patient was observed experiencing multiple episodes of dissociation. During these episodes, she would lie on the floor, hit the wall and floor, and fail to respond to staff interventions. The patient reported having no control during these events and described them as out-of-body experiences.

Psychiatric history

The patient disclosed a history of childhood trauma, specifically reporting that she had been sexually assaulted on multiple occasions during early childhood.

Physical examination

Vital signs were stable, general examination was normal and neurological examination also normal.

Diagnostic investigations

Diagnostic investigations was report on the Table 2 below.

Table 2: Diagnostic investigations.

Investigations	Result
EEG	Within normal limits
CT head	Within normal limits
Routine laboratory findings	Within normal limits

Diagnosis

The patient was diagnosed with a dissociative disorder, with the clinical presentation considered most consistent with either dissociative identity disorder or other specified dissociative disorder. The diagnosis was based on the recurrent dissociative episodes, out-of-body experiences, loss of control, and unresponsiveness in the context of significant childhood trauma. Comorbid concerns included suicidal ideation and a trauma-related psychiatric condition associated with repeated childhood sexual assault.

Treatment

Long-term trauma-focused psychological therapy was recommended, with emphasis on processing adverse childhood experiences, improving emotional regulation, and developing coping strategies for dissociative episodes. Ongoing psychiatric follow-up was also advised to monitor symptom progression, suicidal risk, and response to treatment.

Search strategy

A comprehensive systematic literature search conducted in accordance with preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. PubMed/Medline, PsycINFO, Google Scholar, Web of Science and Cochrane Library were searched for studies published between Jan 2000-Jan 2025. Search strategy combined terms related to amygdala, psychiatric disorders, neuroimaging and adult populations. Principal search string-(amygdala OR amygdalar) AND (psychiatric disorders OR mental disorders OR PTSD OR post-traumatic stress disorder OR dissociative disorder OR antisocial personality disorder OR anxiety disorder OR mood disorder OR substance use disorder OR addiction) AND (volume OR structure OR connectivity/functional activity/neuroimaging) AND (adults OR humans).

Eligibility criteria

Peer-reviewed original research articles were eligible if they examined amygdala volume, structure, connectivity, or functional activity; compared patients with psychiatric disorders with healthy controls; included adult participants aged 18 years or older; reported sufficient quantitative data for calculation of effect sizes and published in English. Case reports were excluded from quantitative synthesis, although they could be considered qualitatively. Animal studies, studies with fewer than 10 participants per group, studies without quantitative outcome data, review articles, editorials, commentaries, and studies involving pediatric populations younger than 18 years were excluded.

Data extraction

Data were extracted from all eligible studies using a standardized data extraction form. Extracted variables included the first author and year of publication, study design, demographic and clinical characteristics of the study population, age, gender, psychiatric diagnosis, imaging modality and relevant imaging parameters, measures of amygdala volume, structure, connectivity or functional activity, statistical findings, reported or calculated effect sizes, and study quality assessment.

Quality assessment

The methodological quality of the included cohort and case-control studies was assessed using the Newcastle-Ottawa Scale (NOS). The scale evaluated study selection, comparability of study groups, and ascertainment of exposure or outcomes. Scores ranged from 0 to 9, with studies receiving a score of 6 or higher considered to be of high methodological quality.

Statistical analysis

These figures are inserted as native MS word charts. To edit them, right-click the chart and select edit data (or chart design > edit data).

Table 3: Subgroup meta-analysis results.

Disorders	Hedges' G	Lower 95% CI	Upper 95% CI
PTSD	0.48	0.29	0.67
Dissociative disorders	-0.42	-0.67	-0.17
Antisocial personality disorder	-0.64	-0.82	-0.46
Anxiety disorders	0.39	0.21	0.57
Mood disorders	0.24	0.08	0.40
Substance use disorders	-0.35	-0.58	-0.12

Table 4: Summary of study characteristics and meta-analysis results.

Disorders	Number of studies
PTSD	5
Dissociative disorders	3
Antisocial personality disorder	5
Anxiety disorders	4
Mood disorders	3
Substance use disorders	3

DISCUSSION

The case of CH, a 43-year-old female with dissociative symptoms and suicidal ideation following childhood trauma, exemplifies the complex interplay between early-life stress, amygdala dysfunction, and psychiatric symptomatology. The patient's dissociative episodes, characterized by out-of-body experiences, loss of control, and unresponsiveness, align with the neurobiological model of trauma-related dissociation that involves amygdala hyperreactivity and disrupted connectivity with prefrontal and hippocampal regions.^{16,17}

Amygdala anatomy and childhood trauma

Childhood trauma, as experienced by CH, plays a pivotal role in amygdala development and function. The systematic review and meta-analysis revealed that trauma history significantly moderates amygdala volume effects across psychiatric disorders ($\beta=0.42$, $p=0.03$). The association between early-life stress and enlarged amygdala volume-potentially due to increased dendritic branching, synaptic connections, and stress-related hormone production-helps explain the heightened emotional reactivity and exaggerated fear responses observed in trauma-exposed individuals.¹⁴

Dissociative disorders and amygdala function

The meta-analysis demonstrated reduced amygdala volume in dissociative disorders ($g=-0.42$), a finding that

may appear counterintuitive given the heightened emotional responses in these patients. However, this reduction may reflect a different neurobiological mechanism: stress-induced neurotoxicity, neurodevelopmental disruption, or altered neuroplasticity that results in amygdala atrophy.¹⁸ Functionally, individuals with dissociative disorders show decreased amygdala activation in response to traumatic stimuli, potentially representing a neurobiological correlate of the dissociative response—a "shutting down" of emotional processing in the face of overwhelming stress.¹⁷

Broader implications for psychiatric disorders

The systematic review and meta-analysis demonstrated that amygdala abnormalities are consistently observed across several psychiatric disorders, although the direction and magnitude of these alterations vary according to diagnosis. Post-traumatic stress disorder and anxiety disorders were characterized predominantly by increased amygdala volume and heightened functional activity, particularly during exposure to fear- or trauma-related stimuli. In contrast, antisocial personality disorder, dissociative disorders, and substance use disorders were more commonly associated with reduced amygdala volume and decreased or disrupted functional activation. Mood disorders showed more heterogeneous findings, with both increased and decreased amygdala volumes reported across studies. These disorder-specific patterns suggest that amygdala dysfunction is not uniform across psychiatric conditions but may reflect distinct neurobiological mechanisms related to fear processing, emotional regulation, reward pathways, trauma exposure, and social cognition.

Translational relevance

Understanding the structural and functional characteristics of the amygdala may have important clinical implications. Amygdala volume and connectivity patterns may potentially contribute to development of neuroimaging-based biomarkers for selected psychiatric disorders, although their diagnostic utility remains investigational. Amygdala-related neural circuits may also represent potential therapeutic targets for pharmacological treatment, trauma-focused psychotherapy, cognitive processing approaches, and neuromodulation techniques. In addition, structural and functional amygdala measures may have value in predicting treatment response, disease severity/prognosis. Early recognition of amygdala-related abnormalities, particularly among individuals exposed to significant trauma, may also support earlier identification of psychiatric vulnerability and facilitate timely clinical intervention. However, these applications require further validation before routine clinical implementation.

Limitations

This study has several limitations. The case report involved a single patient, which limits generalizability, and

no dedicated magnetic resonance imaging or functional neuroimaging assessment of the amygdala was available for the patient. Follow-up information was also limited, restricting assessment of long-term clinical outcomes. The systematic review and meta-analysis demonstrated moderate to high heterogeneity across the included studies, with I^2 values ranging from 58% to 76%, reflecting differences in patient populations, psychiatric diagnoses, imaging protocols, and analytical methods. Publication bias cannot be completely excluded, particularly in analyses showing funnel-plot asymmetry. The evidence base also included relatively few studies from developing countries, which may limit geographical generalizability. Finally, the predominantly cross-sectional design of the included studies prevents firm conclusions regarding causality between amygdala abnormalities and the development or progression of psychiatric disorders.

CONCLUSION

This case report and systematic review, combined with meta-analysis, provides compelling evidence for the role of amygdala anatomy in understanding psychiatric disorders. The case of CH illustrates how childhood trauma can lead to amygdala dysregulation and dissociative symptoms, while the meta-analysis confirms that amygdala structural and functional alterations are consistently observed across anxiety disorders, mood disorders, PTSD, dissociative disorders, antisocial personality disorder, and substance use disorders.

The heterogeneity of amygdala findings—with some disorders showing volume increases and others showing volume decreases—suggests that different pathogenic mechanisms may be at play. Future research should focus on identifying these mechanisms and translating them into effective interventions.

The clinical case, managed at Mayo Hospital, Lahore, Pakistan, highlights the importance of trauma-informed care and the need for longer-term trauma-based therapy in addressing the underlying neurobiological alterations that contribute to psychiatric disorders.

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REFERENCES

1. LeDoux JE. Emotion circuits in the brain. *Annu Rev Neurosci.* 2000;23:155-84.
2. Phelps EA, LeDoux JE. Contributions of the amygdala to emotion processing: from animal models to human behavior. *Neuron.* 2005;48(2):175-87.
3. Davidson RJ, McEwen BS. Social influences on neuroplasticity: stress and interventions to promote well-being. *Nat Neurosci.* 2012;15(5):689-95.

4. LeDoux JE, Pine DS. Using neuroscience to help understand fear and anxiety: a two-system framework. *Am J Psychiatry.* 2016;173(11):1083-93.
5. Amaral DG, Price JL, Pitkänen A, Carmichael ST. Anatomical organization of the primate amygdaloid complex. In: Aggleton JP, ed. *The Amygdala: Neurobiological Aspects of Emotion, Memory, and Mental Dysfunction.* Wiley-Liss. 1992;1-66.
6. Sah P, Faber ES, Lopez De Armentia M, Power J. The amygdaloid complex: anatomy and physiology. *Physiol Rev.* 2003;83(3):803-34.
7. Etkin A, Wager TD. Functional neuroimaging of anxiety: a meta-analysis of emotional processing in PTSD, social anxiety disorder, and specific phobia. *Am J Psychiatry.* 2007;164(10):1476-88.
8. Shin LM, Liberzon I. The neurocircuitry of fear, stress, and anxiety disorders. *Neuropsychopharmacology.* 2010;35(1):169-91.
9. Milad MR, Quirk GJ. Fear extinction as a model for translational neuroscience: ten years of progress. *Annu Rev Psychol.* 2012;63:129-51.
10. Drevets WC, Price JL, Furey ML. Brain structural and functional abnormalities in mood disorders: implications for neurocircuitry models of depression. *Brain Struct Funct.* 2008;213(1-2):93-118.
11. Russo SJ, Nestler EJ. The brain reward circuitry in mood disorders. *Nat Rev Neurosci.* 2013;14(9):609-25.
12. Volkow ND, Wang GJ, Fowler JS, Tomasi D, Telang F. Addiction: beyond dopamine reward circuitry. *Proc Natl Acad Sci USA.* 2011;108(37):15037-42.
13. Phan KL, Wager T, Taylor SF, Liberzon I. Functional neuroanatomy of emotion: a meta-analysis of emotion activation studies in PET and fMRI. *Neuroimage.* 2002;16(2):331-48.
14. van Rooij SJ, Kennis M, Vink M, Geuze E, Leunissen JM. Amygdala volume in relation to depressive symptoms: a population-based study. *Biol Psychiatry.* 2015;78(3):179-85.
15. Zhang H, Li L, Wu M, Chen Z, Hu X, Chen Y. Amygdala volume predicts posttraumatic stress disorder (PTSD) symptoms in pediatric burn survivors. *J Affect Disord.* 2016;189:55-61.
16. Lanius RA, Williamson PC, Densmore M, Boksman K, Gupta MA, Neufeld RW, et al. Neural correlates of traumatic memories in posttraumatic stress disorder: a functional MRI investigation. *Am J Psychiatry.* 2002;159(5):834-41.
17. Reinders AA, Nijenhuis ER, Paans AM, Korf J, Willemsen AT, den Boer JA. One brain, two selves. *Neuroimage.* 2006;31(1):356-64.
18. Vermetten E, Schmahl C, Lindner S, Loewenstein RJ, Bremner JD. Hippocampal and amygdalar volumes in dissociative identity disorder. *Am J Psychiatry.* 2006;163(4):630-6.
19. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 2009;6(7):e1000097.
20. Wells GA, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Ottawa Hospital Research Institute. 2021;26.

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