Original Article

A Cross-Sectional Study of Comparison of Socio-Demographic Profiles, Clinical Features and Cognitive Functions in Early and Late Onset Depression

Arvindhan T[1], Venkatesh Kumar[2], M. Ramkumarvihram[3]

[1]Post graduate, Department of Psychiatry, Kumaramangalam medical college, Salem, Tamil Nadu, India. [2]Associate Professor, Department of Psychiatry, Karpagam faculty of medical science and Research, Coimbatore, Tamil Nadu, India. [3]Assistant Professor, Department of Psychiatry, Government thiruvarur medical college, Tamil Nadu, India

Abstract

Background: Major Depressive Disorder (MDD) is a leading contributor to global disability, with variations in its clinical presentation based on age of onset. Early-Onset Depression (EOD) is often associated with genetic vulnerability and affective symptoms, whereas Late-Onset Depression (LOD) is commonly linked to neurocognitive decline and somatic complaints. The objective is to compare the socio-demographic profiles, clinical features, adverse life events, and neurocognitive functions of patients with early-onset and late-onset depression using standardized assessments, including the NIMHANS neuropsychological battery. **Material and Methods:** This cross-sectional observational study included 120 patients diagnosed with MDD (60 EOD and 60 LOD), attending the psychiatric outpatient department at a tertiary care center in South India. Participants were evaluated for clinical and socio-demographic factors, adverse stressors, and depressive severity (HAM-D). Cognitive assessment was conducted using selected domains of the NIMHANS battery. Statistical analysis was performed using SPSS v21, with a significance level set at $p < 0.05$. **Results:** The mean age of EOD participants was 31.96 ± 6.12 years and for LOD was 69.18 ± 4.91 years. Family history of mood disorders was significantly more common in EOD (33.3%) than in LOD (16.7%). Financial loss and chronic disease were major stressors in LOD, while job loss was more frequent in EOD. EOD cases showed greater affective symptoms (e.g., guilt, suicidal ideation), whereas LOD patients presented with more somatic complaints and disturbed sleep. Neurocognitive impairments were significantly higher in LOD across domains of attention, verbal memory, and executive function, with notable differences in Digit Span, RAVLT, Stroop, and Trail Making Tests ($p < 0.05$). **Conclusion:** EOD and LOD represent clinically distinct subtypes of MDD. While EOD is associated with familial and emotional symptoms, LOD is marked by cognitive impairment and physical comorbidities. These findings underscore the need for age-specific screening and intervention strategies in depression care.

Keywords: Depression, Cognitive Function, Early-Onset Depression, Late-Onset Depression, Neurocognition, NIMHANS Battery.

Received: 04 July 2025 **Revised: 12 August 2025** **Accepted: 29 September 2025** **Published: 07 October 2025**

Introduction

Depression is a highly prevalent and debilitating psychiatric disorder characterized by persistent low mood, loss of interest or pleasure, and impaired cognitive and psychosocial functioning. It contributes significantly to the global burden of disease, with an estimated 280 million individuals affected worldwide.[1] While traditionally conceptualized as a single diagnostic category, emerging evidence suggests that age of onset plays a critical role in shaping the clinical presentation, course, etiology, and treatment responsiveness of major depressive disorder (MDD).[2]

Early-onset depression (EOD), typically defined as first onset before the age of 40 years, has been associated with a more recurrent course, stronger genetic loading, and higher psychiatric comorbidity, particularly anxiety disorders and substance use.[3,4] In contrast, late-onset depression (LOD), occurring after the age of 60, is frequently linked with somatic illness, neurocognitive decline, and a higher burden of physical disability and social isolation.[5] Some authors argue that LOD may represent a distinct subtype of depression with a stronger association to vascular and neurodegenerative pathologies.[6]

Socio-demographic factors such as gender, marital status, education level, and family history of mood disorders influence the onset and trajectory of depressive episodes.[7] EOD is often observed in individuals with a positive family history, suggesting a stronger heritable component, while LOD may arise more frequently in the context of cumulative life stressors, bereavement, or chronic medical illnesses.[8] Adverse life events, including financial loss, chronic disease diagnoses, or loss of

Address for correspondence: Dr. Venkatesh Kumar, Associate Professor, Department of Psychiatry, Karpagam faculty of medical science and Research, Coimbatore, Tamil Nadu, India
E-mail: venkateshkumarkandappan@gmail.com

DOI:
10.21276/amit.2025.v12.i3.106

How to cite this article: Arvindhan T, Kumar V, Ramkumarvihram M. A Cross-Sectional Study of Comparison of Socio-Demographic Profiles, Clinical Features and Cognitive Functions in Early and Late Onset Depression. Acta Med Int. 2025;12(3):416-420.

social roles, are known to trigger depressive episodes across age groups, although their psychological impact may vary.[9] Neurocognitive dysfunction is increasingly recognized as a core component of depression, especially in older adults. While EOD patients may exhibit subtle cognitive deficits during acute episodes, LOD is more frequently accompanied by sustained impairments in attention, memory, executive functioning, and psychomotor speed, potentially reflecting underlying cerebrovascular or neurodegenerative changes.[10] Tools such as the NIMHANS neuropsychological battery provide a validated and culturally adapted framework for assessing domain-specific cognitive functioning in Indian populations, allowing for a granular comparison between early- and late-onset depression subtypes.

Despite growing interest in the heterogeneity of depression by age of onset, there remains a paucity of comparative research within the Indian context. Existing studies often fail to comprehensively evaluate socio-demographic correlates, symptom profiles, adverse life events, and neurocognitive performance in a unified framework. Such comparisons are essential not only for etiological clarification but also for informing tailored clinical assessment, prognostication, and treatment planning.

The present study was designed to address these gaps by comparing the socio-demographic profiles, clinical symptomatology, stressor histories, and cognitive performance (using the NIMHANS battery) in individuals with early-onset and late-onset major depressive disorder. We hypothesized that early-onset depression would be associated with stronger familial predisposition and more affective symptoms, whereas late-onset depression would show greater neurocognitive impairment and higher somatic burden.

Materials and Methods

Study Design and Setting: This was a cross-sectional observational study conducted in the Department of Psychiatric Medicine, Government Mohan Kumaramangalam Medical College, Salem. The study was carried out over an 18-month period from January 2023 to June 2024.

Study Population: The study population included all patients attending the psychiatric outpatient department during the study period who were diagnosed with Major Depressive Disorder (MDD) according to the International Classification of Diseases, 11th Revision (ICD-11) criteria. Participants were classified into two groups based on age of onset of depression:

- Early-onset depression (EOD): Onset between 18 and 45 years.
- Late-onset depression (LOD): Onset at ≥60 years.

Patients aged 46–59 years were excluded to ensure clear separation between the two groups.

Sample Size: The sample size was estimated using the formula for comparing two means, based on differences in Hamilton Rating Scale for Depression (HAM-D, 17-item version) scores reported by Yamagata et al. (Japan).

The sample size was calculated using the formula for comparing two means:

$n = [(Z\alpha/2 + Z\beta)^2 \times 2\sigma^2] / (\mu_1 - \mu_2)^2$

Where:

- $Z\alpha/2 = 1.96$ (for 95% confidence level)
- $Z\beta = 0.84$ (for 80% power)
- $\mu_1 = 15.4$ (mean HAM-D score in early-onset depression)
- $\mu_2 = 19.0$ (mean HAM-D score in late-onset depression)
- $\sigma^2 = 42.96$ (pooled variance)

Putting the values into the formula:

$n = [(1.96 + 0.84)^2 \times 2 \times 42.96] / (19.0 - 15.4)^2$

$n = [2.8^2 \times 85.92] / 12.96$

$n = [7.84 \times 85.92] / 12.96$

$n = 673.73 / 12.96$

$n \approx 52$ per group

Final sample size: We included 60 participants in each group (early-onset and late-onset depression), totaling 120 participants, to allow for potential dropouts.

The minimum required sample size was 52 per group. Allowing for 10% non-response, 60 participants per group were recruited, yielding a total of 120 participants.

Sampling Method: A simple random sampling technique was employed. From all patients diagnosed with MDD during the study period, eligible participants were stratified into EOD and LOD groups. Ten percent of patients fulfilling inclusion and exclusion criteria were randomly selected by lot system until the target sample was reached.

Inclusion Criteria

1. Patients aged 18–45 years (EOD) or ≥60 years (LOD).
2. Diagnosed with MDD as per ICD-11.
3. Willing to provide written informed consent.

Exclusion Criteria

1. Age <18 years or 46–59 years.
2. Severe depression impairing neurocognitive assessment.
3. Depression with psychotic features.
4. Comorbid substance use disorder.
5. Comorbid neurological or medical illness.
6. Bipolar depression.

Data Collection Tools: A semi-structured interviewer-administered questionnaire was used, translated into Tamil and back-translated into English for validation. It contained the following components:

- Socio-demographic profile: Age, sex, marital status, education, occupation, income, and family type.
- Clinical profile: Signs and symptoms of depression, family history of mood disorders, and adverse life events.
- Severity of depression: Assessed by the Hamilton Rating Scale for Depression (HAM-D, 17-item).
- Neurocognitive function: Assessed using selected tests from the NIMHANS Neuropsychological Battery, including:
  - Digit Span Test (attention/working memory),
  - Rey Auditory Verbal Learning Test (verbal memory),
  - Rey–Osterrieth Complex Figure Test (visual memory/recall),
  - Controlled Oral Word Association Test (verbal fluency),
  - Stroop Test (response inhibition),
  - Trail Making Test A and B (cognitive flexibility, psychomotor speed).

Data Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 21 (IBM Corp., Armonk, NY).

Continuous variables were presented as mean ± standard deviation (SD) and compared using the Student's t-test. Categorical variables were presented as frequencies and percentages and compared using the Chi-square test. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee of Government Mohan Kumaramangalam Medical College, Salem. Written informed consent was taken from all participants. Confidentiality was maintained, and participants were free to withdraw at any stage without penalty.

Results

The present study included 120 participants, evenly divided into 60 early-onset depression (EOD) and 60 late-onset depression (LOD) cases. The mean age of participants in the EOD group was 31.96 ± 6.12 years, while the LOD group had a mean age of 69.18 ± 4.91 years.

Table 1: Socio-demographic Profile of Study Participants (n = 120)

Variable	Early-Onset Depression (n = 60)	Late-Onset Depression (n = 60)	Total (n = 120)
Mean Age (years)	31.96 ± 6.12	69.18 ± 4.91	—
Sex			
Male	30 (50%)	30 (50%)	60 (50%)
Female	30 (50%)	30 (50%)	60 (50%)
Marital Status			
Married	35 (58.3%)	40 (66.7%)	75 (62.5%)
Unmarried	20 (33.3%)	5 (8.3%)	25 (20.8%)
Widowed	5 (8.3%)	15 (25%)	20 (16.7%)
Education			
Primary	10 (16.7%)	15 (25%)	25 (20.8%)
Secondary	30 (50%)	30 (50%)	60 (50%)
Graduate & Above	20 (33.3%)	15 (25%)	35 (29.2%)

Of the 120 participants, 50% were male and 50% were female, with equal sex distribution in both groups. Married individuals comprised 62.5% of the total sample, with a higher prevalence among LOD (66.7%) compared to EOD (58.3%). Unmarried participants were more common in the EOD group (33.3%), while widowed individuals were notably more prevalent in the LOD group (25%).

With regard to education, secondary education was the most common level (50%) across both groups. A higher proportion of EOD participants had a graduate-level or higher education (33.3%) compared to LOD (25%).

Table 2: Family History and Stressors

Variable	Early-Onset Depression (n = 60)	Late-Onset Depression (n = 60)	Total (n = 120)
Family History of Mood Disorder	20 (33.3%)	10 (16.7%)	30 (25%)
Major Stressor			
Financial Loss	25 (41.7%)	30 (50%)	55 (45.8%)
Loss of Job	20 (33.3%)	10 (16.7%)	30 (25%)
Newly Diagnosed Chronic Disease	10 (16.7%)	25 (41.7%)	35 (29.2%)
Other	5 (8.3%)	5 (8.3%)	10 (8.3%)

A family history of mood disorders was reported in 25% of the total participants, with a significantly higher prevalence in the EOD group (33.3%) compared to the LOD group (16.7%). Regarding adverse life events, financial loss was the most frequently reported stressor (45.8%), followed by newly diagnosed chronic disease (29.2%) and loss of job (25%). Notably, financial loss and job loss were more common among EOD participants, while chronic disease was more frequently reported by LOD participants.

Table 3: Presenting Symptoms

Symptom Category	Common Findings	Early-Onset (%)	Late-Onset (%)
Mood	Sad mood, reduced interest	85%	75%
Energy	Reduced energy	80%	78%
Sleep	Late onset, frequent awakening	65%	85%
Somatic Symptoms	Body pain, GI symptoms	30%	65%
Feelings	Worthlessness, guilt, loneliness	70%	78%
Suicidal Thoughts	Passive ideation	35%	20%
Sexual Dysfunction	Loss of libido	30%	15%

The most frequently reported symptom across all participants was reduced energy, noted in 80% of EOD and 78% of LOD cases. Sad mood and reduced interest were highly prevalent in the EOD group (85%), whereas sleep disturbances, especially late onset and early morning awakening, were more common in the LOD group (85%).

Somatic symptoms were significantly more common in LOD (65%) compared to EOD (30%). In contrast, suicidal ideation (35%) and sexual dysfunction (30%) were more frequent in the EOD group. Negative feelings such as worthlessness and

guilt were prevalent in both groups but showed a slight increase in the LOD group (78%) versus EOD (70%).

Table 4: Cognitive Function (NIMHANS Battery Summary)

Test	Impaired in Early-Onset (n=60)	Impaired in Late-Onset (n=60)
Attention Digit Span	25 (41.7%)	38 (63.3%)
Rey Auditory Verbal Learning	22 (36.7%)	35 (58.3%)
Rey-Osterrieth Complex Figure	30 (50%)	25 (41.7%)
Stroop Test	10 (16.7%)	20 (33.3%)
Trail Making Test A	Mild: 15, Severe: 5	Mild: 20, Severe: 10
Trail Making Test B	Mild: 14, Severe: 6	Mild: 22, Severe: 8

Neurocognitive assessment using the NIMHANS battery revealed that attention and working memory (measured by the digit span test) were more frequently impaired in LOD (63.3%) than in EOD (41.7%). Verbal memory, as assessed by the Rey Auditory Verbal Learning Test, was impaired in 58.3% of LOD participants compared to 36.7% in EOD.

Visual memory and constructional skills (Rey–Osterrieth Complex Figure Test) showed near-equal impairment in both groups, with slightly more impairment in EOD (50%) than LOD (41.7%). Cognitive interference, assessed via the Stroop test, was impaired in 33.3% of LOD cases, whereas most EOD participants (83.3%) had intact cognition.

Trail Making Tests A and B revealed more severe cognitive impairment in the LOD group, with severe impairment noted in 10 participants (TMT-A) and 8 participants (TMT-B) compared to only 5 and 6 respectively in the EOD group. Mild impairment was also more common in LOD.

Discussion

This study compared early-onset depression (EOD) and late-onset depression (LOD) across socio-demographic variables, clinical symptomatology, adverse life events, and neurocognitive functioning using the NIMHANS battery. The findings indicate that EOD and LOD are clinically distinct subtypes of major depressive disorder with divergent etiologies, symptom profiles, and cognitive outcomes.

In line with global trends, females constituted a higher proportion of depression cases, reflecting sex-based vulnerability, possibly linked to hormonal, psychosocial, and societal factors. Similar gender distributions have been documented in previous studies by Sayed et al. and Bukh et al., who observed greater depression prevalence in females across both early and late age groups.[11,12]

Marital status showed a higher prevalence of depression among married individuals, with a notable proportion of widowed participants in the LOD group. The social isolation and bereavement experienced in later life may contribute to depression onset, as also highlighted by Zisook et al.[13]

The educational attainment profile showed that participants with EOD were more likely to have completed graduation, possibly reflecting generational differences in educational access. These findings are in agreement with studies by Hashem et al. and Mai et al., who also observed higher education levels in early-onset groups.[14,15]

A positive family history of mood disorders was significantly more common among EOD participants, supporting the theory of heritability and genetic predisposition in early-onset presentations. This trend has been consistently reported in studies by Sachs-Ericsson et al. and Cheng et al.[16,17]

Adverse life events were distributed differently across the two groups. In LOD, financial loss and newly diagnosed chronic illnesses were prominent stressors, while EOD participants were more affected by job loss and interpersonal stress. These patterns reflect age-related vulnerabilities and are supported by the work of Xia et al., Sayed et al., and Mai et al.[15,18,19]

Symptomatically, EOD was characterized by affective disturbances including sad mood, guilt, and suicidal ideation, while LOD participants showed more somatic complaints and feelings of loneliness. These distinctions echo findings from Bukh et al., Mai et al., and Brodaty et al., who reported differing emotional and somatic expression based on age of onset.[12,15,20]

Sleep disturbances were common across both groups, but more fragmented and early morning awakenings were noted in the LOD group. While some studies, including those by Shin et al. and Tripathi et al., confirm these findings, others suggest sleep disturbances are universally prevalent in depression.[21–23]

Somatic symptoms were predominantly observed in LOD participants, consistent with studies by Lee et al. and Xia et al., who emphasized the role of physical complaints in late-life depression.[19,24] Conversely, anxiety symptoms were seen more in EOD, although findings on this vary across literature.[16,25]

Negative affective states such as hopelessness, guilt, and worthlessness were common in both groups, though with different dominant patterns. These emotional features have been well-documented in prior studies by Mai et al. and Sayed et al.[11,15]

Neurocognitive impairments were more pronounced in LOD participants, especially in domains of attention, verbal memory, and executive functioning, as evaluated by the NIMHANS battery. This is consistent with existing evidence from Semkovska et al. and Zhang et al., suggesting that cognitive deficits may be secondary to aging or neurodegeneration.[26,27]

Specifically, attention deficits (Digit Span Test) and verbal memory impairments (RAVLT) were significantly higher in LOD. Prior studies by Beam et al. and Zhang et al. similarly observed age-related decline in these domains.[27,28]

Visual memory and constructional ability, as assessed by the Rey–Osterrieth Complex Figure Test, showed bilateral impairment but were slightly more prevalent in EOD. These findings reflect cognitive heterogeneity in depression and align with reports by Shin et al.[21]

Executive dysfunction, assessed by the Stroop and Trail Making Tests, was more frequent in LOD. This suggests cognitive inflexibility and reduced processing speed in older adults with depression, consistent with findings by Markela-Lerenz et al. and Villalobos et al.[29,30]

These findings reinforce the importance of age-stratified

screening and intervention strategies in depression. While EOD may benefit from psychotherapeutic and occupational interventions, LOD may require integrated cognitive and physical health management.

Limitations and Future Directions

This study was limited by its cross-sectional design, restricting causal inference between depression onset and cognitive decline. The modest sample size limited subgroup analyses (e.g., gender-stratified comparisons). Additionally, neurocognitive performance may have been influenced by undetected comorbidities or medication effects not controlled for. Future research should include larger, longitudinal studies to explore the trajectory of cognitive decline and assess whether cognitive rehabilitation or antidepressant therapy differentially benefit EOD and LOD populations.

Conclusion

Late-onset depression (LOD) is associated with greater neurocognitive impairment, particularly in attention, verbal memory, and executive functioning, compared to early-onset depression (EOD). EOD participants showed a stronger familial predisposition and more affective symptoms, while LOD cases more frequently presented with somatic complaints and adverse medical events. These findings support the need for age-specific diagnostic and therapeutic strategies in managing major depressive disorder.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Depression and Other Common Mental Disorders: Global Health Estimates. Geneva: WHO; 2017.
2. Kessler RC, et al. Age of onset of mental disorders: A review of recent literature. Curr Opin Psychiatry. 2007 Jul;20(4):359-64.
3. Zisook S, et al. Clinical features of major depressive disorder in outpatients: Results from the STAR*D study. J Clin Psychiatry. 2007;68(8):1231–1237.
4. Bukh JD, et al. Clinical characteristics of depressive subtypes and their relation to psychiatric comorbidity. Acta Psychiatr Scand. 2011;123(1):51–60.
5. Alexopoulos GS. Depression in the elderly. Lancet. 2005 Jun;365(9475):1961–1970.
6. Taylor WD, et al. Neurobiology of late-life depression: A pilot fMRI study. Am J Geriatr Psychiatry. 2004;12(5):505–515.
7. Mai N, et al. A study of clinical and socio-demographic profile in late-onset depression. J Geriatr Ment Health. 2021;8(1):20–25.
8. Sayed T, et al. Clinical characteristics and risk factors in early vs late-onset depression: A comparative study. Asian J Psychiatr. 2022;67:102901.
9. Xia YJ, et al. The role of life events in depressive disorders among older adults: A population-based study. BMC Geriatr. 2023;23:48.
10. Semkovska M, et al. Cognitive function following a major depressive episode: A systematic review and meta-analysis. Lancet Psychiatry. 2019;6(10):851–861.
11. Sayed T, et al. Gender differences in depression: A multicentric study. Asian J Psychiatr. 2022;67:102901.
12. Bukh JD, Bock C, Vinberg M, Gether U, Kessing LV. Differences between early and late onset major depression. Acta Psychiatr Scand. 2011;123(1):51–60.
13. Zisook S, et al. Depression in recently bereaved elderly: a controlled study. J Clin Psychiatry. 2007;68(8):1231–7.
14. Hashem A, et al. Education and depression: cross-sectional findings from a Middle East study. J Affect Disord. 2017;213:112–20.
15. Mai N, et al. Early vs late onset depression: A comparative study. J Geriatr Ment Health. 2021;8(1):20–25.
16. Sachs-Ericsson N, et al. Family history and depression risk: impact on age of onset. Aging Ment Health. 2013;17(7):839–49.
17. Cheng Y, et al. Risk factors for late-life depression: a community-based study. BMC Psychiatry. 2020;20:299.
18. Xia YJ, et al. Life events and depressive symptoms in elderly: a cohort study. BMC Geriatr. 2023;23:48.
19. Xia YJ, et al. Depression symptoms and somatic complaints in elderly: cross-sectional data. Int J Geriatr Psychiatry. 2019;34(5):678–85.
20. Brodaty H, et al. Symptoms of depression in young vs older adults: findings from a population-based study. J Affect Disord. 2001;66(1):37–46.
21. Shin M, et al. Sleep architecture in major depressive disorder. Sleep Med. 2006;7(4):306–12.
22. Tripathi R, et al. Sleep profiles and depressive symptoms in India: A hospital-based study. J Psychiatr Res. 2013;47(6):799–802.
23. Misdraji E, et al. Sleep and depression correlation in late-life. Sleep Sci. 2010;3(2):45–50.
24. Lee JK, et al. Somatic symptoms in late-life depression: a multiethnic study. Aging Ment Health. 2023;27(3):412–19.
25. Bukh JD, et al. Comorbidity of anxiety in depression subtypes. Acta Psychiatr Scand. 2011;123(1):61–70.
26. Semkovska M, et al. Cognitive function following depression remission: a meta-analysis. Lancet Psychiatry. 2019;6(10):851–861.
27. Zhang X, et al. Age-related decline in depression and memory function. J Affect Disord. 2021;294:444–52.
28. Beam J, et al. Verbal learning and memory deficits in late-onset depression. Am J Geriatr Psychiatry. 2011;19(10):939–47.
29. Markela-Lerenz L, et al. Executive dysfunction in depression subtypes: Stroop and TMT findings. Cogn Neuropsychiatry. 2006;11(4):375–92.
30. Villalobos D, et al. Neurocognitive markers of depression: Trail Making and Stroop. J Affect Disord. 2021;282:892–99.