

## Original Research Article

# PREVALENCE AND CLINICAL CORRELATES OF DEPRESSIVE AND ANXIETY SYMPTOMS AMONG OLDER ADULTS WITH CHRONIC MEDICAL CONDITIONS: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

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## ABSTRACT

**Background:** Depression and anxiety are important but frequently under-recognized psychological comorbidities among older adults with chronic medical illnesses. Increasing chronic disease burden and multimorbidity may further increase psychological symptom burden and complicate clinical management. This study aimed to determine the prevalence and severity of depressive and anxiety symptoms among elderly patients with chronic medical conditions and assess their association with sociodemographic and clinical factors.

**Materials and Methods:** This hospital-based observational cross-sectional study included 300 patients aged  $\geq 60$  years with one or more chronic medical conditions attending the Department of General Medicine. Sociodemographic and clinical characteristics were recorded using a structured proforma. Depressive symptoms were assessed using the 15-item Geriatric Depression Scale (GDS-15), and anxiety symptoms using the Generalized Anxiety Disorder-7 (GAD-7) scale. Associations were examined using appropriate univariable tests and multivariable logistic regression.

**Results:** The mean age was  $69.8 \pm 7.6$  years, and 65.3% had multimorbidity. Depressive symptoms were present in 38.7% (95% CI: 33.3–44.3) and anxiety symptoms in 33.0% (95% CI: 27.8–38.5) of participants, while 26.0% had coexisting symptoms. The prevalence of depressive symptoms increased from 26.0% among participants with one chronic disease to 54.1% among those with  $\geq 3$  diseases; corresponding anxiety prevalence increased from 22.1% to 45.9%. On multivariable analysis, age  $\geq 80$  years, female sex, living alone, and multimorbidity were independently associated with both depressive and anxiety symptoms.

**Conclusion:** Depressive and anxiety symptoms were common and frequently coexisted among elderly patients with chronic medical conditions. Greater chronic disease burden was associated with increasing psychological symptom severity. Incorporating brief mental-health screening into comprehensive geriatric care, particularly for patients with multimorbidity, may facilitate early identification and appropriate evaluation.

**Keywords:** Anxiety, Chronic disease, Depression, Elderly, Multimorbidity.

## INTRODUCTION

Population ageing is accompanied by an increasing burden of chronic non-communicable diseases, and the coexistence of multiple chronic conditions has become an important challenge in geriatric medicine. Multimorbidity is commonly defined as the presence of two or more chronic health conditions in the same individual.<sup>[1]</sup> Its importance extends beyond the cumulative burden of individual diseases, as multimorbidity is associated with complex treatment requirements, functional impairment, polypharmacy, and poorer health outcomes. Depression and anxiety are particularly relevant psychological comorbidities in patients with chronic physical illness. A systematic review and meta-analysis involving 381,527 participants demonstrated that the risk of depressive disorder was approximately twice as high among individuals with multimorbidity compared with those without multimorbidity, while the odds of depression increased with each additional chronic condition.<sup>[2]</sup> Similarly, chronic physical conditions and multimorbidity have been associated with a greater burden of anxiety symptoms.<sup>[3]</sup> These associations assume particular importance in older adults, in whom biological vulnerability, functional decline, bereavement, reduced independence, social isolation, and the cumulative burden of physical disease may interact with psychological health.<sup>[4]</sup> In India, multimorbidity represents a substantial health problem among older adults,<sup>[9]</sup> and nationally representative data have also demonstrated an association between multimorbidity and depressive symptoms in later life.<sup>[10]</sup>

The relationship between chronic physical disease and depression or anxiety is complex and potentially bidirectional. Multimorbidity may contribute to psychological symptoms through persistent pain, sleep disturbance, disability, impaired mobility, loss of independence, treatment burden, and psychosocial stress.<sup>[2]</sup> Conversely, depression and anxiety may adversely affect self-care, treatment adherence, physical activity, social functioning, and the individual's ability to cope with chronic illness. Evidence from older populations further supports a graded relationship between increasing physical disease burden and psychological morbidity.<sup>[2,3]</sup> Biological mechanisms may additionally contribute to this interaction through age-related changes in neuroendocrine stress responses, autonomic regulation, inflammatory pathways, and neurobiological processes implicated in late-life affective disorders.<sup>[4]</sup> Consequently, depression and anxiety in elderly patients with chronic medical illness should be viewed within a biopsychosocial framework rather than as isolated psychiatric phenomena. Recognition of these symptoms is clinically important because psychological morbidity may remain undetected when medical consultations are predominantly focused on physical

disease. The Geriatric Depression Scale (GDS) was specifically developed to screen for depressive symptoms in older adults,<sup>[5]</sup> and the subsequently developed 15-item short form (GDS-15) provides a brief instrument suitable for geriatric assessment.<sup>[6]</sup> The seven-item Generalized Anxiety Disorder scale (GAD-7) is likewise a brief validated instrument for assessing the severity of anxiety symptoms.<sup>[7]</sup> Indian evidence demonstrates a substantial burden of late-life depression; a systematic review and meta-analysis by Pilania et al. reported that depression is an important public-health problem among Indians aged  $\geq 60$  years.<sup>[8]</sup> Furthermore, large Indian studies have demonstrated substantial multimorbidity among older adults,<sup>[9]</sup> and an association between multimorbidity and depressive symptoms.<sup>[10]</sup> However, hospital-based evidence simultaneously evaluating depressive symptoms, anxiety symptoms, their coexistence, and their relationship with chronic disease burden among elderly medical patients remains limited. Therefore, the present study was undertaken to determine the prevalence and severity of depressive and anxiety symptoms among elderly patients with chronic medical conditions using the GDS-15 and GAD-7, to assess their coexistence, and to evaluate their associations with relevant sociodemographic factors, clinical characteristics, and multimorbidity.

## MATERIALS AND METHODS

This hospital-based observational cross-sectional study was conducted in the Department of General Medicine, over a period of [18months]. Elderly patients aged  $\geq 60$  years with at least one chronic medical condition who attended the General Medicine outpatient department and/or were admitted to the medicine wards during the study period were screened for eligibility. Patients fulfilling the predefined eligibility criteria and providing written informed consent were enrolled in the study. Patients who were critically ill, unable to communicate or reliably complete the study questionnaires, or had clinical conditions that precluded reliable assessment were excluded. Participants were recruited using [consecutive/systematic/random] sampling until the required sample size of [N] was achieved. The study was conducted after approval from the Institutional Ethics Committee in accordance with applicable ethical principles for research involving human participants.

Data were collected using a predesigned structured proforma through patient interview and review of relevant medical records. Sociodemographic variables included age, sex, marital status, educational status, socioeconomic status, and living arrangement. Clinical variables included the type and duration of chronic medical condition(s), number of coexisting chronic diseases, current medication burden, presence of polypharmacy, and

history of hospitalization. Multimorbidity was defined as the coexistence of two or more chronic medical conditions in the same participant. Depressive symptoms were assessed using the 15-item Geriatric Depression Scale (GDS-15), and anxiety symptoms were assessed using the seven-item Generalized Anxiety Disorder scale (GAD-7). Participants were classified according to the prespecified validated cut-off values and severity categories of the respective scales. The prevalence and severity of depressive and anxiety symptoms were determined separately, while coexistence was defined as the simultaneous presence of screen-positive depressive and anxiety symptoms in the same participant. Chronic disease burden was assessed according to the number of chronic medical conditions and examined in relation to GDS-15 and GAD-7 scores and symptom severity. Data were entered into [statistical software, version] and analyzed using appropriate descriptive and inferential statistical methods. Continuous variables were assessed for distribution and summarized as mean  $\pm$  standard deviation for normally distributed data or median with interquartile range for non-

normally distributed data, whereas categorical variables were expressed as frequencies and percentages. The prevalence of depressive symptoms, anxiety symptoms, and their coexistence was reported with 95% confidence intervals. Associations between depressive and anxiety symptoms and sociodemographic or clinical characteristics were assessed using the chi-square test or Fisher's exact test for categorical variables and the independent-samples t-test or appropriate non-parametric test for continuous variables. The relationship between chronic disease burden and GDS-15/GAD-7 symptom severity was evaluated using appropriate tests for trend, group comparison, or correlation according to the distribution and nature of the variables. Variables considered clinically relevant and/or associated with the outcomes on univariable analysis were evaluated using multivariable logistic regression to identify factors independently associated with depressive and anxiety symptoms. Adjusted odds ratios (aORs) with 95% confidence intervals were reported, and a two-sided p-value  $<0.05$  was considered statistically significant.

## RESULTS

**Table 1: Sociodemographic and clinical characteristics of study participants (N = 300)**

| Characteristics                           | Category                           | n (%)          |
|-------------------------------------------|------------------------------------|----------------|
| Age, years                                | 60–69                              | 157 (52.3)     |
|                                           | 70–79                              | 99 (33.0)      |
|                                           | $\geq 80$                          | 44 (14.7)      |
|                                           | Mean $\pm$ SD                      | 69.8 $\pm$ 7.6 |
| Sex                                       | Male                               | 164 (54.7)     |
|                                           | Female                             | 136 (45.3)     |
| Marital status                            | Married                            | 191 (63.7)     |
|                                           | Widowed                            | 94 (31.3)      |
|                                           | Unmarried/divorced/separated       | 15 (5.0)       |
| Educational status                        | No formal education                | 71 (23.7)      |
|                                           | Primary                            | 91 (30.3)      |
|                                           | Secondary                          | 88 (29.3)      |
|                                           | Higher secondary/graduate or above | 50 (16.7)      |
| Living arrangement                        | With spouse/family                 | 263 (87.7)     |
|                                           | Alone                              | 37 (12.3)      |
| Clinical setting                          | Outpatient                         | 187 (62.3)     |
|                                           | Inpatient                          | 113 (37.7)     |
| Duration of chronic illness               | $<5$ years                         | 82 (27.3)      |
|                                           | 5–10 years                         | 118 (39.3)     |
|                                           | $>10$ years                        | 100 (33.3)     |
| Number of chronic diseases                | 1                                  | 104 (34.7)     |
|                                           | 2                                  | 111 (37.0)     |
|                                           | $\geq 3$                           | 85 (28.3)      |
| Multimorbidity ( $\geq 2$ diseases)       | Present                            | 196 (65.3)     |
|                                           | Absent                             | 104 (34.7)     |
| Polypharmacy ( $\geq 5$ medications)      | Present                            | 121 (40.3)     |
| Hospitalization during previous 12 months | Yes                                | 103 (34.3)     |
| Major chronic disease                     | Hypertension                       | 201 (67.0)     |
|                                           | Diabetes mellitus                  | 143 (47.7)     |
|                                           | Ischemic heart disease             | 68 (22.7)      |
|                                           | Chronic respiratory disease        | 54 (18.0)      |
|                                           | Chronic kidney disease             | 42 (14.0)      |
|                                           | Cerebrovascular disease            | 29 (9.7)       |
|                                           | Other chronic conditions           | 47 (15.7)      |

A total of 300 elderly patients with chronic medical conditions were included in the study. As shown in [Table 1], the mean age of the study participants

was 69.8  $\pm$  7.6 years, with the majority belonging to the 60–69-year age group (52.3%), followed by 70–79 years (33.0%) and  $\geq 80$  years (14.7%). Males

constituted 54.7% of the study population, while 45.3% were females. Nearly two-thirds (63.7%) of participants were married, whereas 31.3% were widowed. Most participants (87.7%) were living with their spouse or family, while 12.3% were living alone. Regarding clinical characteristics, 62.3% were recruited from outpatient services and 37.7% were inpatients. Chronic illness of more than 10 years' duration was present in 33.3% of participants. Multimorbidity, defined as the presence of two or

more chronic diseases, was observed in 196 (65.3%) participants, including 28.3% who had three or more chronic conditions. Polypharmacy was present in 40.3%, and 34.3% had a history of hospitalization during the preceding year. Hypertension (67.0%) and diabetes mellitus (47.7%) were the most frequently observed chronic conditions, followed by ischemic heart disease (22.7%), chronic respiratory disease (18.0%), chronic kidney disease (14.0%), and cerebrovascular disease (9.7%).

**Table 2: Prevalence, severity, and coexistence of depressive and anxiety symptoms (N = 300)**

| Outcome                      | Category                             | n (%)      | 95% CI*   |
|------------------------------|--------------------------------------|------------|-----------|
| Depressive symptoms (GDS-15) | Absent (0–4)                         | 184 (61.3) | —         |
|                              | Mild (5–8)                           | 73 (24.3)  | —         |
|                              | Moderate (9–11)                      | 30 (10.0)  | —         |
|                              | Severe (12–15)                       | 13 (4.3)   | —         |
| Any depressive symptoms      | GDS-15 ≥5                            | 116 (38.7) | 33.3–44.3 |
| Anxiety symptoms (GAD-7)     | Minimal (0–4)                        | 201 (67.0) | —         |
|                              | Mild (5–9)                           | 57 (19.0)  | —         |
|                              | Moderate (10–14)                     | 29 (9.7)   | —         |
|                              | Severe (15–21)                       | 13 (4.3)   | —         |
| Any anxiety symptoms         | GAD-7 ≥5                             | 99 (33.0)  | 27.8–38.5 |
| Coexistence pattern          | Neither                              | 163 (54.3) | —         |
|                              | Depressive symptoms only             | 38 (12.7)  | —         |
|                              | Anxiety symptoms only                | 21 (7.0)   | —         |
|                              | Both depressive and anxiety symptoms | 78 (26.0)  | 21.1–31.4 |

As presented in [Table 2], 116 (38.7%; 95% CI: 33.3–44.3%) participants screened positive for depressive symptoms on the GDS-15. Mild depressive symptoms were present in 24.3%, moderate symptoms in 10.0%, and severe symptoms in 4.3% of participants. Anxiety symptoms on the GAD-7 were identified in 99 (33.0%; 95% CI: 27.8–38.5%) participants, with 19.0% having mild, 9.7%

moderate, and 4.3% severe anxiety symptoms. Assessment of coexistence showed that 54.3% of participants had neither depressive nor anxiety symptoms, 12.7% had depressive symptoms alone, and 7.0% had anxiety symptoms alone. Concurrent depressive and anxiety symptoms were observed in 78 (26.0%) participants, demonstrating a substantial overlap between the two symptom domains.

**Table 3: Association of sociodemographic and clinical characteristics with depressive and anxiety symptoms**

| Characteristic                   | Depressive symptoms n/N (%) | Unadjusted OR (95% CI) | p-value | Anxiety symptoms n/N (%) | Unadjusted OR (95% CI) | p-value |
|----------------------------------|-----------------------------|------------------------|---------|--------------------------|------------------------|---------|
| Age                              |                             |                        |         |                          |                        |         |
| 60–69 years                      | 49/157 (31.2)               | Reference              | —       | 42/157 (26.8)            | Reference              | —       |
| 70–79 years                      | 43/99 (43.4)                | 1.69 (1.01–2.83)       | 0.046   | 37/99 (37.4)             | 1.63 (0.96–2.76)       | 0.069   |
| ≥80 years                        | 24/44 (54.5)                | 2.64 (1.34–5.20)       | 0.005   | 20/44 (45.5)             | 2.28 (1.14–4.55)       | 0.019   |
| Sex                              |                             |                        |         |                          |                        |         |
| Male                             | 53/164 (32.3)               | Reference              | —       | 44/164 (26.8)            | Reference              | —       |
| Female                           | 63/136 (46.3)               | 1.81 (1.13–2.91)       | 0.014   | 55/136 (40.4)            | 1.85 (1.13–3.02)       | 0.014   |
| Living arrangement               |                             |                        |         |                          |                        |         |
| With family/spouse               | 94/263 (35.7)               | Reference              | —       | 80/263 (30.4)            | Reference              | —       |
| Living alone                     | 22/37 (59.5)                | 2.64 (1.32–5.28)       | 0.006   | 19/37 (51.4)             | 2.42 (1.22–4.81)       | 0.011   |
| Duration of chronic illness      |                             |                        |         |                          |                        |         |
| <5 years                         | 23/82 (28.0)                | Reference              | —       | 19/82 (23.2)             | Reference              | —       |
| 5–10 years                       | 44/118 (37.3)               | 1.52 (0.83–2.80)       | 0.174   | 37/118 (31.4)            | 1.51 (0.80–2.86)       | 0.204   |
| >10 years                        | 49/100 (49.0)               | 2.47 (1.33–4.60)       | 0.004   | 43/100 (43.0)            | 2.50 (1.31–4.78)       | 0.006   |
| Multimorbidity                   |                             |                        |         |                          |                        |         |
| No                               | 27/104 (26.0)               | Reference              | —       | 23/104 (22.1)            | Reference              | —       |
| Yes                              | 89/196 (45.4)               | 2.37 (1.41–3.98)       | 0.001   | 76/196 (38.8)            | 2.23 (1.30–3.83)       | 0.004   |
| Polypharmacy                     |                             |                        |         |                          |                        |         |
| No                               | 57/179 (31.8)               | Reference              | —       | 49/179 (27.4)            | Reference              | —       |
| Yes                              | 59/121 (48.8)               | 2.04 (1.27–3.28)       | 0.003   | 50/121 (41.3)            | 1.87 (1.15–3.05)       | 0.012   |
| Hospitalization in previous year |                             |                        |         |                          |                        |         |
| No                               | 65/197 (33.0)               | Reference              | —       | 57/197 (28.9)            | Reference              | —       |
| Yes                              | 51/103 (49.5)               | 1.99 (1.22–3.25)       | 0.006   | 42/103 (40.8)            | 1.69 (1.02–2.80)       | —       |

The univariable associations between participant characteristics and psychological symptoms are

summarized in [Table 3]. The proportion with depressive symptoms increased across age

categories from 31.2% among participants aged 60–69 years to 43.4% among those aged 70–79 years and 54.5% among those aged ≥80 years. A similar pattern was observed for anxiety symptoms, which increased from 26.8% to 37.4% and 45.5%, respectively. Females had a higher prevalence of both depressive (46.3% vs. 32.3%;  $p=0.014$ ) and anxiety symptoms (40.4% vs. 26.8%;  $p=0.014$ ) compared with males. Participants living alone also had higher proportions of depressive (59.5% vs. 35.7%;  $p=0.006$ ) and anxiety symptoms (51.4% vs.

30.4%;  $p=0.011$ ) than those living with their spouse or family. Depressive and anxiety symptoms were additionally more frequent among participants with chronic illness of >10 years' duration, multimorbidity, polypharmacy, and a history of hospitalization during the preceding year. In particular, multimorbidity was associated with higher unadjusted odds of depressive symptoms (OR 2.37; 95% CI: 1.41–3.98;  $p=0.001$ ) and anxiety symptoms (OR 2.23; 95% CI: 1.30–3.83;  $p=0.004$ ).

**Table 4: Multivariable logistic regression analysis of factors associated with depressive and anxiety symptoms**

| Predictor                        | Depression aOR (95% CI) | p-value | Anxiety aOR (95% CI) | p-value |
|----------------------------------|-------------------------|---------|----------------------|---------|
| Age 70–79 vs 60–69 years         | 1.39 (0.78–2.47)        | 0.261   | 1.35 (0.74–2.46)     | 0.326   |
| Age ≥80 vs 60–69 years           | 2.02 (1.01–4.06)        | 0.047   | 1.97 (1.01–3.86)     | 0.047   |
| Female vs male                   | 1.72 (1.03–2.88)        | 0.039   | 1.79 (1.05–3.04)     | 0.032   |
| Living alone vs with family      | 2.16 (1.03–4.55)        | 0.042   | 2.05 (1.01–4.17)     | 0.048   |
| Illness duration >10 vs <5 years | 1.67 (0.84–3.31)        | 0.142   | 1.72 (0.85–3.49)     | 0.132   |
| Multimorbidity vs single disease | 1.98 (1.12–3.50)        | 0.019   | 1.87 (1.04–3.37)     | 0.037   |
| Polypharmacy vs <5 medications   | 1.39 (0.81–2.39)        | 0.230   | 1.31 (0.75–2.29)     | 0.343   |
| Hospitalization in previous year | 1.47 (0.86–2.52)        | 0.157   | 1.29 (0.74–2.25)     | 0.369   |

On multivariable logistic regression analysis [Table 4], some associations observed in the univariable analysis were attenuated after adjustment for other covariates. Age ≥80 years remained independently associated with depressive symptoms (aOR 2.02; 95% CI: 1.01–4.06;  $p=0.047$ ) and anxiety symptoms (aOR 1.97; 95% CI: 1.01–3.86;  $p=0.047$ ), compared with participants aged 60–69 years. Female sex was independently associated with both depressive (aOR 1.72; 95% CI: 1.03–2.88;  $p=0.039$ ) and anxiety symptoms (aOR 1.79; 95% CI: 1.05–3.04;  $p=0.032$ ). Similarly, living alone remained associated with

depressive symptoms (aOR 2.16; 95% CI: 1.03–4.55;  $p=0.042$ ) and anxiety symptoms (aOR 2.05; 95% CI: 1.01–4.17;  $p=0.048$ ). Multimorbidity was independently associated with approximately two-fold higher adjusted odds of depressive symptoms (aOR 1.98; 95% CI: 1.12–3.50;  $p=0.019$ ) and higher odds of anxiety symptoms (aOR 1.87; 95% CI: 1.04–3.37;  $p=0.037$ ). In contrast, illness duration, polypharmacy, and previous hospitalization did not retain statistically significant independent associations with either outcome after multivariable adjustment.

**Table 5: Association between chronic disease burden and severity of depressive and anxiety symptoms**

| Number of chronic diseases     | n   | GDS-15 score, median (IQR) | GAD-7 score, median (IQR) | Depressive symptoms n (%) | Anxiety symptoms n (%) |
|--------------------------------|-----|----------------------------|---------------------------|---------------------------|------------------------|
| 1                              | 104 | 3 (2–5)                    | 2 (1–4)                   | 27 (26.0)                 | 23 (22.1)              |
| 2                              | 111 | 4 (2–7)                    | 3 (1–6)                   | 43 (38.7)                 | 37 (33.3)              |
| ≥3                             | 85  | 7 (4–9)                    | 6 (3–9)                   | 46 (54.1)                 | 39 (45.9)              |
| Overall                        | 300 | 4 (2–7)                    | 3 (1–6)                   | 116 (38.7)                | 99 (33.0)              |
| p for trend/overall comparison |     | <0.001                     | <0.001                    | <0.001                    | 0.002                  |

The relationship between increasing chronic disease burden and psychological symptom severity is presented in [Table 5]. Among participants with a single chronic disease, 26.0% had depressive symptoms and 22.1% had anxiety symptoms; these proportions increased to 38.7% and 33.3%, respectively, among participants with two chronic diseases and to 54.1% and 45.9%, respectively, among those with three or more chronic diseases. Median GDS-15 scores also increased from 3 (IQR 2–5) among participants with one chronic disease to 4 (IQR 2–7) among those with two diseases and 7 (IQR 4–9) among those with three or more diseases. Correspondingly, median GAD-7 scores increased from 2 (IQR 1–4) to 3 (IQR 1–6) and 6 (IQR 3–9), respectively. These findings demonstrated a statistically significant gradient in depressive and anxiety symptom burden across increasing

categories of chronic disease burden ( $p<0.001$  for depressive symptoms and  $p=0.002$  for anxiety symptoms).

## DISCUSSION

The present study demonstrated a considerable burden of depressive and anxiety symptoms among elderly patients with chronic medical conditions. Of the 300 participants, 38.7% screened positive for depressive symptoms on the GDS-15 and 33.0% for anxiety symptoms on the GAD-7, while 26.0% had coexisting depressive and anxiety symptoms. Mild, moderate, and severe depressive symptoms were observed in 24.3%, 10.0%, and 4.3% of participants, respectively, whereas mild, moderate, and severe anxiety symptoms were present in 19.0%, 9.7%, and 4.3%, respectively. These findings indicate that

psychological symptoms frequently accompany chronic physical illness in older patients and that depression and anxiety commonly overlap rather than occurring as completely independent symptom domains.

The prevalence observed in our study is closely comparable with that reported by Lu et al,<sup>[11]</sup> who studied 1,173 community-dwelling adults aged  $\geq 65$  years in Hunan, China. They reported depression in 37.34% and anxiety in 32.74% of participants.<sup>[11]</sup> These figures are remarkably close to the corresponding prevalences of 38.7% and 33.0% in our study. Lu et al. also found that the presence of three or more comorbidities was associated with both anxiety and depression, supporting the relationship between increasing medical burden and psychological symptoms observed in our population.<sup>[11]</sup> In contrast, Zhao et al. studied 9,821 chronically ill older adults and reported anxiety in 26.83%, depression in 10.33%, and coexisting anxiety and depression in 6.88%.<sup>[12]</sup> Thus, the prevalence of depression and coexistence in our study was substantially higher, while the difference in anxiety prevalence was less marked. Differences in healthcare setting, population characteristics, chronic disease profiles, screening instruments and thresholds, and social and functional characteristics may contribute to variation between studies.

Coexistence of depressive and anxiety symptoms was observed in 26.0% of our participants. Akinsulore et al,<sup>[13]</sup> studied 328 older adults and reported depression alone in 13.0%, anxiety alone in 19.9%, and comorbid depression and anxiety in 6.0%. In comparison, depressive symptoms alone in our study were almost identical at 12.7%, whereas anxiety alone was lower at 7.0% and coexistence was considerably higher at 26.0%. Akinsulore et al. also identified living alone as an independent factor associated with comorbid depression and anxiety.<sup>[13]</sup> This finding is consistent with our study, in which living alone was independently associated with both depressive symptoms (aOR 2.16; 95% CI: 1.03–4.55) and anxiety symptoms (aOR 2.05; 95% CI: 1.01–4.17). Although the magnitude of comorbidity differs between the two studies, both demonstrate the importance of simultaneously evaluating depressive and anxiety symptoms in older adults.

The prevalence of depressive symptoms in our study was also higher than that reported by Mulud and Mohamad,<sup>[14]</sup> who studied 220 community-dwelling older adults with chronic diseases and found depression in 16.4%. Their study nevertheless demonstrated an association between multimorbidity and depression (OR 3.36), which is directionally consistent with our findings.<sup>[14]</sup> At the other end of the spectrum, Belsiyal et al,<sup>[15]</sup> evaluated 337 hospitalized older adults with chronic illness in India and reported depressive symptoms in approximately 80% of participants. Multiple chronicity was associated with greater odds of depression (OR 2.44; 95% CI: 1.49–3.98).<sup>[15]</sup> The prevalence of 38.7% in our study therefore lies

between the substantially lower estimate reported among community-dwelling patients by Mulud and Mohamad<sup>14</sup> and the much higher estimate among hospitalized older adults reported by Belsiyal et al.<sup>[15]</sup> One plausible contributor is the clinical setting, as our study population comprised both outpatients and inpatients, whereas the latter study was restricted to hospitalized elderly patients.

Multimorbidity emerged as an important finding in the present study. It was present in 65.3% of participants and was independently associated with depressive symptoms (aOR 1.98; 95% CI: 1.12–3.50) and anxiety symptoms (aOR 1.87; 95% CI: 1.04–3.37). Furthermore, a graded increase in symptom burden was observed with increasing numbers of chronic diseases. Depressive symptoms increased from 26.0% among participants with one chronic disease to 38.7% among those with two diseases and 54.1% among those with three or more diseases. Anxiety symptoms similarly increased from 22.1% to 33.3% and 45.9%, respectively. Median GDS-15 scores increased from 3 (IQR 2–5) in participants with one chronic disease to 7 (IQR 4–9) among those with  $\geq 3$  diseases, while median GAD-7 scores increased from 2 (IQR 1–4) to 6 (IQR 3–9).

This dose-related pattern is supported by previous literature. Read et al,<sup>[2]</sup> in a systematic review and meta-analysis of 40 studies involving 381,527 participants, found that depressive disorder was more than twice as likely among individuals with multimorbidity compared with those without multimorbidity (RR 2.13; 95% CI: 1.62–2.80) and nearly three times as likely compared with individuals without any chronic physical condition (RR 2.97; 95% CI: 2.06–4.27). They also reported a 45% increase in the odds of depressive disorder with each additional chronic condition (OR 1.45; 95% CI: 1.28–1.64).<sup>[2]</sup> Similarly, Seo et al,<sup>[16]</sup> analyzed 156,747 middle-aged and older adults in Korea and demonstrated an increasing burden of depressive symptoms with multiple chronic diseases; among elderly participants, multimorbidity was associated with an adjusted risk ratio of approximately 1.62 for depressive symptoms.<sup>[16]</sup> These findings support our observation that cumulative chronic disease burden is associated with progressively greater psychological symptom burden.

Large Indian datasets provide particularly relevant context. Ansari et al,<sup>[10]</sup> analyzed 31,464 adults aged  $\geq 60$  years from the Longitudinal Ageing Study in India and reported depressive symptoms in approximately 29% overall, including 26% of men and 31% of women. Multimorbidity remained associated with depression after adjustment (aOR 1.27; 95% CI: 1.12–1.45).<sup>[10]</sup> They further found that the association was partly mediated by poor self-rated health, poor sleep, limitations in activities of daily living and instrumental activities of daily living, pain, and physical inactivity.<sup>[10]</sup> Our depressive symptom prevalence of 38.7% was higher than the approximately 29% reported in this

nationally representative population. However, our study specifically included hospital-attending elderly patients with established chronic medical conditions, whereas LASI was population based; therefore, direct comparison of prevalence estimates should be made cautiously.

The burden of multimorbidity in our study can also be considered against Indian population data. Pattanaik et al,<sup>[17]</sup> analyzed 7,118 Indian adults aged  $\geq 50$  years from SAGE Wave 2 and reported multimorbidity in 45.14%, with hypertension (22%) and arthritis (19%) among the most frequently identified conditions. In our chronic-disease-selected hospital population, multimorbidity was higher at 65.3%, and hypertension was the most frequent chronic condition (67.0%), followed by diabetes mellitus (47.7%). The higher prevalence in our study is clinically plausible because all participants were aged  $\geq 60$  years and already had at least one chronic medical condition. Ahmed et al,<sup>[18]</sup> using data from 31,386 Indian adults aged  $\geq 60$  years, reported poor self-perceived mental health in 8.67%, difficulty in activities of daily living in 23.77%, instrumental activities of daily living difficulty in 48.36%, and physical inactivity in 68.9%. They found that early- and late-onset multimorbidity were associated with more than two-fold higher odds of poor perceived mental health compared with absence of chronic disease.<sup>[18]</sup> These population-level findings reinforce the broader relationship between accumulated chronic morbidity, functional health, and psychological well-being among older Indians.

Female sex was independently associated with both outcomes in our study. Depressive symptoms were present in 46.3% of women compared with 32.3% of men, while anxiety symptoms occurred in 40.4% and 26.8%, respectively. After adjustment, female participants had higher odds of depressive symptoms (aOR 1.72; 95% CI: 1.03–2.88) and anxiety symptoms (aOR 1.79; 95% CI: 1.05–3.04). Mulugeta et al,<sup>[19]</sup> similarly reported depressive symptoms in 51.77% of older adults and found female sex to be independently associated with depression (aOR approximately 2.3). Their study also demonstrated increasing odds of depressive symptoms across older age categories.<sup>[19]</sup> In our study, participants aged  $\geq 80$  years had approximately twice the adjusted odds of depressive (aOR 2.02) and anxiety symptoms (aOR 1.97) compared with those aged 60–69 years. These findings suggest that sex and advanced age may help identify subgroups with a greater psychological symptom burden, although the magnitude and direction of such associations may vary across populations.

Living arrangement was another relevant correlate. Participants living alone had a substantially greater prevalence of depressive symptoms (59.5% vs. 35.7%) and anxiety symptoms (51.4% vs. 30.4%) than those living with a spouse or family. The associations remained significant after multivariable

adjustment. Akinsulore et al,<sup>[13]</sup> likewise identified living alone as an independent correlate of coexisting depression and anxiety, while Mulugeta et al,<sup>[19]</sup> reported that living alone was associated with depressive symptoms (aOR 1.99; 95% CI: 1.17–3.41) and that poor social support was associated with markedly higher odds of depressive symptoms (aOR 3.56; 95% CI: 2.09–6.04).<sup>[19]</sup> Living alone should not, however, be regarded as equivalent to social isolation, because the quality and availability of social support were not directly quantified in our study.

The association between multimorbidity and psychological morbidity is also supported by evidence from South Asia. Farooq et al,<sup>[20]</sup> reported anxiety/depressive symptoms in 27.4% of 2,867 adults in Karachi and found multimorbidity to be independently associated with psychological symptoms (aOR 1.33; 95% CI: 1.11–1.58); female sex was also strongly associated (aOR 2.40; 95% CI: 2.01–2.87). Although their study included a broader adult age range and used a different psychological assessment instrument, the direction of association is consistent with the present findings. Gajović et al,<sup>[21]</sup> reported depression in 10.0% of older adults, with a higher prevalence among women than men (12.6% vs. 6.5%). Multimorbidity (OR 1.89), chronic pain (OR 2.35), and poor self-rated health (OR 8.37) were associated with depression.<sup>[21]</sup> The wide variation in absolute prevalence across studies emphasizes the influence of population selection, healthcare setting, disease burden, screening instruments, and sociocultural context; nevertheless, the association between multiple chronic illnesses and psychological morbidity is relatively consistent.

In the present study, polypharmacy and previous hospitalization were associated with depressive and anxiety symptoms on univariable analysis but did not remain statistically significant after multivariable adjustment. This attenuation suggests that their crude associations may partly reflect correlated factors such as advanced age, multimorbidity, disease burden, or other clinical characteristics. The finding highlights the importance of distinguishing unadjusted associations from independently associated factors and avoiding causal interpretation of cross-sectional data.

Overall, our findings indicate that depressive and anxiety symptoms are common and frequently coexist among elderly patients with chronic medical conditions. The progressive increase in both GDS-15 and GAD-7 symptom burden with increasing numbers of chronic diseases is particularly noteworthy and is consistent with evidence linking multimorbidity to psychological morbidity.<sup>[2,10,16]</sup> Older age, female sex, living alone, and multimorbidity remained independently associated with psychological symptoms in our study. These findings support consideration of psychological assessment as part of comprehensive care for elderly

patients with substantial chronic disease burden. However, because the study was cross-sectional, temporal sequence and causality cannot be established. Furthermore, GDS-15 and GAD-7 are screening instruments rather than diagnostic interviews; consequently, the findings should be interpreted as the prevalence and correlates of depressive and anxiety symptoms, rather than clinically diagnosed depressive or anxiety disorders.

## CONCLUSION

Depressive and anxiety symptoms were common among elderly patients with chronic medical conditions, affecting 38.7% and 33.0% of participants, respectively, with 26.0% exhibiting coexisting symptoms. Increasing chronic disease burden was accompanied by progressively greater depressive and anxiety symptom burden. Older age, female sex, living alone, and multimorbidity were independently associated with these psychological symptoms. These findings highlight the importance of considering mental health as an integral component of comprehensive care for older adults with chronic medical illnesses.

### Recommendations

Routine screening for depressive and anxiety symptoms using brief validated instruments such as the GDS-15 and GAD-7 may be considered as part of comprehensive geriatric assessment, particularly among patients with multimorbidity and other identified vulnerability factors. Patients who screen positive should undergo appropriate clinical evaluation and, when indicated, referral for mental-health assessment and management. Greater attention to psychosocial support, social isolation, functional status, and chronic disease burden may facilitate a more integrated and patient-centred approach. Future multicentre prospective studies should evaluate temporal relationships between multimorbidity and psychological symptoms and assess whether early identification and intervention improve clinical outcomes and quality of life.

### Limitations

The findings should be interpreted in light of several limitations. The cross-sectional design precludes determination of temporal or causal relationships between chronic disease burden and depressive or anxiety symptoms. As a hospital-based study, the findings may not be generalizable to community-dwelling elderly populations or other healthcare settings. GDS-15 and GAD-7 are screening instruments rather than diagnostic interviews; therefore, the findings represent depressive and anxiety symptoms and should not be interpreted as prevalence estimates of clinically diagnosed psychiatric disorders. Residual confounding from factors such as functional impairment, frailty, pain, sleep disturbance, cognitive status, social support, and disease severity may also be present. Larger multicentre longitudinal studies incorporating

standardized diagnostic assessments and a broader range of geriatric and psychosocial variables are warranted.

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