

Original Article

Depression and anxiety among persons with type II diabetes mellitus and hypertension; A cross-sectional analytical study in the rural field practice area of a tertiary care center in Puducherry

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ABSTRACT

Objectives: To determine the proportion of depression and anxiety disorders; their association with sociodemographic, NCD-related factors and Quality of Life among persons with type II Diabetes Mellitus or Hypertension at a rural health center in Puducherry.

Materials and Methods: This facility-based cross-sectional analytical study recruited 692 participants from May 2020 to September 2021. A structured questionnaire collected sociodemographic and NCD-related history; The Hospital Anxiety and Depression Scale (HADS) and The World Health Organization quality of life (WHOQOL) - BREF questionnaires for depression, anxiety and QOL assessment, respectively. Independent variables were assessed for relationship with depression and anxiety using univariate analysis. Multivariable logistic regression analysis was done to determine the predictors of depression and anxiety.

Results: Nearly 17.8% (95% confidence interval [CI] - 13.8%–22.4%) had depression and 12.7% (95% CI - 9.5–16.7%) had anxiety. Age (adjusted odds ratio [aOR] - 0.97; 95% CI - 0.95–0.99), depression/anxiety disorders family history (aOR - 2.58; 95% CI - 1.26–5.26), overall QOL score reduction (aOR - 0.76; 95% CI - 0.60–0.97), and social domain score reduction (aOR - 0.98; 95% CI - 0.97–0.99) were the significant predictors of depression. No formal education (aOR - 10.84; 95% CI - 4.54–25.86), being homemaker (aOR - 3.49; 95% CI - 1.29–9.42), no DM/HTN family history (aOR - 1.51; 95% CI - 0.66–1.54), psychological domain score reduction (aOR - 0.97; 95% CI - 0.95–0.99) and environmental domain score reduction (aOR - 0.96; 95% CI - 0.94–0.98) were significant predictors of anxiety.

Conclusion: Nearly one-fifth had depression and more than one-tenth had anxiety among the participants. A fair number of persons with HTN/DM have higher anxiety and depressive scores and most domains had a poor QOL score with depression alone having associated with a depression/anxiety family history.

Keywords: Depression, Anxiety, Quality of life, Diabetes mellitus, Hypertension

INTRODUCTION

Hypertension (HTN) is one of the most frequent causes of death and disability across the globe. In India, HTN is prevalent in roughly 24% males and 21.3% females, according to the National Family Health Survey-5 2019–21 report.^[1] Diabetes mellitus (DM) affects an estimated 285 million people globally which may surpass 500 million by 2030, with Asia bearing the major brunt of the “diabetes epidemic.”^[4,20] India is now considered the “diabetes capital of the world,” reporting 72.9 million (8.8% of the adult population) cases of DM in 2017, according to the International Diabetes Federation.^[2] Mental health disorders lead in the fifth position among the causes of

years of healthy life lost due to disabilities (YLDs) and disability-adjusted life years (DALYs), accounting for 22.9% and 7.4% respectively.^[6,20] People with DM and HTN are more likely to suffer from depression or anxiety.^[7] They tend to utilize more healthcare resources and have a poor quality of life (QOL) if their ailments are not properly managed.^[7] Depression affects an estimated 350 million individuals worldwide, with a lifetime risk of 7%.^[3] Anxiety is also prevalent as it is the sixth most common cause of disability when considering YLDs alone globally.^[6] The National Mental Health Survey (NMHS) of India (2015–16) showed the lifetime prevalence of depression and anxiety was 5.1% and 3.1% respectively.^[8]

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Persons with mild or moderate depression/anxiety continue their daily lives without much disruption, thus being overlooked by healthcare systems. Studies on individuals seeking help from primary care settings have shown the anxiety prevalence varying from 15% to 44%, and 33 to 83% were suffering from depression.^[5,8] National program for prevention and control of cancer, diabetes, cardiovascular disease and stroke recently attempted to broaden the community's understanding of successful non-communicable disease (NCD) prevention, detection, referral, and treatment measures. Although linking NCD care with ongoing interventions of the National Mental Health Program has been considered under primary healthcare infrastructure, we are very far from achieving it nationwide.^[1]

The presence of chronic multiple comorbidities has important implications for the QOL and patient well-being which is currently under-addressed in our primary healthcare settings.^[11,12] This study aims to determine the proportion of depression and anxiety disorders and their association with socio-demographic, NCD-related factors as well as the QOL among persons with DM/HTN residing in rural field practice areas and availing treatment at JIPMER Rural Health Centre (JIRHC), Puducherry.

MATERIALS AND METHODS

This is a facility-based cross-sectional analytical study done in JIPMER Rural Health Center, Puducherry providing services in four villages with around 10000 residents namely Ramanathapuram, Thondamanatham, Thutipet, and Pillayarkuppam.^[74] In September 2019, 704 people enrolled at the NCD clinic for treatment of diabetes, HTN, or both, all of them were approached for the study. The study was conducted on the NCD clinic days – Wednesdays and alternate Tuesdays.^[75] Persons showing symptoms of mental health problems were referred to the psychiatry clinic in JIRHC, held once fortnightly on Wednesdays which is attended by the Psychiatry faculty of JIPMER. All persons aged ≥ 30 years who were diagnosed with DM, HTN, or both, residing in rural field practice areas and getting treatment from JIRHC were included in the study. By the time a person reaches his/her thirties, if there is a higher risk of having an NCD like Type II DM or HTN, they would have been incorporated into the JIRHC NCD clinic by the healthcare workers. Anticipating a similar anxiety disorder prevalence of 19.1% among those with DM and HTN in a hospital-based study by Kulkarni *et al.*, (2012), the sample size was calculated in OpenEpi Version 3.0 as 659 with 95% confidence interval (CI) and 3% absolute precision.^[10] Considering 5% non-response rate, 692 participants consented to participate in the study.

The 692 participants also include those with pre-existing psychiatric conditions. Those with severe psychiatric conditions while those with physical disabilities such as

speech and hearing impairment were interviewed with the help of their relatives taking care of the person's health needs. A proforma containing socio-demographic details and NCD-related history were collected following which Hospital Anxiety and Depression Scale (HADS) questionnaire containing 14 items was used to screen for depression and anxiety disorders among respondents within the last 1 week. A one-week assessment was done to identify and manage short-term fluctuations in depression and anxiety symptoms appropriately.^[87] The total score of HADS ranges from 0 to 21, with 0–7 indicating no depression or anxiety, 8–10 mild, 11–14 moderate, and 15–21 severe.

The 26-item scale, World Health Organization (WHO)-QOL-BREF questionnaire was used to assess the QOL where except for the first two questions assessing the overall QOL and general health satisfaction, the remaining items are divided into four domains-Physical, psychological, social, and environmental. Raw scores were transformed statistically to make them identical to the WHOQOL-100 scores. The revised scores were then used in the analysis.

Both HADS and WHO-QOL-BREF questionnaires were validated and pre-tested in the study setting prior to the study in the local language.^[76-87] The interview of each participant didn't last for more than 45 min (15 min for HADS and WHO-QOL-BREF questionnaire administration respectively).

Ethical approval

The scientific and ethical aspects of the study were approved by both the Post-graduate Research Monitoring Committee and the Institute Ethics Committee (JIP/IEC/2019/418). All participants signed in the informed consent form outlining the purpose of the study after a thorough explanation in the local language (Tamil). The consent for those with physical disabilities or severe psychiatric co-morbidities were sought from their relatives/caregivers.

Study procedure

Data collection was done by principal investigator (PI) alone from May 2020 to September 2021. The list of all persons with DM, HTN, or both in the rural field practice area of JIPMER and receiving treatment in JIRHC from the NCD clinic register. After obtaining written informed consent and interviewing for the collection of socio-demographic data, the study participants completed filling out the Hospital Anxiety and Depression scale as well as WHO-QOL-BREF questionnaires' responses on their own during their NCD clinic visit. A maximum of ten persons were given the questionnaires per clinic day. Any study participants identified with depression or anxiety symptoms (i.e., HADS ≥ 8 in the depression/anxiety subset of questions within the last 1 week) or severe deterioration in QOL in any domain

within the last 4 weeks were referred to the psychiatry clinic for in-depth evaluation. Persons diagnosed with depression/anxiety disorders in psychiatry clinic were motivated to follow psychiatry advice in subsequent NCD clinic visits.

Statistical analysis

Data entry was done in EpiCollect v5.0 application, and analysis was performed on the STATA software v14.0. Variables were summarized as the proportion of persons having DM, HTN, or both with depression and the proportion of persons having DM, HTN, or both with anxiety with 95% CI.

Categorical variables such as age, gender, education, per capita monthly income, occupation, family history of depression/anxiety, duration of DM/HTN, tobacco use within the last month, alcohol use within the last year, complications of DM/HTN diagnosed, and other comorbidities were summarized as frequency with percentages. The WHO-QOL-BREF items scores are summarized as median and interquartile range. Chi-squared test of proportion was employed to determine whether socio-demographic and NCD-related factors were associated with depression/anxiety. Wilcoxon rank-sum test was used to test the association among QOL and depression/anxiety. The relationship between socio-demographic, NCD-related characteristics, QOL, and depression/anxiety symptoms was estimated using binary logistic regression and reported as adjusted odds ratio (aOR) with 95% CI. Variables with a $P < 0.2$ in univariate analysis were included in the multivariate regression model.

RESULTS

A total of 692 persons with a mean age (standard deviation, SD) of 55.3 (12.9) years were interviewed. Around 58% of participants were females, 284 (41.1%) had no formal education, and 117 (16.9%) were widowed. About 222 (32.1%) had both DM and HTN. Among the 383 persons having DM, the median (interquartile range, IQR) duration since the diagnosis of DM was 6 (5,9) years, while in 531 persons having HTN, it was 6 (4,10) years. Around 105 (15.5%) persons were having any known complications of DM, HTN or both, and 301 (43.5%) were unaware of any DM/HTN family history. Around half of the individuals had first-degree relatives with a depression/anxiety history. The median (IQR) domain-wise scores in physical, psychological, social and environmental domains (WHO-QOL-BREF) were 56 (44,63), 50 (44,69), 56 (44,69), and 56 (44,69) respectively [Table 1]. Nearly 123 (17.8%) persons had symptoms of depression, with 84 (12.2%) having mild, 26 (3.8%) having moderate, and 13 (1.9%) having severe depression, whereas 88 participants had symptoms of anxiety (12.7%), of which 73 (10.6%) had mild, 12 (1.7%) had moderate, and 3 (0.4%) had severe anxiety [Table 2]. Of all the participants interviewed, 12 of them had both depression and anxiety.

In the univariate analysis, factors associated with depression included age in years, gender, education, occupation, monthly income, marital status, comorbidities managed by NCD clinic, duration of DM in years, duration of HTN in years, complications caused by DM or HTN or both, number of comorbidities, family history of DM/HTN or depression/anxiety, current tobacco use, and current alcohol use, as well as all QOL domains. Further, in the multivariate regression analysis, the associated factors for depression were persons with increasing age with an odds ratio of 0.97 (95% CI: 0.95–0.99), depression/anxiety family history with an odds ratio of 2.58 (95% CI: 1.26–5.26), reduction in overall QOL with an odds ratio of 0.76 (95% CI: 0.67–0.97), and decrease in social domain with an odds ratio of 0.98 (95% CI: 0.97–0.99) [Table 3]. Meanwhile, for multivariate analysis, the factors associated with anxiety were those who are not educated with an odds ratio of 10.84 (95% CI: 4.54–25.86), homemakers with an odds ratio of 3.49 (95% CI: 1.29–9.42), DM/HTN family history with 1.51 higher odds ratio (95% CI: 0.66–1.54), and decrease in psychological domain score (aOR: 0.97; 95% CI: 0.95–0.99) as well as environmental domain score (aOR: 0.96; 95% CI: 0.94–0.98) [Table 4].

All 216 persons who got HADS scores ≥ 8 were referred to the psychiatry clinic for further evaluation. About 191 (88.42%) of them were diagnosed with depression/anxiety disorders and started on clinical management. The median number of visits (IQR) done in RHC after diagnosis was 4 (2, 5), though some participants had to rely on other nearby healthcare facilities providing psychiatric services owing to the COVID-19 restrictions [Table 5].

DISCUSSION

In the NCD clinic, 17.8% of respondents who have had depressive symptoms (95% CI: 13.8–22.4%). Studies done in various primary healthcare centers showed depression prevalence between 21% and 40.5% suggesting that one-fifth of the patients were depressed as found in the present study.^[11,13–16,25,41,43,53,55,59] The depression prevalence among Puducherry's general population was lesser to the proportion reported in this study.^[8,72]

The proportion of anxiety reported at 12.7% (95% CI: 9.5–16.7%) was lesser than in other studies done in a similar setting in India.^[6,8,11,15–16,35–38] Anxiety prevalence ranged from 3% to 60% of people with DM, HTN, or both in multicentric studies, indicating a huge heterogeneity.^[6,8–9,11,25,28–34,36,38,41,51,57] This heterogeneity across various studies could be due to the variation in assessment tools, population characteristics, sampling variability, and methodological variations.

In this study, individuals with depression had a higher average age of 53 years (SD = 13.8) compared to those without depression. Studies on older people have shown that depression is the most prevalent Common Mental

Table 1: Distribution of baseline characteristics among study participants ($n=692$).

Characteristic	Total number of participants n (%)
Age in years (Mean [SD])	55.3 (12.9)
Gender	
Female	402 (58.1)
Male	290 (41.9)
Education	
No formal education	284 (41.0)
Primary (1 st -4 th standard)	82 (11.8)
Secondary (5 th -10 standard)	184 (26.6)
Higher secondary (11 th -12 standard)	118 (17.1)
Graduate and above	24 (3.5)
Occupation	
Employed	301 (43.5)
Homemaker	274 (39.6)
Unemployed	117 (16.9)
Socio-economic status ^a	
Lower class (<1050 INR)	151 (21.8)
Lower middle class (1051-2101 INR)	70 (10.1)
Middle class (2102-3503 INR)	136 (19.7)
Upper middle class (3504-7007 INR)	284 (41.0)
Upper class (>7008 INR)	51 (7.4)
Name of the village	
Ramanathapuram	234 (33.8)
Thondamanatham	179 (25.9)
Thutipet	49 (7.1)
Pillayarkuppam	230 (33.2)
Marital status	
Married	553 (79.9)
Widowed	117 (16.9)
Unmarried	13 (1.9)
Separated	9 (1.3)
Comorbidities managed in NCD clinic	
DM alone	161 (23.3)
HTN alone	309 (44.6)
Both DM and HTN	222 (32.1)
Duration of DM in years (Median [IQR]) ($n=383$)	6 (5,9)
Duration of HTN in years (Median [IQR]) ($n=531$)	6 (4,10)
Any known complications of DM and/or HTN	
Present	105 (15.2)
Absent	587 (84.8)
Complications of DM and/or HTN ($n=105$)	
Neuropathy	51 (48.6)
Coronary artery disease	26 (24.8)
Peripheral vascular occlusive disease	19 (18.0)
Other complications ^b	9 (8.6)
Other comorbidities diagnosed ^c	
Psychiatric disorders	
Major depressive disorder	9 (1.3)
Alcohol use disorder	4 (0.6)
Psychosis – not otherwise specified	4 (0.6)
Others psychiatric morbidities ^d	8 (1.2)
Respiratory diseases	
Bronchial asthma	54 (7.8)
Chronic obstructive pulmonary disease	6 (0.8)

(Contd...)

Table 1: (Continued).

Characteristic	Total number of participants n (%)
Endocrinological disorders	
Hypothyroidism	15 (2.2)
Hyperthyroidism	2 (0.3)
Graves' disease	2 (0.3)
Other disorders	
Sensorineural hearing loss	6 (0.9)
Epilepsy	6 (0.9)
Rheumatic heart disease with mitral stenosis	4 (0.6)
Others ^e	18 (2.6)
Family history of DM or HTN	
DM	154 (22.3)
HTN	229 (33.1)
Other non-communicable diseases	58 (8.4)
No known history of non-communicable diseases	301 (43.5)
Family history of depression or anxiety disorders ^f	
Depression	8 (1.2)
Anxiety disorders	3 (0.4)
Other psychiatric illnesses	37 (5.3)
No known history of psychiatric illnesses	644 (93.1)
Current tobacco use	
Smokeless tobacco	53 (7.7)
Bidi	11 (1.6)
No	628 (90.7)
Current alcohol use	
Yes	136 (19.6)
No	556 (80.4)
QOL domains/items scores ^g (Median [IQR])	
Item 1: Overall QOL	3 (3,4)
Item 2: Overall health satisfaction	3 (3,4)
Physical domain	56 (44,63)
Psychological domain	50 (44,69)
Social domain	56 (44,69)
Environmental domain	56 (44,69)

HTN: Hypertension, DM: Diabetes mellitus, QOL: Quality of life, IQR: Interquartile range, SD: Standard deviation, ^aModified B.G. Prasad (2019), ^bOther complications diagnosed include diabetic retinopathy (5), recurrent foot ulcer (2), and chronic kidney disease (1), ^cMultiple responses possible, ^dOther psychiatric morbidities – bipolar affective disorder (6) and somatoform disorder (2), ^eOther comorbidities diagnosed – senile cataract (10), dyslipidemia (6), Parkinson's disease (2), ^fRestricted to first-degree relatives, ^gBased on response to WHO-QOL-BREF scores,

Table 2: Distribution of depression and anxiety among study participants (n=692).

HADS score	No. of participants n (%)	95% confidence interval
Depression		
No depression (HADS score of 0–7)	569 (82.2)	80.4–86.1
Depression (HADS score ≥8)	123 (17.8)	13.8–22.4
Anxiety		
No anxiety (HADS score of 0–7)	619 (87.3)	84.6–89.7
Anxiety (HADS score ≥8)	73 (12.7)	9.5–16.7

HADS: Hospital anxiety and depression scale

Disorder.^[6,17,21,61,66] Further, studies conducted outside India suggest older people are more prone to developing depression compared with younger people.^[19,30,31,51,66] Of those with anxiety, 17.1% were homemakers, adding to the evidence from various studies done in India and elsewhere,

likely due to the inherent high risk for female gender among anxiety disorders.^[9,24,26,27,38,44–45,52] Statistically, no association between gender and depression was noticed in this study; though depression is twice as common among women with DM/HTN than in males.^[3,18,30] Female endocrinological

Table 3: Association between Socio-demographic, NCD-related characteristics, and QOL scores on depression among study participants (n=692).

Characteristic	Total number of participants n (%)		Depression n (%)		Univariate analysis OR (95% CI)	Multivariable analysis aOR (95% CI)	Multivariable analysis (P-value)
	Absent (n=569)	Present (n=123)	Absent (n=569)	Present (n=123)			
Age in years (Mean [SD])	692 (100.0)	53.4 (13.8)	55.7 (12.8)	53.4 (13.8)	0.98 (0.97-1.00)	0.97 (0.95-0.99)	0.030
Gender							
Female	402 (58.1)	72 (58.6)	330 (58.0)	72 (58.6)	1.22 (0.66-2.27)	0.76 (0.36-1.61)	0.483
Male	290 (41.9)	51 (41.5)	239 (42.0)	51 (41.5)	Ref	Ref	-
Education							
Not educated	284 (41.0)	47 (38.2)	237 (41.6)	47 (38.2)	Ref	Ref	-
Educated	408 (59.0)	76 (61.8)	322 (58.4)	76 (61.8)	1.15 (0.77-1.72)	1.28 (0.68-2.45)	0.443
Occupation							
Employed	301 (43.5)	49 (39.8)	252 (44.3)	49 (39.8)	0.71 (0.42-1.22)	0.76 (0.41-1.42)	0.403
Homemaker	274 (39.6)	49 (39.8)	225 (39.5)	49 (39.8)	0.80 (0.47-1.37)	1.03 (0.42-2.51)	0.935
Unemployed	117 (16.9)	25 (20.4)	92 (16.2)	25 (20.4)	Ref	Ref	-
Monthly income							
>7008	51 (7.4)	7 (5.7)	44 (7.7)	7 (5.7)	Ref	Ref	-
1051-7007	490 (70.8)	86 (69.9)	404 (71.0)	86 (69.9)	1.33 (0.58-3.07)	1.02 (0.43-2.45)	0.959
<1050	151 (21.8)	30 (24.4)	121 (21.3)	30 (24.4)	1.56 (0.64-3.80)	1.52 (0.58-3.97)	0.392
Marital status							
Married	553 (79.9)	92 (74.8)	461 (81.0)	92 (74.8)	Ref	Ref	-
Not married	139 (20.1)	31 (25.2)	108 (19.0)	31 (25.2)	1.44 (0.91-2.27)	1.23 (0.43-3.51)	0.173
Comorbidities under NCD clinic							
DM alone	161 (23.3)	24 (19.5)	137 (24.1)	24 (19.5)	Ref	Ref	-
HTN alone	309 (44.6)	53 (43.1)	256 (44.9)	53 (43.1)	1.18 (0.69-1.99)	1.84 (0.83-4.10)	0.277
Both	222 (32.1)	46 (37.4)	176 (30.9)	46 (37.4)	1.49 (0.87-2.56)	1.42 (0.75-2.72)	0.132
Duration of DM in years (Median [IQR])	383 (55.3)	5 (2.8)	6 (5.9)	5 (2.8)	0.98 (0.94-1.03)	-	-
Duration of HTN in years (Median [IQR])	531 (76.7)	5 (2.8)	6 (5.10)	5 (2.8)	0.99 (0.94-1.01)	0.95 (0.90-1.01)	0.097
Complications due to DM and/or HTN							
Yes	105 (15.2)	25 (20.3)	80 (14.1)	25 (20.3)	1.38 (0.38-3.60)	1.71 (0.92-3.16)	0.086
No	587 (84.8)	98 (79.7)	489 (85.9)	98 (79.7)	Ref	Ref	-
No. of comorbidities							
<2	335 (48.4)	52 (42.3)	283 (49.7)	52 (42.3)	Ref	Ref	0.996
≥2	357 (51.6)	71 (57.8)	286 (50.3)	71 (57.8)	1.35 (0.91-2.00)	0.99 (0.54-1.83)	-
Family history of DM or HTN							
Present	333 (48.1)	64 (52.0)	269 (47.3)	64 (52.0)	0.83 (0.56-1.22)	0.84 (0.54-1.32)	0.461
Absent	359 (51.9)	59 (48.0)	300 (52.7)	59 (48.0)	Ref	Ref	-
Family history of depression or anxiety disorders							
Present	48 (9.9)	15 (12.2)	33 (5.8)	15 (12.2)	2.25 (1.18-4.29)	2.58 (1.26-5.26)	0.009
Absent	644 (90.1)	108 (87.8)	536 (94.2)	108 (87.8)	Ref	Ref	-
Current tobacco use							
Yes	64 (9.2)	16 (13.0)	48 (8.4)	16 (13.0)	1.62 (0.88-2.96)	0.86 (0.38-1.94)	0.728
No	628 (90.8)	107 (87.0)	521 (91.6)	107 (87.0)	Ref	Ref	-

(Contd...)

Table 3: (Continued).

Characteristic	Total number of participants n (%)		Depression n (%)		Univariate analysis OR (95% CI)	Multivariable analysis aOR (95% CI)	Multivariable analysis (P-value)
	Absent (n=569)	Present (n=123)	Absent (n=569)	Present (n=123)			
Current alcohol use							
Yes	136 (19.6)	21 (17.1)	115 (20.2)	21 (17.1)	1.23 (0.74–2.05)	1.51 (0.66–3.47)	0.322
No	556 (80.4)	102 (82.9)	454 (79.8)	102 (82.9)	Ref	Ref	-
QOL scores							
Overall QOL	692 (100.0)	3 (2,4)	3 (3,4)	3 (2,4)	0.69 (0.57–0.84)	0.76 (0.60–0.97)	0.030
Overall health satisfaction		3 (2,4)	3 (3,4)	3 (2,4)	0.89 (0.74–1.07)	1.21 (0.95–1.55)	0.105
Physical domain		56 (38,63)	56 (44,63)	50 (38,63)	0.98 (0.97–0.99)	1.01 (0.98–1.03)	0.275
Psychological domain		56 (44,69)	56 (44,69)	50 (38,63)	0.97 (0.96–0.99)	1.00 (0.98–1.02)	0.826
Social domain		56 (44,69)	56 (44,69)	50 (31,56)	0.98 (0.97–0.99)	0.98 (0.97–0.99)	0.049
Environmental domain		56 (50,75)	56 (50,75)	50 (38,63)	0.97 (0.96–0.98)	0.98 (0.96–1.00)	0.078

Pseudo R²: 0.2965, aOR: adjusted odds ratio, CI: Confidence interval, NCD: Non-communicable diseases, DM: Diabetes mellitus, HTN: Hypertension, QOL: Quality of life, SD: Standard deviation

peculiarities, societal pressures, and gender-restricted work roles might explain this association.^[11,16,25]

Characteristics like educational status, occupation, monthly income, and marital status are associated with depression in multiple studies done in India and elsewhere, although not in present study.^[6,8,11,18,23,25,35,36,38,50,56,67] Of those reported with anxiety, 38.2% never had formal education, supporting studies done worldwide and in India suggest persons with a lower educational status were more likely to have anxiety.^[16,22,25,40,42,44,48,75] Based on the above studies it is likely that people with low educational levels may have fewer employment and income opportunities, resulting in financial insecurity and anxiety. With their limited health literacy, which can further lead to anxiety about understanding and managing their health. Less than half of the study participants reported having a DM/HTN family history, suggesting a lack of knowledge about NCDs. Over 53.4% of people without a DM/HTN family history feel anxious, according to Indian studies, contrary to the current study's suggestion of an association between having no DM/HTN family history and anxiety.^[3,44] However, a Nepal study indicated anxiety was associated with a family history of NCDs.^[42] This disparity may be due to differences in the healthcare systems across nations and methodological variations.^[42]

Depression was not associated with the DM/HTN duration in this study, as Raval *et al.* (2010) reported.^[68] However, a Bahrain study identified a correlation between anxiety and depression with duration of NCDs.^[37] In RHC, those who require a longer duration of DM/HTN management will be followed up in a higher facility; thus, most regular patients attending the NCD clinic at the center are recently diagnosed cases of DM/HTN. Although current tobacco and alcohol usage was not significantly associated with depression or anxiety in this study, DM/HTN patients consuming tobacco or alcohol are more likely to develop depression and anxiety than those who do not (Katon *et al.*, 2004; Saleh *et al.*, 2014; Hassan *et al.*, 2019).^[69-71] Although these studies show tobacco and alcohol use may not independently contribute to depressive or anxiety symptoms, their duration, frequency, or severity of use can make persons suffering from type II DM or HTN more likely to develop these mental health problems. Meanwhile, family history of depressive symptoms or anxiety was under-reported because of a lack of knowledge or stigma since literature suggests depression or anxiety are more common in those with a family history.^[18,42,63] Although the present study has not shown significance, comorbidities managed in the NCD clinic, complications due to DM/HTN or both, and presence of multiple comorbidities were associated with depression in various studies in India and countries like Bangladesh, Pakistan, and United Kingdom.^[6,11,25,35,36,38,39,51,52,54,61]

Table 4: Association between socio-demographic, NCD-related characteristics, QOL scores, and anxiety among study participants (n=692).

Characteristic	Total number of participants n (%)	Anxiety n (%)		Univariate analysis OR (95% CI)	Multivariable analysis aOR (95% CI)	Multivariable analysis (P-value)
		Absent (n=604)	Present (n=88)			
Age in years (Mean [SD])	692 (100.0)	55.2 (12.9)	55.9 (13.6)	1.00 (0.98–1.02)	–	–
Gender						
Female	402 (58.1)	357 (59.1)	45 (51.1)	1.38 (0.88–2.16)	0.95 (0.48–1.87)	0.903
Male	290 (41.9)	247 (40.9)	43 (48.9)	Ref	Ref	–
Education						
Not educated	284 (41.0)	237 (41.6)	47 (38.2)	3.91 (2.91–6.97)	10.84 (4.54–25.86)	<0.001
Educated	408 (59.0)	322 (58.4)	76 (61.8)	Ref	Ref	–
Occupation						
Employed	301 (43.5)	252 (44.3)	70 (79.5)	0.60 (0.31–1.14)	1.32 (0.67–2.57)	0.420
Homemaker	274 (39.6)	225 (39.5)	15 (17.1)	0.91 (0.50–1.66)	3.49 (1.29–9.42)	0.014
Unemployed	117 (16.9)	92 (16.2)	3 (3.4)	Ref	Ref	–
Monthly income						
>7008	51 (7.4)	48 (7.9)	3 (3.4)	Ref	Ref	–
1051–7007	490 (70.8)	424 (70.2)	66 (75.0)	2.49 (0.75–8.23)	2.13 (0.62–7.39)	0.230
<1050	151 (21.8)	132 (21.8)	19 (21.6)	2.30 (0.65–8.13)	2.36 (0.61–9.10)	0.210
Marital status						
Married	553 (79.9)	487 (80.6)	66 (75.0)	Ref	Ref	–
Not married	139 (20.1)	117 (19.4)	22 (25.0)	1.38 (0.82–2.30)	0.97 (0.50–1.88)	0.938
Comorbidities under NCD clinic						
DM alone	161 (23.3)	144 (23.8)	17 (19.3)	1.59 (0.85–2.94)	0.79 (0.37–1.69)	0.550
HTN alone	309 (44.6)	273 (45.2)	36 (40.9)	1.12 (0.60–2.06)	0.97 (0.39–2.36)	0.949
Both	222 (32.1)	187 (31.0)	35 (39.7)	Ref	Ref	–
Duration of DM in years (Median [IQR])	383 (55.3)	6 (5,9)	6 (4,8)	1.01 (0.97–1.06)	–	–
Duration of HTN in years (Median [IQR])	531 (76.7)	6 (4,10)	6 (4,10)	1.02 (0.98–1.06)	1.03 (0.97–1.08)	0.298
Complications due to DM and/or HTN						
Yes	105 (15.2)	87 (14.4)	18 (20.5)	1.53 (0.87–2.69)	1.24 (0.61–2.53)	0.545
No	587 (84.8)	517 (85.6)	70 (79.5)	Ref	Ref	–
No. of comorbidities						
<2	335 (48.4)	301 (49.8)	34 (38.6)	Ref	Ref	0.225
≥2	357 (51.6)	303 (50.2)	54 (61.4)	1.58 (0.99–2.49)	1.55 (0.76–3.16)	–
Family history of DM or HTN						
Present	333 (48.1)	292 (48.4)	41 (46.6)	Ref	Ref	0.001
Absent	359 (51.9)	312 (51.6)	47 (53.4)	1.57 (0.68–1.68)	1.51 (0.66–1.54)	–
Family history of depression or anxiety disorders						
Present	48 (9.9)	39 (6.5)	9 (10.2)	1.65 (0.77–3.54)	2.25 (0.96–5.21)	0.059
Absent	644 (90.1)	565 (93.5)	79 (89.8)	Ref	Ref	–
Current tobacco use						
Yes	64 (9.2)	52 (8.6)	12 (13.6)	1.68 (0.85–3.28)	0.58 (0.24–1.38)	0.219
No	628 (90.8)	552 (91.4)	76 (86.4)	Ref	Ref	–
Current alcohol use						
Yes	136 (19.6)	121 (20.0)	15 (17.1)	1.21 (0.87–2.19)	–	–
No	556 (80.4)	483 (80.0)	73 (82.9)	Ref	–	–
QOL scores						
Overall QOL	692 (100.0)	3 (3,4)	3 (2,4)	0.75 (0.59–0.93)	0.94 (0.71–1.24)	0.668
Overall health Satisfaction		3 (3,4)	3 (2,4)	0.85 (0.68–1.06)	1.02 (0.77–1.35)	0.883
Physical domain		56 (44,63)	50 (44,56)	0.98 (0.96–1.00)	1.02 (0.99–1.04)	0.187
Psychological domain		56 (44,69)	50 (38,56)	0.96 (0.95–0.98)	0.97 (0.95–0.99)	0.027
Social domain		56 (44,69)	50 (31,69)	0.98 (0.97–0.99)	1.01 (0.99–1.02)	0.317
Environmental domain		56 (50,75)	50 (38,56)	0.97 (0.96–0.98)	0.96 (0.94–0.98)	0.004

Pseudo R²: 0.3423, aOR: adjusted odds ratio, CI: Confidence interval, NCD: Non-communicable diseases, DM: Diabetes mellitus, HTN: Hypertension, QOL: Quality of life, SD: Standard deviation, OR: Odds ratio, IQR: Interquartile range

Table 5: Distribution of persons with depression or anxiety disorders screened was put on psychiatric care at psychiatry clinic ($n=216$).

Psychiatric illness screened	HADS score ≥ 8 ($n=216$) (%)	Started on clinical management ($n=191$) (%)
Depression	123 (17.8)	103 (83.7)
Anxiety	88 (12.7)	88 (100.0)

HADS: Hospital anxiety and depression scale

Both depression and anxiety led to lower QOL scores in our study [Tables 3 and 4]. Other studies had lower scores across all the domains under the QOL when assessed using the WHO-QOL-BREF questionnaire.^[16,54,62,64] Studies outside India also had low QOL scores among persons with depression.^[7,49,65,69] DM duration and QOL were not associated with each other in the CODE-2 trial.^[54,61,65] Another study using the EQ-5D-5L instrument reported anxiety/depression among 35% of respondents, whereas pain or discomfort was indicated by 53%.^[54]

Compared with other studies, our study population had a better median follow-up visits (IQR) of 4 (2,5) clinics due to better mobilization of patients by Accredited Social Health Activists and healthcare facilities' proximity.^[47,58,60,73] Patients who suffer from common mental disorders such as depression or anxiety are more likely to be non-compliant with their treatment.^[46,49,60,61,65] The study's strengths include the following: (i) the prevalence of depression and anxiety disorders among participants was assessed using a comprehensive screening tool, and (ii) data entry via a mobile application with inbuilt checks minimizes data entry errors. The limitation of the study was not gathering data from a comparison group of healthy individuals, and medical conditions (e.g., treatment status, drugs taken, etc.) and glycemic status (as well as blood pressure) were not assessed objectively.

CONCLUSION

Nearly one-fifth of participants have depression and more than one-tenth of anxiety among persons with DM, HTN, or both in this study. Therefore, regular screening of common mental disorders is required, along with prompt referral to a psychiatry clinic for those diagnosed. In conclusion, our study highlights the complex interplay between chronic diseases like type II DM, HTN, and mental illness such as depression and anxiety, leading to a significant impact on an individual's QOL. Our findings suggest that the co-occurrence of chronic diseases and mental illnesses, like depression and anxiety, can lead to a range of physical and psychosocial impairments that ultimately affect the QOL. This underscores the importance of taking a more holistic, patient-centered approach to healthcare that addresses both physical and psychological health needs to improve outcomes. In particular, our study highlights the need for healthcare providers to be aware of the potential deleterious effects of chronic diseases and

mental illness on QOL and to incorporate screening and assessment tools, such as the HADS and the QOL (WHO-QOL-BREF) questionnaire, into routine clinical practice. Better screening and identification of mental illness, in conjunction with effective management of chronic diseases, can help reduce the negative impact on QOL and improve overall outcomes in these patients. Therefore, integrated care that takes into account both physical and mental health should be prioritized in clinical practice and public health initiatives to address the burden of chronic diseases and mental health disorders.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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