Loneliness and its correlates amongst elderly attending non-communicable disease rural clinic attached to a tertiary care centre of North India

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ARTICLE INFO

ABSTRACT

Background: Psychological and sociological factors like loneliness have a noteworthy influence on the aging. Very less is known about loneliness amongst the elderly populations living with various Non-communicable diseases.
Aim: The present study aimed to evaluate the prevalence and correlates of loneliness among elderly patients with Non-communicable diseases.
Methodology: 296 patients attending the chronic disease clinic of two Community Health Centres were evaluated on University of California, Los Angeles Loneliness Scale (UCLA LS), Geriatric Depression Scale, Generalized Anxiety Disorder (GAD-7 scale) and Vulnerability to Abuse Screening Scale.
Results: More than half (55.4%) of the participants experienced loneliness as per the three item UCLA LS. When the total scores of UCLA scale were used to evaluate the severity of loneliness, half of the study participants had either moderate (N = 39; 13.2%), moderately high (N = 52; 17.6%) and high (N = 55; 18.6%) level of loneliness. Higher proportion of patients experiencing loneliness had anxiety and reported abuse. Significant predictors of loneliness included presence of diabetes mellitus or hypertension, generalized anxiety disorder and abuse.
Conclusion: Older adults living with non-communicable diseases are at a higher risk for loneliness. Mutual help groups kind of models can be developed to help in "re-peopling" elderly. Primary health centres should help in improving the overall health and morale amongst the elderly by stamping down their apprehensions and anxieties.

1. Introduction

India is witnessing spectacular economic growth, with better longevity supplemented by reduced fertility (Nations - Department of Economic, 2018). As per the most recent census, India has more geriatric population than ever, and it is going to increase exponentially in near future. As a part of Indian traditions and values, the elders in India are passionately looked after by their family members and they lived together as a joint family. However, this is now thing of the past as a result of the splitting up of these extended families, and elders often find themselves helpless in the times of need. Literature review provides strong evidence that psychological and sociological factors have a noteworthy influence on the aging patterns. Amongst these factors, loneliness is one of the hidden villains of the story (Egede and Dismuke, 2012; Holt et al., 2013).

Loneliness is defined as a "subjective experience, a feeling of a gap between desired and actual relationships, a perceived deficit in social relationships" (Perlman and Anne Peplau, 1984). There are 2 main causal models that explains loneliness. The first model scrutinizes the 'outside factor', which include absence of societal mesh, as the main cause of the loneliness; while the other model highlights the 'inside factors', such as personality and psychological factors (Singh and Misra, 2009). Loneliness is experienced by many either because they are living alone, or they lack close family ties, little connections with their innate traditions and culture, an inability to take part in local community activities diligently (Solanki, 2019, n.d.).Data from different parts of the world suggest that loneliness is a very common feature in late stages of life (Woolham et al., 2013). With increasing age, the probabilities of being haunted by the age-related deprivations tend to increase. Such losses may alter the upkeep of social relations, leading to an even

higher incidence of loneliness.

Loneliness is an important biopsychosocial stressor with long term consequences as it brings with it a slew of health issues. When loneliness occurs in combination with other physiological co-morbidities, degraded morale, depression and anxiety are common outcomes (Bekhet and Zauszniewski, 2012; Cacioppo and Hawkley, 2009).It is also associated with physiological stress, sleep problems, impaired mental health and a higher mortality risk(Luo et al., 2012). A systematic review depicted an overall odds of 1.5 for mortality with loneliness, which corroborates to the risk from light smoking and even higher than the risks confabulated by hypertension and obesity (Holt-Lunstad et al., 2015, 2010).

Loneliness and consequences of diabetes mellitus appears to have a bilateral relationship. Stress induced systemic inflammation arising as a result of loneliness has a poor impact on mean glucose levels and health outcomes. On the other hand, complications of diabetes mellitus in turn affects physical mobility which decreases an individual's capacity to socialize, thus leading to loneliness (Morse et al., 2006).Further, the systemic inflammation induced by stress observed in persons with loneliness is an aggravating factor for miserable health outcomes colligated with diabetes mellitus (Jaremka et al., 2013; Nefs et al., 2012).Similarly, loneliness significantly increases the probability of having hypertension in later stages of life (Momtaz et al., 2012).

Although many studies from India, have evaluated the prevalence of psychiatric morbidities among patients with various Non-communicable diseases (NCDs), there is lack of literature on association of loneliness and various NCDs. Accordingly, the present study, aimed to investigate the prevalence of loneliness among patients with NCDs and to assess the relationship of loneliness with socio-demographic factors, depression, anxiety and abuse.

2. Methodology

Detailed methodology of the study has been given in the previous paper Here, we describe the methodology in brief and interested readers can refer to the previous publication from the study(Verma et al., 2019).

2.1. General study settings

The study was conducted at the chronic disease clinic of two Community Health Centres (Khera and Bassi Pathana) of Fatehgarh Sahib district of Punjab. These health centres are also the field practice area of the Department of Community Medicine, School of Public Health, PGIMER, Chandigarh. The study was conducted between September 2017 and June 2018. Ambulatory participants aged ≥60 years and living with either diabetes mellitus and/or hypertension were included in the study. Hypertension and diabetes mellitus are being diagnosed using the JNC-VII (Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure)criteria and World Health Organization (WHO) screening criteria for diabetes mellitus(Joint National Committee, 2003; World Health Organisation, 1999).

The study was approved by the ethics committee of the Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India ((INT/IEC/2017/1320; 21st Nov 2017) and was carried out as per the principles of the Declaration of Helsinki. All participants were recruited after informing them about the purpose of the study and obtaining the written consent. In case of illiterate participants, their thumb impressions were taken in presence of a neutral witness.

2.2. Sample size and sampling

As per the literature review (Kusaslan Avci, 2018), the minimum required sample size was calculated to be 317, with a 95 confidence

interval and a 5 type-I error rate. The test power was considered as 80 and the effect size was assigned a value of 2.2 based on the following formula: n¼4Za2.r2/d2 0(n¼41.962.202/2.22).

Validated tools were used to assess depression (Geriatric Depression Scale) (Yesavage et al., 1982), Generalized Anxiety Disorder (GAD-7 scale)(Spitzer et al., 2006), Loneliness (University of California, Los Angeles Loneliness Scale (UCLA LS))(Russell et al., 1980)and Vulnerability to Abuse Screening Scale (VASS)(Schofield and Mishra, 2003).

UCLA LS comprises of 20 items, of which 10 items are coded in a straightforward direction, and 10 in a reverse direction (Russell et al., 1980). The participants were enquired about how frequently they endured a particular situation, and scoring each item on a Likert-scale from 1 to 4. The maximum score which can be obtained is 80, with a higher scores indicating higher level of loneliness. The scale has good internal consistency (coefficient *a* ranging from 0.89 to 0.94), test-retest reliability (r = 0.73), and adequate convergent and construct validity (Russell et al., 1980). For this study, the Hindi translated version of the scale was used. As per the Perry's loneliness classification matrix, a score of 65–80, 50–64, 35–49 and 20–34 indicates a severe high degree, moderately high degree, moderate degree, and low degree of loneliness (Perry, 1990). Additionally, 3 items of the scales (i.e., 'lack of companionship', 'left out in life', and 'isolated from others') are commonly used to assess the prevalence of loneliness and responses for any of these three items in the form of "sometimes/often" are considered as indicative of the presence of loneliness (Hughes et al., 2004).

VASS comprises of 12 items, with "yes" and "no" responses, which evaluate emotional, psychological, and verbal abuse in the hand of family members. Cronbach's alpha coefficients of various factors or domains of VASS vary from 0.31–0.74. For this study, VASS was translated into Hindi by following the methodology laid down by World Health Organization for an earlier study at our centre (World Health Organisation, 2007). VASS total score of > 4was used as an indicator of presence of abuse.

2.3. Analysis and statistics

Quantitative data were double- entered and validated using Epi-Data entry version 3.1 and subsequently analyzed using Epi Data analysis version 2.2.2.182 (Epi Data Association, Odense, Denmark). The data were evaluated using the Kolmogorov–Smirnov normality test, and was found to have normal distribution. Univariate analysis was run to assess association between different categorical variables (sex, marital status, occupation, duration of illness, presence of comorbidities etc) and those variables with a p-value of < 0.2 were subjected to multivariable logistic regression analysis after ruling out collinearity, to derive the factors affecting loneliness in a significant manner. Odds ratios with 95% confidence intervals were used to measure the strength of the association. A p-value of < 0.05 was considered statistically significant. The key outcome variable was the prevalence of loneliness expressed in percentages. Pearson correlation analysis was used to determine correlation between depression, anxiety, loneliness and abuse.

3. Results

3.1. Socio-demographic and behavioral characteristics

Out of a total of 330 patients who attended the clinic during the study period, 320 gave consent for the interview (response rate of 97%). However, complete data was available for 296 cases only, who were included in final analysis.

3.2. Prevalence of loneliness

Prevalence of loneliness in the study sample was first evaluated by using the 3 items of the scales (i.e., lack of companionship, left out in life, and isolated from others). Responses for any of these three items in

Table 1

Prevalence of loneliness, Depression, Anxiety and Vulnerability to abuse as per the 3 item UCLA LS amongst the elderly patients attending a chronic disease clinic.

	Males N (%)	Female N (%)	Total N (%)	Chi-square value (p-value)
	135 (100)	161 (100)	296 (100)	
Overall loneliness symptom (Any of 3 items - item 4, 10, 16)	76 (56.3)	88 (54.7)	164 (55.4)	0.080 (0.778)
Prevalence of types of loneliness				
Item 4: Lack of companionship				0.648
Never/rarely	80 (59.3)	97 (60.2)	177 (59.8)	(0.723)
Sometimes	34 (25.2)	35 (21.7)	69 (23.3)	
often	21 (15.6)	29 (18.0)	50 (16.9)	
Item 10: Left out in life				0.003
Never/rarely	85 (63.0)	101 (62.7)	186 (62.8)	(0.999)
Sometimes	31 (23.0)	37 (23.0)	68 (23.0)	
often	19 (14.1)	23 (14.3)	42 (14.2)	
Item 16: Isolated from others				0.987
Never/rarely	84 (62.2)	109 (67.7)	193 (65.2)	(0.611)
Sometimes	31 (23.0)	31 (19.3)	62 (20.9)	
often	20 (14.8)	21 (13.0)	41 (13.9)	
Prevalence of Depression as per GDS score				
No/Mild	82 (60.7)	46 (28.6)	128 (43.2)	30.96
Yes (> 20)	53 (39.3)	115 (71.4)	168 (56.8)	(< 0.001) ***
Prevalence of Generalized Anxiety as per GAD-7 scale				
No (0-9)	105 (77.8)	76 (47.2)	181 (61.1)	28.89
Yes (> 9)	30 (22.2)	85 (52.8)	115 (38.9)	(< 0.001) **
Vulnerability to abuse				
No	46 (34.1)	59 (36.6)	105 (35.5)	0.212 (0.368)
Yes (VASS score > 4)	89 (65.9)	102 (63.4)	191 (64.5)	

the form of "sometimes/often" are considered as indicative of the presence of loneliness. As is evident from Table 1, overall, more than half (55.4%) of the participants experienced loneliness with no significant difference in the prevalence across the 2 genders. When the total scores of UCLA scale were used to evaluate the severity of loneliness, about half (N = 150; 50.7%) of the participants reported low level of loneliness. Other half of the study participants had either moderate (N = 39; 13.2%), moderately high (N = 52; 17.6%) and high (N = 55; 18.6%) level of loneliness.

3.3. Prevalence of depression, anxiety and vulnerability to abuse

As evident from Table 1, more than half (56.8%) of the study participants had depression, more than one-third had generalized anxiety (38.9%) and about two-third were vulnerable to abuse (64.5%).When participants of either gender were compared, compared to males, higher proportion of females reported having depression and generalized anxiety (Table 1).

When those with and without loneliness as per the 3 items of UCLA-LS were compared, no significant difference were seen between the two groups on any of the demographic parameters (Table 2).There was no significant difference between those with and without loneliness in terms of prevalence of NCDs and depression. Compared to those without loneliness, higher proportion of patients experiencing loneliness had anxiety and reported abuse (Table 2).

When the demographic profile of those with various grades of loneliness (Low and moderate/moderately high/high) were compared, significantly higher proportion of those with moderate/moderately high/high level of loneliness belonged to nuclear families, had higher per capita income and were more often living alone. No significant difference was noted in terms of age, gender, marital status, place of residence, education and occupational status (Table 3). Compared to those with low loneliness, higher proportion of those with moderate/

Table 2

Association between presence or absence of loneliness as per the 3 item UCLA LS with socio-demographic and clinical characteristics.

Characteristics	Loneliness Absent	Loneliness Present	Total	Chi-square	p-value
Total	132 (100)	164 (100)	296 (100)		
Age group					
60-69 years	94 (71.2)	119 (72.6)	213 (72.0)	0.148	0.929
70-79 years	33 (25.0)	40 (24.4)	73 (24.7)		
80 and above	5 (3.8)	5 (3.0)	10 (3.4)		
Gender					
Male	59 (44.7)	76 (46.3)	135 (45.6)	0.080	0.778
Female	73 (55.3)	88 (53.7)	161 (54.4)		
Marital status					
	104 (78.8)	123 (75.0)	227 (76.7)	0.587	0.444
Single/ divorced/ separated/ widowed	28 (21.2)	41 (25.0)	69 (23.3)		
Type of family					
Nuclear	28 (21.2)	44 (26.8)	72 (24.3)	1.254	0.263
Joint/extended	104 (78.8)	120 (73.2)	224 (75.7)		
Per capita income in INR*					
≤1875	40 (30.3)	62 (37.8)	102 (34.5)	1.888	0.389
1876-6253	57 (43.3)	65 (39.6)	122 (41.2)		
≥6254	35 (26.5)	37 (22.6)	72 (24.3)		
Place of residence					
Urban	14 (10.6)	19 (11.6)	33 (11.1)	0.071	0.790
Rural	118 (89.4)	145 (88.4)	263 (88.9)		
Living alone					
No	121 (91.7)	142 (86.6)	263 (88.9)	1.906	0.167
Yes	11 (8.3)	22 (13.4)	33 (11.1)		
Living Away					
No	113 (85.6)	147 (89.6)	260 (87.8)	1.111	0.292
Yes	19 (14.4)	17 (10.4)	36 (12.2)		
Death of spouse					
No	116 (87.9)	137 (83.5)	253 (85.5)	1.111	0.188
yes	16 (12.1)	27 (16.5)	43 (14.5)		
Educational status					
Illiterate	69 (52.3)	78 (47.6)	147 (49.7)	2.763	0.251
Up to Primary	34 (25.8)	36 (22.0)	70 (23.6)		
Up to Middle school and higher	29 (22.0)	50 (30.5)	79 (26.7)		
Occupational status					
Unemployed/ Retired/ Home maker	56 (42.4)	78 (47.6)	134 (45.3)	4.193	0.241
Unskilled worker	24 (18.2)	21 (12.8)	45 (15.2)		
Semi-skilled/ skilled worker	15 (11.4)	11 (6.7)	26 (8.8)		
Clerical/shop owner/ farmer	37 (28.0)	54 (32.9)	91 (30.7)		
Co-morbidity					
Diabetes	31 (23.5)	54 (32.9)	85 (28.7)	4.913	0.086
Hypertension	69 (52.3)	84 (51.2)	153 (51.7)		
Both	32 (24.2)	26 (15.9)	58 (19.6)		
Depression					
No	62 (47.0)	66 (40.2)	128 (43.2)	1.348	0.148
Yes	70 (53.0)	98 (59.8)	168 (56.8)		
Anxiety					
No	90 (68.2)	91 (55.5)	181 (61.1)	4.961	**0.017***
Yes	42 (31.8)	73 (44.5)	115 (38.9)		
Vulnerability to abuse					
No	57 (43.2)	48 (29.3)	105 (35.5)	6.185	**0.009****
Yes	75 (56.8)	116 (70.7)	191 (64.5)		

Figures represent numbers with percentages in parentheses; *Per capita monthly income as per BG Prasad Socioeconomic classification scale (2017).

Table 3
Association between loneliness as per the 20 item UCLA LS and the socio-demographic and clinical characteristics.

Characteristics	Low Loneliness	Moderate to high loneliness	Total	Chi-square	p-value
Total	189 (63.9)	107 (36.1)	296 (100)		
Age group					
60-69 years	110 (73.3)	103 (70.5)	213 (72.0)	0.590	0.745
70-79 years	36 (24.0)	37 (25.3)	73 (24.7)		
80 and above	4 (2.7)	6 (4.1)	10 (3.4)		
Gender					
Male	73 (48.7)	62 (42.3)	135 (45.6)	1.147	0.284
Female	77 (51.3)	84 (57.5)	161 (54.5)		
Marital status					
Married	116 (77.3)	111 (76.0)	227 (76.7)	0.071	0.790
Single/divorced/separated/widowed	34 (22.7)	35 (24.0)	69 (23.3)		
Type of family					
Nuclear	27 (18.0)	45 (30.8)	72 (24.3)	6.608	**0.01***
Joint/extended	123 (82.0)	101 (69.2)	224 (75.7)		
Per capita income in INR*					
≤1875	56 (37.3)	46 (31.5)	102 (34.5)	4.174	0.124
1876-6253	65 (43.3)	57 (39.0)	122 (41.2)		
≥6254	29 (19.3)	43 (29.5)	72 (24.3)		
Place of residence					
Urban	15 (10.0)	18 (12.3)	33 (11.1)	0.405	0.524
Rural	135 (90.0)	128 (87.7)	263 (88.9)		
Living alone					
No	140 (93.3)	123 (84.2)	264 (88.9)	6.167	**0.013***
Yes	10 (6.7)	23 (15.8)	33 (11.9)		
Living Away					
No	130 (86.7)	130 (89.0)	260 (87.8)	0.390	0.532
Yes	20 (13.3)	16 (11.0)	36 (12.2)		
Death of spouse					
No	130 (86.7)	123 (84.2)	253 (85.5)	0.349	0.555
Yes	16 (11.0)	23 (15.8)	43 (14.5)		
Educational status					
Illiterate	72 (48.0)	75 (51.4)	147 (49.7)	1.550	0.461
Up to Primary	40 (26.7)	30 (20.5)	70 (23.6)		
Up to Middle school and higher	38 (25.3)	41 (28.1)	79 (26.7)		
Occupational status					
Unemployed/Retired/Home maker	64 (42.7)	70 (47.9)	134 (45.3)	2.338	0.505
Unskilled worker	21 (14.0)	24 (16.4)	45 (15.2)		
Semi-skilled/skilled worker	16 (10.7)	10 (6.8)	26 (8.8)		
Clerical/shopowner/farmer	49 (32.7)	42 (28.8)	91 (30.7)		
Co-morbidity					
Diabetes	34 (22.7)	51 (34.9)	85 (28.7)	5.438	0.066
Hypertension	84 (56.0)	69 (47.3)	153 (51.7)		
Both	32 (21.3)	26 (17.8)	58 (19.6)		
Depression					
No	73 (48.7)	55 (37.7)	128 (43.2)	3.645	0.056
Yes	77 (51.3)	91 (62.3)	168 (56.8)		
Anxiety					
No	104 (69.3)	77 (52.7)	181 (61.1)	8.575	**0.003****
Yes	46 (30.7)	69 (47.3)	115 (38.9)		
Vulnerability to abuse					
No	73 (48.7)	32 (21.9)	105 (35.5)	23.12	**< 0.001*****
Yes	77 (51.3)	114 (78.1)	191 (64.5)		

Figures represent numbers with percentages in parentheses; *Per capita monthly income as per BG Prasad Socioeconomic classification scale (2017).

moderately high/high level of loneliness had anxiety and reported abuse (Table 3).

3.4. Predictors of loneliness

Unadjusted and adjusted odds ratios with 95% confidence intervals were calculated to evaluate the predictors of loneliness. Presence of loneliness as per the 3 items of UCLA-LS was associated with diagnosis of diabetes mellitus, generalized anxiety disorder and presence of abuse (Table 4). When the similar predictors were evaluated for presence of moderate/moderately high/high level, presence of hypertension, generalized anxiety and abuse emerged as the significant predictors (Table 5).

3.5. Correlation of loneliness with depression, anxiety and abuse

The total score of UCLA-LS had significant positive correlation with depression scores (Pearson's correlation coefficient – 0.135; p = 0.02*), generalized anxiety scale scores (Pearson's correlation coefficient – 0.145; p = 0.01**) and VASS total score (Pearson's correlation coefficient – 0.385; p < 0.001***).

4. Discussion

In this modern era loneliness has become a major public health issue especially in the older age group and requires active and urgent attention due to its ill effects on their health (Hawkley and Cacioppo, 2010; Luo et al., 2012; Zhong et al., 2017; Zhou et al., 2018). Loneliness leads to increased cardiovascular risk, the decline in cognitive function, depression, anxiety (Cacioppo and Hawkley, 2009; Gerst-Emerson and

Table 4

Sociodemographic and clinical predictors of loneliness as per UCLA-LS 3 item.

Characteristics	Total 296 (100)	Loneliness Present (% of total)	Crude OR (95 CI)	p-value	Adjusted OR (95 CI)	p-value
Total	**296 (100)**	164 (55.4)				
Age group						
60-69 years	213 (72.0)	119 (55.9)	1.26 (0.35-4.50)	0.716	**1.58 (0.37-6.67)**	0.532
70-79 years	73 (24.7)	40 (54.8)	1.21 (0.32-4.54)	0.776	1.38 (0.32-5.91)	0.658
80 and above	10 (3.4)	5 (50.0)	**Ref**	0.71	**Ref**	–
Gender						
Male	135 (45.6)	76 (56.3)	1.06 (0.67-1.69)	0.77	**1.71 (0.63-2.17)**	0.617
Female	161 (54.4)	88 (54.7)	**Ref**		**Ref**	–
Education of the patient						
Illiterate	147 (49.7)	78 (53.1)	**Ref**		1.08 (0.57-2.05)	0.802
Up to Primary	70 (23.6)	36 (51.4)	0.93 (0.53-1.65)	0.82	1.66 (0.82-3.36)	0.153
Up to High School & Higher	79 (26.7)	50 (63.3)	**1.52 (0.87-2.67)**	0.14	**Ref**	–
Occupational status						
Unemployed/Retired/Home maker	134 (45.3)	78 (58.2)	**Ref**		**Ref**	
Unskilled worker	45 (15.2)	21 (46.7)	**0.62 (0.31-1.23)**	0.18	1.07 (0.52-2.19)	0.845
Semi-skilled/ skilled worker	26 (8.8)	11 (42.3)	**0.52 (0.22-1.23)**	0.13	0.59 (0.26-1.37)	0.225
Clerical/shop-owner/farmer	91 (30.7)	54 (59.3)	1.04 (0.61-1.80)	0.86	0.39 (0.15-1.01)	0.053
Marital status						
Married	227 (76.7)	123 (54.2)	**Ref**		–	
Single/divorced/separated/widowed	69 (23.3)	41 (59.4)	1.23 (0.71-2.13)	0.44	–	
Type of family						
Nuclear	72 (24.3)	44 (61.1)	**1.36 (0.79-2.34)**	0.26	–	
Joint/extended	224 (75.7)	120 (53.6)	Ref		–	
Per capita income in INR*						
≤1875	102 (34.5)	62 (60.8)	**1.46 (0.79-2.69)**	**0.21**	1.87 (0.97-3.60)	0.061
1876-6253	122 (41.2)	65 (53.3)	1.07 (0.60-1.93)	0.79	1.23 (0.66-2.31)	0.504
≥6254	72 (24.3)	37 (51.4)	Ref	–	**Ref**	
Place of residence						
Urban	33 (11.1)	19 (57.6)	1.10 (0.53-2.29)	0.79	–	
Rural	263 (88.9)	145 (55.1)	**Ref**		–	
Living alone						
No	263 (88.9)	142 (54.0)	**Ref**		**Ref**	
Yes	33 (11.1)	22 (66.7)	**1.70 (0.79-3.65)**	**0.17**	1.64 (0.71-3.78)	0.246
Living away						
No	260 (87.8)	147 (56.5)	**1.45 (0.72- 2.92)**	**0.29**		
Yes	36 (12.2)	17 (47.2)	Ref	–		
Death of spouse						
No	253 (85.5)	27 (62.8)	**Ref**			
Yes	43 (14.5)	54 (63.5)	1.42 (0.73-2.78)	0.29		
Co-morbid Conditions						
Diabetes mellitus	85 (28.7)	54 (63.5)	**2.14 (1.08-4.23)**	**0.02**	**2.52 (1.20-5.28)**	**0.014***
Hypertension	153 (51.7)	84 (54.9)	**1.49 (0.81-2.75)**	**0.19**	**1.45(0.75-22.80)**	**0.257**
Both	58 (19.6)	26 (44.8)	Ref	–	**Ref**	–
Generalised depression						
No	128 (43.2)	66 (51.6)	**Ref**		**Ref**	
Yes	168 (56.8)	98 (58.3)	1.31 (0.82-2.08)	0.246	0.89 (0.45-1.75)	0.751
Generalised anxiety disorder						
No	181 (61.1)	91 (50.3)	**Ref**		**Ref**	
Yes	115 (38.9)	73 (63.5)	**1.71 (1.06-2.77)**	**0.02**	**2.07 (1.04-4.08)**	**0.036***
Vulnerability to abuse						
No	105 (35.5)	48 (45.7)	**Ref**		**Ref**	
Yes	191 (64.5)	116 (60.7)	**1.83 (1.13-2.97)**	**0.01**	**1.97 (1.17-3.31)**	**0.011***

Jayawardhana, 2015). Higher degree of loneliness has also been shown to be associated with self-harming behaviours, Alzheimer's disease and other dementias and have negative impact on immune system and cardiovascular system(Tiwari, 2013). However, there is limited data on prevalence of loneliness among elderly from India.

Present study evaluated the prevalence of loneliness amongst the elderly patients visiting the NCD clinic of a rural area by 2 methods, i.e., by using the 3 items of UCLA-LS and using the whole (20 item) UCLA-LS. According to UCLA-LS total score, about half of the elderly living with NCDs had moderate or moderately high or high level of loneliness, while with the use of 3 item UCLA-LS 55% respondents depicted loneliness. In terms of specific features, 40.2% reported lack of companionship, 37.2% reported left out in life and 34.8% reported isolated from others. These results are little higher than the available data from the Western countries, which report prevalence of loneliness in 11.5%–43% of individuals aged ≥60 year (Loboprabhu and Molinari,

2012; YANG and VICTOR, 2011). Our study depicted higher prevalence of loneliness in elderly having symptoms suggestive of anxiety and abuse. In the correlation analysis, higher severity of loneliness was significantly associated with depression, anxiety and history of abuse. Another study from Indian setting which evaluated loneliness among patients of depression reported a prevalence rate of 77.3% (Grover et al., 2018). The association of loneliness with depression and severity of depression is well known(Peerenboom et al., 2015).

Taken together, when we compare the findings of the present study with these data, it is evident that loneliness is more prevalent in Indian setting, that too in the elderly people living with NCDs. This higher prevalence in the Indian setting suggests that there is an increasing need to timely recognize and increase the awareness about the same.

The present study's illustrates that the notions of the elderly regarding loneliness are convoluted and confounded by different sociodemographic and clinical parameters. The data highlights the fact, that

Table 5

Sociodemographic and clinical predictors of moderate/moderately high/high levelofloneliness as per UCLA LS 20 item.

Characteristics	Total 296 (100)	Moderate to high loneliness	Crude OR (95 CI)	p-value	Adjusted OR (95 CI)	p-value
Age group						
60-69 years	213 (72.0)	103 (48.4)	Ref		Ref	
70-79 years	73 (24.7)	37 (50.7)	1.09 (0.64-1.86)	0.731	1.21 (0.66-2.11)	0.536
80 and above	10 (3.4)	6 (60.0)	1.60 (0.43-5.83)	0.475	1.95 (0.44-8.60)	0.374
Gender						
Male	135 (45.6)	62 (45.9)	Ref		Ref	
Female	161 (54.5)	84 (52.2)	1.28 (0.81-2.03)	0.285	1.30 (0.74-2.29)	0.352
Education of the patient						
Illiterate	147 (49.7)	75 (51.0)	Ref		–	
Up to Primary	70 (23.6)	30 (42.9)	0.72 (0.40-1.27)	0.261	–	
Up to High School & Higher	79 (26.7)	41 (51.9)	1.03 (0.59-1.79)	0.900	–	
Marital status						
–						
Married	227 (76.7)	111 (48.9)	Ref		–	
Single/divorced/separated/widowed	69 (23.3)	35 (50.7)	1.07 (0.62-1.84)		–	
Type of family						
Nuclear	72 (24.3)	45 (62.5)	2.03 (1.17-3.50)	0.01	Ref	
Joint/extended	224 (75.7)	101 (45.1)	ref		1.71 (0.91-3.19)	0.09
Per capita income in INR*						
≤1875	102 (34.5)	46 (45.1)	Ref		Ref	
1876-6253	122 (41.2)	57 (46.7)	1.06 (0.63-1.81)	0.80	1.15 (0.63-2.09)	0.633
≥6254	72 (24.3)	43 (59.7)	1.80 (0.97-3.32)	0.05	1.83 (0.93-3.60)	0.080
Place of residence						
Urban	33 (11.1)	18 (54.5)	1.26 (0.61-2.61)		–	
Rural	263 (88.9)	128 (48.7)	Ref		–	
Living alone						
No	263 (88.9)	123 (46.8)	Ref		Ref	
Yes	33 (11.9)	23 (69.7)	2.61 (1.19-5.71)	0.01	2.11 (0.87-5.10)	0.097
Living away						
No	260 (87.8)	130 (50.0)	1.25 (0.62-2.51)	0.53	–	
Yes	36 (12.2)	16 (44.4)	Ref		–	
Death of spouse						
No	253 (85.5)	123 (48.6)	Ref		–	
Yes	43 (14.5)	23 (53.5)	1.21 (0.63-2.32)	0.55	–	
Co-morbid Conditions						
Diabetes mellitus	85 (28.7)	51 (60.0)	Ref		Ref	
Hypertension	153 (51.7)	69 (45.1)	1.84 (0.94-3.62)	0.07	2.59 (1.19-5.64)	0.016*
Both	58 (19.6)	26 (44.8)	1.01 (0.55-1.85)	0.97	0.81 (0.40-1.62)	0.563
Generalised depression						
No	128 (43.2)	55 (43.0)	Ref		Ref	
Yes	168 (56.8)	91 (54.2)	1.56 (0.98-2.49)	0.05	1.01 (0.50-2.03)	0.975
Generalised anxiety disorder						
No	181 (61.1)	77 (42.5)	Ref		Ref	
Yes	115 (38.9)	69 (60.0)	2.02 (1.25-3.25)	0.004	2.21 (1.10-4.41)	0.024*
Vulnerability to abuse						
No	105 (35.5)	69 (60.0)	Ref		Ref	
Yes	191 (64.5)	32 (30.5)	3.37 (2.03-5.60)	0.000	3.67 (2.12-6.36)	< 0.001***

even the elderly belonging to the rural areas are at a higher "risks" for loneliness because of a variety of deprivations that they may have suffered over the period of time. We observed that loneliness was associated with living in a joint/extended family setup and higher per capita family income and living alone in our study. Existing literature supports the association of loneliness with living alone(Dean et al., 1992). Association of loneliness with joint/extended family set-up is in contrast with other studies(Liu and Guo, 2007; Newsom and Schulz, 1996), which show that having a spouse and other members in the house are considered as good predictor of life satisfaction and decreased feeling of loneliness and left out in life. However, the association of loneliness with extended/joint family in the present study can be considered from the perspective of changing social norms. These suggest that although there are many people living in the same household, the interaction between people is reducing due to increasing use of gadgets (Drago, 2015). Previous study depicted that adequacy of income, advancing age, gender, marital status, education, employment status, financial stability are important correlates of loneliness(Grover et al., 2018). However, in the present study, similar associations did not emerge. Findings of the present study in this regard must be considered

as preliminary and there is a need to replicate these findings. In terms of physical health, in the present study, loneliness was also associated with diabetes mellitus and hypertension, supported by a similar Turkish study (Kusaslan Avci, 2018). This indicates that elderly people living with comorbidities perceive their health in different way which has more relative importance to loneliness than actual limitations because of the disease. Perceived poor health leads to loneliness through gradual social and emotional withdrawal. Elderly are preoccupied with different co-morbidities, may isolate elderly through limited interaction and communication with their family members and peer groups.

Our study has some strengths. As there is confusion in the analysis as per different schools of thought about the UCLA-LS, we have attempted to present the data in both ways in the same paper. We can now conclude that the burden of loneliness in elderly is high irrespective of the method used. Our study has some limitations as well. Ideally, final diagnosis of psychiatric comorbidities should be based upon thorough consultations from an expert Psychiatrists. However, in the absence of Psychiatric consultations in remote areas, we have used only the validated screening tools for assessment during the community-based assessments that can assure us of near actual results. The study

did not involve assessment of other factors such as social support, coping, physical disabilities etc. The study was limited to a rural population. This study was cross-sectional in nature, hence causality cannot be established. It is quite possible that psychiatric morbidity and loneliness are outcome of the NCDs or vise versa. Longitudinal studies involving multiple assessments can answer these questions. Further, this was a NCD clinic based study and hence, the findings cannot be generalized to the general population. Future longitudinal general population based studies involving participants from the community can answer these questions.

The present study has few public health speculations. Since the results depicted may be seen as just a tip of iceberg, we should recognise loneliness as an emerging epidemic and take measures to curb it in its early phases. Evidence shows that there is compelling need for re-integration of the elderly into the community and especially among the ones who have lost their spouses. There is a need to develop models and evaluate the same to address the issue of emerging loneliness among elderly. Mutual help groups kind of models can be developed to help in "re-peopling" elderly. The members within these groups can serve as role models, may solicit friendship, and have the potential for being idolised while rendering the unfilled gaps in the community. Preventive/Primary health centres may also take a lead in formation of such groups as they can help in improving the overall health and morale amongst the elderly by stamping down their apprehensions and anxieties and also enhance opportunities for social interaction.

Although the results from this rural clinics based study depicted that older adults are at a higher risk for loneliness, much remains to be known. There is a need for longitudinal studies to evaluate the physical and psychological impact of loneliness on the elderly and the health care systems.

Conflict of interest

None.

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