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Correlates for the severity of suicidal risk in participants with common mental disorders with comorbid chronic medical conditions in rural primary healthcare settings in India

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ABSTRACT

Context: Suicide is on the rise in low- and middle-income countries (LMICs), including India. There are limited studies assessing factors linked to the severity of suicidal risk in patients with depression and comorbid chronic medical disorders in primary healthcare (PHC) settings.

Aim: This study examines factors linked to suicidal risk among participants in a cluster randomized controlled trial of collaborative care intervention (Healthier Options through Empowerment (HOPE Study)).

Settings and Design: The setting was at 49 PHC in the rural Ramanagara District of Karnataka State in southern India. Study eligibility criteria included being ≥ 30 years with at least mild depression or generalized anxiety disorder and at least one medical condition (cardiovascular disorder or type 2 diabetes mellitus).

Methods and Material: The severity of suicidal risk at baseline was assessed using the Mini International Neuropsychiatric Interview (MINI), and other measures included the severity of depression (Patient Health Questionnaire-9-items (PHQ-9)), the severity of anxiety (Generalized Anxiety Disorder Scale-7-items (GAD-7)), disability, social support, quality of life, number of comorbid chronic medical illnesses, and body mass index (BMI).

Statistical Analysis Used: Chi-square tests and independent-samples *t*-tests were used to compare the demographic and clinical characteristics of the no-low and mod-high suicidal risk groups. Logistic regression analysis was used to identify correlates associated with the mod-high suicidal risk group.


Results: Mod-high suicidal risk was significantly positively associated with the severity of depression and disability and significantly negatively associated with social support.

Conclusion: The severity of depression, higher disability scores, and lower social support were found to be independent correlates of mod-high suicidal risk. Screening, managing depression, and facilitating social support for patients with chronic medical illness in PHC settings may reduce suicidal risk.

Key words: Chronic medical illness, depression, disability, primary healthcare settings, social support, suicidal ideation

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INTRODUCTION

Suicide is a significant public health problem globally, including in India, which contributes more than one-fourth to the global burden of suicide.^[1] India has the highest suicide mortality rate (16.3 per 100,000 population) among all Southeast Asia regional countries and ranks third in female suicide rates globally.^[2]

Globally, in primary healthcare (PHC) settings (rural and urban areas) and among those with a diagnosis of depression, at least 50% report suicidal ideas.^[3] While it is well known that anxiety and depression predict suicidal ideation (SI) and attempts,^[4,5] there is a complex interaction between common mental disorders (CMDs), chronic physical illness, and suicidality. Some studies have found symptoms of mental illness such as depression^[3,6] and physical illness^[7-10] to be independent contributors to higher suicidal risk. Others have noted that depression alone predicted SI and higher suicidal risk among participants with chronic medical conditions, both in population-based studies^[11,12] and among patients attending general outpatient settings.^[13,14] A systematic review and meta-analysis confirmed that SI among severe diabetics is found primarily among those with depressive symptoms.^[15] The presence of chronic physical illnesses may influence a person's mood or attitude toward life through fear of death, apprehension toward pain, or the perception that they are an unacceptable physical or economic burden on their families.^[16]

Findings from studies examining the association between the number of chronic medical illnesses and an increased risk of suicidal behavior have been inconsistent. A study from the Collaborative Psychiatric Epidemiology Surveys (CPES), which was a cross-sectional population-based household survey of adults in the United States, found that an increase in the number of physical health conditions was associated with higher odds for suicidal behavior compared with those with no physical conditions. Participants with one physical condition had 1.29 higher odds of SI, 1.45 higher odds of a suicide plan, and 1.37 higher odds of suicide attempts. Participants with two to three physical conditions had 1.46 higher odds of SI, 1.98 higher odds of a suicide plan, and 2.20 higher odds of suicide attempts, while participants with four or more physical illnesses had 2.99, 4.82, and 4.39 times higher odds of reporting SI, a suicide plan, and suicide attempts, respectively.^[17] Similarly, a multicountry study found that the odds of lifetime SI and attempts increased with an increase from 1 to 5+ in the number of physical conditions.^[9] However, others (population-based household survey in Spain) failed to find any association between the number of chronic medical conditions and suicidal risk.^[18] A study from South Korea reported that co-occurring chronic illnesses might be linked to some aspects of suicidal behavior such as SI or suicidal attempts, but not all forms of suicidal behavior in the general population.^[19]

In India, there is a paucity of studies that have examined factors associated with suicidal risk in patients with chronic medical illnesses. The majority of studies from India examining factors associated with suicidal risk are based on hospital samples, specific medical disorders, those with severe mental illness, and/or self-reported chronic physical illness.^[20-23] To the best of our knowledge, there are no studies in PHC settings in India that have examined factors associated with suicidal risk in a population with CMDs and chronic medical conditions with limited healthcare access.

METHODOLOGY

Participants

The present analysis is based on baseline data from a cluster randomized controlled trial (cRCT) that evaluated the effect of integrating the collaborative care model for mental health (depression and anxiety) and chronic medical diseases (diabetes mellitus, hypertension, or cardiovascular disorders) on CMDs among patients in PHC settings (Healthier Options through Empowerment (HOPE) study).^[24] Approval of the Institutional Ethical Review Board at St. John's Medical College and Hospital and Committee on Human Research, University of California, San Francisco was obtained. The screening for this parent study occurred in two phases. Initial screening occurred at the PHCs and village-level health fairs, and eligible participants were invited to the PHC for confirmatory screening before enrollment. The eligibility criteria for the initial and confirmatory screenings and study protocol for the cRCT are provided in a published study.^[25] The screening was conducted by trained research assistants who had master's degrees in psychology or psychiatric social work. They were trained in mental health screening instruments by the study investigators. They were assessed on the fidelity of their training and certified before beginning fieldwork. Later, they were given periodic booster sessions to maintain the quality of the assessment. The study inclusion criteria were men and women 30 years or older, with comorbid CMD (depression or dysthymia, generalized anxiety disorder, panic disorder, and suicidality) and either hypertension, diabetes, and/or ischemic heart disease. The study settings were 49 PHCs in the rural Ramanagara District of Karnataka State in southern India.

Clinical and psychological assessments

We collected demographic details of the participants including age, gender, marital status (married vs. single (i.e., never married, separated, divorced, and widowed)), educational status, and household monthly income (divided into less than or equal to Rs. 5000 vs. more than Rs. 5000).

Primary outcome measure

Suicidal risk categories: The Mini International Neuropsychiatric Interview (MINI) was used in the parent study to confirm a diagnosis of anxiety or depressive disorder as per the Diagnostic and Statistical Manual of Mental

Disorders, 4th Edition (DSM-IV) at the confirmatory screening and has items pertaining to SI. MINI also allows for grading suicidal risk as low, moderate, and high. Those scoring ≥ 6 were excluded from the study and were referred to the district psychiatrist for further management and treatment. The baseline follow-up occurred within one week after the confirmatory screening, and they were administered measures such as Patient Health Questionnaire-9-items (PHQ-9), Generalized Anxiety Disorder Scale-7-items (GAD-7), and other assessments at the PHCs. The administration of the scales and the sequences are mentioned in detail in Table 3 of the protocol paper (Srinivasan *et al.*, 2018).^[25] The MINI suicidality assessment consists of six questions with “Yes or No” responses. As per the standard scoring protocol, we gave weighted scores to positive answers as follows: “In the past month did you think that you would be better off dead or wish you were dead?” was given a score of 1, “Want to harm yourself?” a score of 2, “...Think about suicide?” a score of 6, and “... Have a suicide plan?” and “... Attempt suicide?” each a score of 10. Finally, the scores were summed and a total score of suicidal risk in the past month was obtained. The total suicidal risk scores were categorized into two groups: the no-low suicidal risk group (no-to-low risk, score 0–5) and the mod-high suicidal risk group (moderate-to-high risk, score 6–29). We wanted to categorize them into these groups to plan interventions appropriately. We included even those with no risk in the no-low suicidal risk category because chronic medical illness itself is associated with increased SI after adjusting for depression.^[17]

Other study measures included

PHQ-9: The PHQ-9 is a standardized and validated scale used to measure the presence of depressive symptoms in the past 2 weeks.^[26] Participant response options consist of 0 (not at all), 1 (several days), 2 (more than half of the days), and 3 (nearly all the days). Item scores are summed over all items, so the total score ranges from 0 to 27, and the severity of depression is categorized as minimal (0–4), mild (5–9), moderate (10–14), and severe (15–27). The PHQ-9 has been widely used in studies of patients with depression and comorbid medical conditions.^[27–29] We dropped the 9th question in the calculation of the total depression score in this study, to avoid overlap with the suicidality outcome.

GAD-7: GAD-7^[30] is a 7-item questionnaire used for screening and measuring the severity of generalized anxiety disorder in the past 2 weeks. Administration, response options, and scoring are like the PHQ-9. This scale has been used in Indian studies previously.^[31] We have used the total scores in this study.

Disability Scores: The 12-item version of the World Health Organization (WHO) Disability Assessment Schedule 2.0 (WHODAS 2.0) was used to assess disability. It is organized into six domains designed to assess health

status related to cognition (e.g., learning a new task), mobility (e.g., standing for a long time), self-care (e.g., getting dressed), interpersonal (e.g., maintaining a friendship), life activities (e.g., household responsibilities), and participation in society (e.g., joining in community activities) for the past 30 days. The participants mark on a 5-point scale ranging from 1 “None” to 5 “Extreme—cannot do” how much difficulty they had in the past 30 days with various items. The total scores are obtained by summing over all items, as per the “simple scoring” instructions in the WHODAS manual. The scores range from 12 to 60, with higher scores indicating greater perceived disability.^[32] This scale has been used in previous research in India.^[33]

Social Support: The Social Support Questionnaire (SSQ)^[34] is a 12-item questionnaire. The original scale consisted of six items for instrumental social support and six items for emotional social support and was used to assess the social support of parents in a study of the home environment and cognitive performance of school-going children from urban Bangalore. In this study, we excluded one item from the instrumental social support subscale and one from the emotional social support subscale because the items asked about receiving support for childcare and did not apply to our study population of mostly older adults. Response options range from 1 (definitely not enough) to 4 (definitely enough), and we used the total mean score of all the items. The internal consistency of this scale in our sample was $\alpha = 0.914$.^[35,36]

WHO Quality of Life Brief Version (WHOQOL-BREF): This instrument comprises 26 items in the following domains: physical health, psychological health, social relationships, and environment. As per standard scoring instructions, scores were calculated for the individual subdomains; however, the subdomain social relationships were dropped as we assessed social support using another scale.^[34] The transformed scores (4–20) of each retained domain were added to compute the total score. The total score ranged from 12 to 60, with higher scores indicating greater quality of life.^[37]

Clinical measurements

We assessed glycemic control (hemoglobin A1c (HbA1c)), systolic and diastolic blood pressure, lipid profile (total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides), and body mass index (BMI), which were measured using standard assays. We categorized participants as diabetic if the HbA1c $\geq 6.5\%$ and nondiabetic otherwise. Hypertension was diagnosed if the systolic blood pressure was ≥ 140 mm Hg and/or diastolic blood pressure ≥ 90 mm Hg on two measurements. Hyperlipidemia was diagnosed if patients had LDL cholesterol levels > 190 mg/dL for patients without diabetes and > 70 mg/dL in diabetics. We calculated the BMI based on the formula: weight (kg) divided by height (cm^2).^[38] Based

on the cutoff of ≥ 23 , the participants were divided into under-/normal weight and overweight/obese.^[39]

Statistical analysis

Descriptive statistics for normally distributed variables were reported as mean and standard deviations and for categorical variables as frequencies and percentages. Chi-square tests and independent-samples *t*-tests were used to compare the demographic and clinical characteristics between the no-low and mod-high suicidal risk groups. A multivariate logistic regression analysis was performed to examine the association of socio-demographic and clinical variables with the two categories of suicide risk (no-low and mod-high suicidal risk). Variables that were significant with a *P* value of < 0.10 in the bivariate analysis were included in the multivariate logistic regression analysis to identify correlates associated with suicide risk-adjusted for the other covariates. An adjusted odds ratio (AOR) and 95% confidence interval (CI) are reported. We used robust standard errors to account for the clustering of participants in PHCs. We used a two-tailed analysis and considered a *P* value of less than 5% statistically significant.

RESULTS

A description of the sample is provided in Table 1, overall, and by suicidal risk category. We had 1816 (73%) participants with more than one medical condition. The total mean depression scores were 8.51 ± 4.12 , and the total anxiety scores were 6.75 ± 3.73 . The categories of depression severity included minimal (380, 15.3%), mild (1249, 50.2%),

moderate (627, 25.2%), and severe (230, 9.3%). The categories of anxiety severity scores included minimal (753, 30.3%), mild (1249, 48.4%), moderate (439, 17.7%), and severe (90, 3.6%). These categories are based on the standard PHQ-9 and GAD-7 cutoff scores.

Of the 2479 participants in these analyses, 2186 were in the no-low suicidal risk group and 293 were in the mod-high suicidal risk group. Female participants made up 83.3% of the higher suicidality risk group vs. 73.8% of the lower suicidality risk group ($p = 0.001$). The mod-high suicidal risk group also contained relatively more single individuals (44.0% vs. 34.8% in the lower suicidality risk group, $P = 0.001$), people with no formal education (64.7% vs. 56.9%, $P = 0.012$), and with a household income of Rs. ≤ 5000 (76.1% vs. 70.5%, $P = 0.046$).

The mean depression scores, mean anxiety scores, and disability scores^[32] were significantly higher in the mod-high suicidal risk group compared with the no-low suicidal risk group. In addition, mean social support scores and quality of life were significantly lower in the mod-high suicidal risk group than in the no-low suicidal risk group [Table 1].

The unadjusted odds ratio in the logistic regression analysis revealed that, after accounting for clustering in PHC, female sex, marital status, educational status, depression, anxiety, disability, social support, and quality of life were significantly associated with the mod-high suicidal risk group [see Table 2 for details]. The multivariable analyses confirmed that depression (AOR = 1.08, 95% CI: 1.02–1.13,

Table 1: Socio-demographic and clinical variables by severity of suicidal ideation

Variables	Subgroups	Total (n=2479)	No-low risk (n=2186)	Mod-high risk (n=293)	P
Sex	Male	621 (25.1%)	572 (26.2%)	49 (16.7%)	0.001
	Female	1858 (74.9%)	1614 (73.8%)	244 (83.3%)	
Marital status	Married	1589 (64.1%)	1425 (65.2%)	164 (56.0%)	0.001
	Single	890 (35.9%)	761 (34.8%)	129 (44.0%)	
Educational status	No formal education	1432 (57.8%)	1243 (56.9%)	189 (64.7%)	0.012
	1–7 yrs.	725 (29.3%)	646 (29.6%)	79 (27.1%)	
	≥ 8 yrs	319 (12.9%)	295 (13.5%)	24 (8.2%)	
Income groups (Indian rupees)	≤ 5000	1764 (71.2%)	1541 (70.5%)	223 (76.1%)	0.046
	> 5000	715 (28.8%)	645 (29.5%)	70 (23.9%)	
Diabetes status	No, HbA1c ≤ 6.4	968 (39.3%)	849 (39.0%)	119 (41.6%)	0.399
	Yes, HbA1c ≥ 6.5	1494 (60.7%)	1327 (61.0%)	167 (58.4%)	
Body mass index	Under-/normal weight ≤ 22.9	678 (30.6%)	589 (30.2%)	89 (33.6%)	0.287
	Overweight/obese ≥ 23	1536 (69.4%)	1360 (69.8%)	176 (66.4%)	
Hyperlipidemia	No	951 (38.6%)	832 (38.2%)	119 (41.6%)	0.271
	Yes	1511 (61.4%)	1344 (61.8%)	167 (58.4%)	
Hypertension	Normal	915 (37.1%)	812 (37.2%)	103 (36.0%)	0.689
	HTN stage 1 to HTN crisis	1552 (62.9%)	1369 (62.8%)	183 (64.0%)	
Number of chronic medical conditions (DM, HTN, and hyperlipidemia)	1 to 2	1536 (62.4%)	1362 (62.6%)	174 (61.3%)	0.665
	3	924 (37.6%)	814 (37.4%)	110 (38.7%)	
Depression scores (PHQ-8)		7.80 \pm 3.87	7.54 \pm 3.69	9.79 \pm 4.54	0.001
Anxiety scores (GAD-7)		6.75 \pm 3.73	6.52 \pm 3.55	8.43 \pm 4.45	0.001
Disability score (WHODAS 2.0)		24.30 \pm 7.72	23.83 \pm 7.44	27.80 \pm 8.86	< 0.001
Social support (total scores)		5.77 \pm 0.93	5.82 \pm 0.90	5.39 \pm 0.97	0.001
Quality of life (except social domain)		35.15 \pm 5.09	35.46 \pm 4.92	32.86 \pm 5.75	0.001

The Chi-squared test was used for assessing the difference between the lower and higher suicidal risk groups, and the independent-samples *t*-test was used for continuous variables

Table 2: Binary logistic regression analysis of moderate-to-high suicidal ideation on socio-demographic and clinical variables

Variables	Subgroups	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
Sex	Male	Ref	0.007	Ref	0.11
	Female	1.76 (1.17–2.67)		1.47 (0.92–2.34)	
Marital status	Married	Ref	0.001	Ref	0.195
	Single	1.47 (1.18–1.84)		1.21 (0.91–1.62)	
Educational status	No formal education	Ref	0.180	Ref	0.697
	1–7 yrs.	0.80 (0.58–1.11)		1.06 (0.79–1.41)	
	>8 yrs.	0.54 (0.33–0.87)		0.97 (0.61–1.55)	
Income groups (Indian rupees)	≤5000	Ref	0.068	Ref	0.275
	>5000	0.75 (0.55–1.02)		0.82 (0.58–1.17)	
Depression score (PHQ-9)		1.14 (1.09–1.19)	<0.001	1.08 (1.02–1.13)	0.007
Anxiety score (GAD-7)		1.13 (1.08–1.18)	<0.001	1.02 (0.97–1.07)	0.508
Disability score (WHODAS 2.0)		1.03 (1.02–1.04)	<0.001	1.01 (1.002–1.02)	0.015
Social support (total scores)		0.62 (0.54–0.71)	<0.001	0.79 (0.70–0.89)	<0.001
Quality of life (except social domain)		0.90 (0.88–0.93)	<0.001	0.98 (0.95–1.0)	0.293

Logistic regression analysis was used. Sex, marital status, educational status, and income groups were controlled for the adjusted odds ratio. Robust standard errors to account for the clustering of participants in PHCs were used

P value = 0.007) and disability (AOR = 1.01, 95% CI: 1.002–1.02, *P* value = 0.015) were significantly positively associated with the mod-high suicidal risk group, while social support (AOR = 0.79, 95% CI: 0.70–0.89, *P* value = < 0.001) was significantly negatively associated. The demographic variables, anxiety, and quality of life were no longer significant in the multivariable model.

DISCUSSION

In this study among participants with CMDs and comorbid medical conditions in rural PHC settings in India, increased severity of depression and greater disability were significantly positively associated with the mod-high suicidal risk group, while social support was significantly negatively associated with the mod-high suicidal risk group. These findings are consistent with multiple studies in populations with chronic medical illnesses.^[3,12,13,40-43] To the best of our knowledge, this is the first study in India that has examined the correlates of suicidal risk among participants with depression and comorbid medical conditions in a rural PHC setting.

The severity of depression was significantly positively and independently associated with the mod-high suicidal risk in our participants, and this association is consistent with other studies done globally.^[13,14,43] A nested case–control study in England found that clinical depression contributed to higher suicidal risk across a range of physical conditions except for osteoporosis.^[44] In participants with depression and comorbid medical conditions, it is the severity of depression that contributes to an increased risk of SI.^[11-14] Depression has a bidirectional relationship with chronic medical disorders, and this relationship increases the risk of SI as evident in the results of this study.^[45] It is therefore important to screen, identify, and treat depression in those with comorbid medical conditions. We did not find any association between the number of chronic medical

conditions and suicidal risk. While some authors have reported an association between the number of medical conditions and increased severity of the suicidal risk^[9], others did not find any association between them.^[18] Our results could be because we simply enumerated the chronic medical illnesses, rather than using a more complex, weighted disease-specific index of severity of chronic medical illnesses. Researchers reiterate the importance of considering the severity, complexity, and/or duration of chronic medical illnesses rather than just the number of chronic medical conditions when examining the association between chronic medical conditions and suicidal risk.^[46] Others have noted that it is the effect of physical illness in terms of disruption to daily activity, which influences a person’s life, rather than the number of medical conditions that predict suicide risk.^[47] This finds support from the findings of the present study, and several earlier studies that found disability independent of depression were associated with the mod-high suicidal risk group.^[42,48-51] A systematic review found that the association between disability and suicidal risk remained significant when controlling for depression, concluding that functional disability increases the risk of suicide independent of depression and other covariates.^[52] This could be explained by individual experiences associated with living with a disability in terms of cognitive problems, functional limitations, poor self-care, difficulty in socialization, difficulty in life activities, and community participation.^[53] It is posited that persons with a disability experience heightened levels of perceived burdensomeness and thwarted belonging compared with those without a disability.^[54]

Even though anxiety scores were not significant when adjusting for other covariates in our sample, the unadjusted significant effect of anxiety is in line with previous research that anxiety is associated with heightened suicide risk. Therefore, it is important to screen for anxiety in this population.^[55]

There are limited studies exploring the potential buffering role of social support in suicidal risk among participants who have depression with comorbid medical conditions in rural PHC settings. Most of the studies have focused on elderly people, and there have been very few studies on adults with comorbid medical illnesses in PHC settings. Adequate social support is directly associated with a lower occurrence of SI,^[39] and other authors have found that social support is protective against suicide in the presence of risk factors such as negative life events.^[56] Better social support has also been found to act indirectly in mitigating suicidal risk by increasing other protective factors such as self-esteem and a feeling of belongingness.^[57,58] Social support is one of the highly modifiable factors that can be used to strengthen existing suicide prevention programs worldwide.^[59]

Strengths

This was a large community-based study from rural India. We used laboratory measures to identify or confirm chronic medical illnesses, while previous community-based studies relied on self-reports of medical conditions. We also used well-validated instruments for measuring depression severity and suicidal risk. Previous studies have assessed SI in terms of whether it was present or absent; however, in the present study, we have assessed the severity of SI using the MINI questionnaire.^[11,60] This is important since the severity of suicidal risk is a better indicator of morbidity than merely noting the presence or absence of SI.^[61,62]

Limitations

The main limitation of this study is the cross-sectional nature of the analysis, which prevents us from attributing a causal role to the correlates. We did not include other chronic medical conditions such as chronic obstructive lung disease, bronchial asthma, and cancers that have previously been reported to be associated with an increased risk of suicide. The assessment of suicidal risk on MINI and measure of severity of depression and anxiety were not done at the same time point, and this could have influenced the findings and conclusions drawn. The findings from the present study cannot be generalized to populations in other parts of India.

CONCLUSIONS

There are limited studies that have examined suicidal risk in adults with depression and comorbid chronic medical illness in rural PHC settings, and hence, our study fills this gap. Our study has some important implications regarding suicide prevention and intervention. First, our results support the need for screening SI in patients presenting with depression and chronic medical illness. However, suicidality is multifactorial and it is important that all individuals irrespective of the presence of chronic medical conditions need screening for suicidal risk. Second, because of a rise in the prevalence of depression, suicides, and

chronic medical illnesses such as diabetes mellitus (DM) and cardiovascular diseases in rural India,^[63] it is critical to screen and provide early intervention for depression in PHC settings. It is important to integrate screening and treatment of depression with care for chronic medical conditions.

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Conflicts of interest

There are no conflicts of interest.

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