Research

Anxiety, depression, and Type D personality in ischaemic heart disease patients receiving treatment from outpatient clinics in a government hospital in Sri Lanka

Chandima Kumara Walpita Gamage[1] · Piyanjali Thamesha De Zoysa[2] · Aindralal Balasuriya[3] · Neil Francis Joseph Fernando[4]

Abstract

Background Anxiety, depression, and Type D personality are strongly correlated with the prognosis of IHD and the effectiveness of therapy. The main purpose of this study was to assess the proportions and associations of anxiety, depression, and Type D personality among clinically stable IHD patients (aged 18–60) treated at an outpatient clinic operated by a government hospital in Sri Lanka, who were diagnosed with IHD within the preceding three months.

Methods A cross-sectional study design was analysed using SPSS® version 23.0. The validated Sinhalese version of the Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety and depression, while the DS-14 was used to determine Type D personality traits.

Results Among the 399 patients, 29.8% (n = 119) had anxiety, 24.8% (n = 99) had depression, and 24.6% (n = 24.6) had Type D personality. The level of anxiety had a significant association with depression (p = 0.002) and Type D personality (p = 0.003). Furthermore, depression was significantly associated with ethnicity (p = 0.014), occupation (p = 0.010), and type D personality (p = 0.009). Type D personality was the strongest predictor of anxiety, with patients being 1.902 times more likely to experience anxiety (95% CI 1.149–3.148; p = 0.012). Anxiety was a significant predictor of depression, with patients being 1.997 times more likely to experience depression (95% CI 1.210–3.296; p = 0.007). Non-Sinhalese ethnic background was also a significant predictor of depression (OR: 0.240; 95% CI 0.073–0.785; p = 0.018). Anxiety increased the likelihood of having Type D personality traits by 1.899 times (95% CI 1.148–3.143; p = 0.013).

Conclusion The current study recommends the importance of screening and treating the psychological risk factors of IHD patients parallel to their IHD treatment to improve their prognosis. These insights highlight the need for targeted interventions that address depression, anxiety and the impact of Type D personality traits in enhancing the overall management and prognosis of IHD.

Keywords Depression · Anxiety · Type D personality · Ischaemic heart disease · Hospital anxiety and depression scale · DS-14

✉ Chandima Kumara Walpita Gamage, ckumara@kdu.ac.lk; Piyanjali Thamesha De Zoysa, ptdz@psych.cmb.ac.lk; Aindralal Balasuriya, ab@kdu.ac.lk; Neil Francis Joseph Fernando, neil.fernando@kdu.ac.lk | [1]Department of Nursing and Midwifery, Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University, Dehiwala-Mount Lavinia, Sri Lanka. [2]Department of Psychiatry, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka. [3]Department of Para Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University, Dehiwala-Mount Lavinia, Sri Lanka. [4]Department of Clinical Sciences, Faculty of Medicine, General Sir John Kotelawala Defence University, Dehiwala-Mount Lavinia, Sri Lanka.

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Abbreviations

CVDs	Cardiovascular diseases
DS14	Type D scale-14
HADS	Hospital anxiety and depression scale
HADS-A	HADS-anxiety subscale
HADS-D	HADS-depression subscale
IHD	Ischaemic heart disease
T2DM	Type 2 diabetes mellites

1 Introduction

Globally, cardiovascular diseases (CVDs), with a particular emphasis on IHD, are the leading cause of mortality and substantially contribute to disability [1]. From 1990 onwards, the incidence of IHD has consistently risen, reaching 182 million Disability-Adjusted Life Years, 9.14 million fatalities, and 197 million prevalent cases in the year 2019 [1]. Similarly, in the past 20 years, the incidence of IHD has increased twofold in Sri Lanka [2]. According to the 2019 Annual Health Statistics, hospital admissions due to IHD are on the rise (455.4 per 100,000 in 2011 and 667.2 per 100,000 in 2019). Since 2010, IHD has been the leading factor contributing to mortality in Sri Lanka, with a rate of 8121 per 100,000 people in 2019 [3]. Psychological risk factors such as depression [4], anxiety [5] and Type D personality [6] significantly contribute to the onset and adverse outcomes of IHD [7].

IHD patients with major depression and heightened depressive symptoms have a worse prognosis, as well as increased morbidity and mortality [8, 9]. Additionally, depression is linked to poor drug adherence [10] and physical activity [11], which further impacts clinical outcomes [9]. Consequently, depression is linked to decreased engagement and increased drop-out rates in cardiac rehabilitation programs that encourage lifestyle modifications [5].

However, there is also evidence connecting anxiety to the emergence of cardiovascular issues [12]. Long-term high levels of anxiety have been associated with an increased risk of myocardial infarction and death in people with IHD [13]. Roest and colleagues [14] reported that anxiety increased the incidence of incident IHD by 26% in a 2010 meta-analysis that included 20 trials and over 250,000 participants, adjusting for other medical factors when possible. Furthermore, anxiety disorders negatively influence lifestyle behaviours [15], coping abilities, cardiac rehabilitation [16] and treatment compliance [17], resulting in poor disease prognosis.

In addition to anxiety and depression, Type D personality, which is also known as a "distressed personality," is a recognized psychosocial risk factor for the onset and unfavourable prognosis of IHD [18, 19]. According to studies conducted worldwide, one in four IHD patients has a Type D personality [6]. The findings of 12 different studies (n = 5341) were combined for a meta-analysis on the predictive impact of Type D personality, and it was shown that patients with IHD had a considerably increased risk of death when they had a Type D personality [18]. Moreover, several research avenues suggest a correlation between Type D personality traits and the development and course of atherosclerosis. People with Type D personalities had substantially more sensitive plaques, with a 4.5-fold greater probability of lipid plaque, a threefold greater risk of thin cap fibroatheroma, and a 2.5-fold greater risk of plaque rupture, according to a study of 152 IHD patients [20]. This indicates that the emergence of IHD is influenced by Type D personality traits.

Two stable qualities are combined in the Type D personality: (i) social inhibition, or the propensity to suppress negative emotions in social interactions out of fear of rejection or disapproval, and (ii) negative affectivity, or the propensity to experience unpleasant emotions (such as anger, sorrow, fear, and impatience) across time and settings [21]. Moreover, having a Type D personality increases the likelihood of experiencing emotional stress in the future, including depression episodes [22, 23] and anxiety [22]. Also, poor eating habits and a lower level of physical exercise are linked to Type D personality [24–26], poor medication adherence [27, 28], and deficits in self-regulatory behaviours [28, 29], which may worsen the disease.

In cardiac patients, depression detection and early treatment (i.e., with antidepressants and cognitive behaviour therapy) are highly successful in lowering the illness burden [30, 31]. Epidemiological research shows that psychotherapy for anxiety improves cardiovascular symptoms and reduces CVD-related complications [32]. Furthermore, psychotherapy has been demonstrated to be useful in lowering the risk of IHD in people with Type D personalities [6].

Although the psychological factors affecting IHD have been discussed broadly worldwide, the prevalence of anxiety, depression, and Type D personality traits among IHD patients in Sri Lanka has not been thoroughly studied. This study

aimed to investigate the prevalence of anxiety, depression, and Type D personality traits among IHD patients at an outpatient clinic operated by a government hospital in Galle district, Sri Lanka, as well as to identify associated factors.

2 Methods

2.1 Study design

This descriptive cross-sectional study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies [33].

2.2 Setting and sampling

Adult patients aged 18 to 60 years, who received treatment at an outpatient clinic operated by a government hospital in Galle district, Sri Lanka after being diagnosed with IHD within the preceding three months, were included in the study. To account for potential confounding factors, patients with past or present clinical histories of serious illnesses (HIV/AIDS, stroke, cancer, chronic kidney disease, heart failure) or physical disabilities (amputation, arthritis, cerebral palsy, upper limbs, multiple sclerosis, muscular dystrophy, acquired spinal injury (paraplegia or quadriplegia), post-polio syndrome, spinal bifida) were excluded.

2.3 Measures

The study instruments included detailed demographics and scales, including the Hospital Anxiety and Depression Scale (HADS) and Type D Scale-14 (DS14).

2.3.1 Demographics

Participant characteristics such as sex, ethnicity, level of education, occupation status, and previously diagnosed physical comorbidities were assessed using a self-administered questionnaire.

2.3.2 Depression and anxiety

Two seven-item subscales, the HADS-Depression Scale (HADS-D) and HADS-Anxiety Scale (HADS-A), are part of the HADS and are used to measure depression and anxiety, respectively [34]. The HADS was developed based on the psychological components of depression and anxiety to be valid for patients with somatic issues [35]. The Sinhalese version of the HADS, which was validated in Sri Lanka, was used to assess anxiety and depression. The results showed that the two variables had Cronbach's alphas of 0.86 and 0.83 for anxiety and depression, respectively [36]. Every HADS item is answered on a four-point Likert scale, with codes ranging from 0 to 3. As a result, each scale receives a summation score that falls between 0 and 21 [34]. There is no commonly accepted threshold score for the HADS [37]. The recommended cut-off value for caseness is ≥ 8 for both anxiety and depression [38].

2.3.3 Type D scale-14 (DS14)

The Sinhala version of the DS14, which has been validated in Sri Lanka, was used to assess type D personalities [39], which confirmed the theoretical two-factor structure of the original DS-14. The DS-14 comprises two seven-item subscales, namely, NA and SI. Furthermore, the Cronbach's alpha values of the NA and SI subscales were 0.93 and 0.88, respectively. The NA and SI components of the DS-14 comprise a 5-point Likert personality scale (0 = False, 1 = Rather False, 2 = Neutral, 3 = Rather True, 4 = True) that is used to score individuals. To evaluate these personality qualities, the NA and SI can be scored as continuous variables (from 0 to 28). A standardized cut-off of ≥ 10 on one of the subscales indicates either high negative affectivity or high social inhibition. An individual is classified as having a Type D personality when they score ≥ 10 on both the NA and SI scales [21].

2.4 Data analysis

The data were subjected to both descriptive and inferential statistical tests using the Statistical Package for Social Sciences (SPSS) software (version 23). Categorical variables are expressed as numbers with percentages, and continuous variables are expressed as the means and standard deviations. NA and SI were also analysed as dichotomized scores using the standard cut-off of ≥ 10. Pearson's chi-square test (or Fisher's exact test) was used to determine the relationships between the degrees of anxiety, depression, and Type D personality and independent categorical factors (gender, education level, and comorbidities). A significant alpha threshold of < 0.05 was established. Logistic regression analyses were employed to identify the factors associated with depression, anxiety, and Type D with independent variables, including age, gender, ethnicity, level of education, occupation, and comorbidities.

2.5 Ethical considerations

Approval for conducting the study was granted by the Ethics Review Committee of the Faculty of Medicine, University of Colombo, Sri Lanka (EC-18-011), and organizational approval was granted by the Medical Superintendent of the hospital. The GL-Assessment and Mapi Research Trust provided authorization for the use of the Sinhalese version of HADS [40], and permission to use the DS-14 was obtained from its developers. All participants and/or their legal guardians provided informed consent following a detailed description of the study's goals. The patients' regular activities at the outpatient clinic were not disrupted throughout the data-collecting process, and they were made aware of their ability to withdraw from the research at any time without having an impact on the hospital treatment they received. The Declaration of Helsinki was followed when conducting the study detailed in this article, and all procedures were carried out under the laws and guidelines that were in effect at the time.

3 Results

3.1 Sample characteristics

The patient characteristics of the study sample are shown in Table 1. Most of the participants (69.4%, n = 277) were over 50 years old, and the age range was from 26 to 60 years. The majority were females (54.1%, n = 183). Most of the patients were educated only at the primary education level (41.9%, n = 167). Among all the participants, 79.7% (n = 318), 71.9% (n = 287) and 25.6% (n = 102) were also diagnosed with type 2 diabetes mellitus (T2DM), hypertension, and hypercholesterolaemia, respectively. The overall proportion of anxiety was 29.8% (n = 119), depression was 24.8% (n = 99) and the presence of Type D personality was 24.6% (n = 24.6). Considering the scores, 33.8% (n = 135) and 69.7% (n = 278) of the patients presented with NA and SI (with total scores ≥ 10), respectively.

As shown by Pearson chi-square tests (or Fisher's exact tests) in Table 1, there were significant differences in reports of anxiety according to the depression (Depression: 25.7% vs No Depression: 42.4%, p = 0.002) and Type D personality (No Type D personality: 25.9% vs Type D personality 41.8%, p = 0.003). Further comparisons showed that there were significant differences in the report of depression based on ethnic background (p = 0.014). Among Sinhalese individuals, 23.8% reported experiencing depression, whereas, among other ethnic groups, the proportion rose to 53.8%. Further, there were significant differences in reports of depression according to the occupation (p = 0.010). Within the agricultural sector, 47.5% of patients reported experiencing depression, contrasting with 25.3% among those engaged in housework, 17.2% in service professions, and 10.1% in business roles. Moreover, there were significant differences in depression according to anxiety (p = 0.002). Among patients diagnosed with anxiety, 35.3% also experienced depression, whereas only 20.4% of patients without anxiety reported depressive symptoms. Nevertheless, there were significant differences in Type D personality according to the anxiety (p = 0.003) and depression (p = 0.009). Among patients with anxiety, 41.8% manifested Type D personality traits, contrasting with 58.2% among those without anxiety. Similarly, among patients experiencing depression, 34.3% exhibited Type D personality traits, while only 21.3% of those without depression displayed such characteristics.

3.2 Factors associated with anxiety, depression, and Type D personality

Three logistic regressions were conducted to identify predictors of anxiety, depression, and Type D personality traits (Table 2). According to the logistic regression model of depression, two independent variables were significantly associated with anxiety. The strongest predictor of anxiety was Type D personality, which was 1.902 times more likely to be associated with anxiety (95% CI 1.149–3.148; p = 0.012). The second predictor of anxiety was Type D personality: Patients

Table 1 Demographic characteristics of participants (n = 399)

	n	%	Level of anxiety				p	Level of depression				p	Type D personality				p
			No anxiety		Anxiety			No depression		Depression			Not Type D		Type D		
			n	%	n	%		n	%	n	%		n	%	n	%	
Gender																	
Male	183	45.9	129	70.5	54	29.5	0.899	138	75.4	45	24.6	0.925	143	78.1	40	21.9	0.248
Female	216	54.1	151	69.9	65	30.1		162	75.0	54	25.0		158	73.1	58	26.9	
Ethnicity																	
Sinhalese	386	96.7	270	69.9	116	30.1	0.589	294	76.2	92	23.8	0.014*	293	75.9	93	24.1	0.237
Other	13	3.3	10	76.9	3	23.1		6	46.2	7	53.8		8	61.5	5	38.5	
Age																	
< 50	122	30.6	84	68.9	38	31.1	0.701	94	77.0	28	23.0	0.568	88	72.1	34	27.9	0.308
> 50	277	69.4	196	70.8	81	29.2		206	74.4	71	25.6		213	76.9	64	23.1	
Educational level																	
No schooling	73	18.3	47	64.4	26	35.6	0.142	52	71.2	21	28.8	0.590	58	79.5	15	20.5	0.211
Primary	167	41.9	114	68.3	53	31.7		124	74.3	43	25.7		118	70.7	49	29.3	
Ordinary level	142	35.6	109	76.8	33	23.2		112	78.9	30	21.2		110	77.5	32	22.5	
Advanced level	17	4.3	10	58.8	7	41.2		12	70.6	5	29.4		15	88.2	2	11.8	
Occupational level																	
Housework	130	32.6	93	71.5	37	38.5	0.756	105	35	25	25.3	0.010*	103	79.2	27	20.8	0.406
Agriculture	136	34.1	91	66.9	45	33.1		89	29.7	47	47.5		98	72.1	38	27.9	
Service	94	23.6	67	71.3	27	28.7		77	25.7	17	17.2		73	77.7	21	22.3	
Business	39	9.8	29	74.4	10	25.6		29	9.7	10	10.1		27	69.2	12	30.8	
T2DM																	
No	297	74.4	212	71.4	85	28.6	0.369	225	75.8	72	24.2	0.653	231	77.8	66	22.2	0.064
Yes	102	25.6	68	66.7	34	33.3		75	73.5	27	26.5		70	68.6	32	31.4	
Hypertension																	
No	81	20.3	60	74.1	21	25.9	0.390	56	69.1	25	30.9	0.158	60	74.1	21	25.9	0.425
Yes	318	79.7	220	69.2	98	30.8		244	76.7	74	23.3		241	75.8	77	24.2	
Hypercholesterolaemia																	
No	112	28.1	72	64.3	40	35.7	0.108	79	70.5	33	29.5	0.179	77	68.8	35	31.3	0.053
Yes	287	71.9	208	72.5	79	27.5		221	77.0	66	23.0		224	78.0	63	22.0	
HADS anxiety																	
No anxiety (HADS(A) < 8)	280	70.2	–	–	–	–	–	223	79.6	57	20.4	0.002*	223	74.1	57	58.2	0.003*
Anxiety (HADS(A) ≥ 8)	119	29.8	–	–	–	–		77	64.7	42	35.3		78	25.9	41	41.8	
HADS depression																	
No depression (HADS(D) < 8)	300	75.2	223	74.6	77	25.7	0.002*	–	–	–	–	–	236	78.4	64	21.3	0.009*
Depression (HADS(D) ≥ 8)	99	24.8	57	57.6	42	42.4		–	–	–	–		65	65.7	34	34.3	
DS-14																	
Not Type D	301	75.4	223	74.1	78	25.9	0.003*	236	78.4	65	21.6	0.009*	–	–	–	–	–
Type D	98	24.6	57	58.2	41	41.8		64	65.3	34	34.7		–	–	–	–	

*Significance level at 0.05 level

with anxiety 0.510 times (95% CI 0.308–0.844; p = 0.009) more likely to have depression. The logistic regression model of depression showed that patients with anxiety were 1.997 times (95% CI 1.210–3.296; p = 0.007) more likely to have depression. Furthermore, other ethnics excluding Sinhalese (OR: 0.240; 95% CI 0.073–0.785; p = 0.018) was a significant predictor of depression (Table 2). The logistic regression model on type D personality traits showed that patients with anxiety were 1.899 times (95% CI 1.148–3.143; p = 0.013) more likely to have a Type D personality trait (Table 2).

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Table 2 Logistic regression analyses of factors associated with depression, anxiety, and Type D personality odds ratio (95% CI)

	Anxiety		Depression		Type D personality	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Gender						
Male	Ref		Ref		Ref	
Female	0.971 (0.565–1.670)	0.916	1.175 (0.669–2.063)	0.575	0.584 (0.325 -1.047)	0.071
Ethnicity						
Sinhalese	Ref		Ref		Ref	
Other	1.731 (0.443–6.759)	0.430	0.240 (0.073–0.785)	0.018*	0.654 (0.194–2.199)	0.492
Age						
< 50	Ref		Ref		Ref	
> 50	1.111 (0.679–1.816)	0.675	0.769 (0.447–1.325)	0.345	1.317 (0.782–2.216)	0.300
Educational level						
No Schooling	Ref		Ref		Ref	
Primary	0.717 (0.230–2.241)	0.567	0.638 (0.183–2.225)	0.481	1.366 (0.262–7.104)	0.711
Ordinary Level	0.551 (0.188–1.620)	0.279	0.508 (0.155–1.668)	0.264	2.477 (0.512–11.985)	0.260
Advanced Level	0.374 (0.124–1.125)	0.080	0.440 (0.130–1.483)	0.185	1.782 (0.361–8.794)	0.478
Occupation						
Housework	Ref		Ref		Ref	
Agriculture	1.389 (0.552–3.495)	0.485	0.874 (0.339–2.256)	0.782	0.417 (0.167–1.043)	0.061
Service	1.398 (0.588–3.326)	0.448	1.726 (0.726–4.103)	0.217	0.613 (0.262–1.435)	0.259
Business	1.326 (0.535–3.283)	0.542	0.597 (0.229–1.553)	0.290	0.652 (0.265–1.601)	0.350
T2DM						
No	Ref		Ref		Ref	
Yes	0.854 (0.507–1.439)	0.553	0.894 (0.510–1.566)	0.694	0.597 (0.348–1.024)	0.061
Hypertension						
No	Ref		Ref		Ref	
Yes	0.754 (0.421–1.349)	0.341	1.559 (0.875–2.780)	0.132	0.936 (0.513–1.706)	0.829
Hypercholesterolaemia						
No	Ref		Ref		Ref	
Yes	1.465 (0.888–2.415)	0.135	1.231 (0.723–2.096)	0.443	1.261 (0.747–2.129)	0.386
Anxiety	–	–	1.997 (1.210–3.296)	0.007*	1.899 (1.148–3.143)	0.013*
Depression	0.510 (0.308–0.844)	0.009*	–	–	1.693 (0.989–2.899)	0.055
Type D personality	1.902 (1.149–3.148)	0.012*	1.695 (0.994–2.890)	0.053	–	–

*Significance level at 0.05 level

4 Discussion

To our knowledge, this is the first study to examine the prevalence of anxiety, depression, and type D personality traits among IHD patients in Sri Lanka. In this study, the proportions of individuals with anxiety, depression and Type D personality traits among the study population were 29.8%, 24.8% and 24.6%, respectively. In similar studies, the prevalence of depression is 37% [41] and anxiety is 36% [42] in IHD patients. However, other studies have reported lower prevalence rates, such as 17.1% [43] for depression and 7% for anxiety [44]. Furthermore, the prevalence of Type D personality traits in patients with IHD varies, with studies reporting values ranging from 18% [45] to 60.1% [46]. These varying rates of mental health conditions and Type D personalities in IHD patients suggest that there may be different factors at play in different populations or study samples, such as varied comorbidities, cultural norms, beliefs, and values between countries.

The chi-square tests (and Fisher's exact tests) conducted in the current study indicated a statistically significant association between anxiety, depression, and Type D personality traits. Previous research has consistently demonstrated a high prevalence of anxiety and depression among IHD patients, with Type D personality being a significant risk factor for these

conditions [22, 47, 48]. Furthermore, the current study confirmed that Type D is associated with a fourfold greater risk of IHD, consistent with previous research findings [6]. These findings underscore the importance of considering Type D personality as a potential risk factor not only for IHD but also for the development of anxiety and depression in patients with this condition. Understanding the relationship between Type D personality and these mental health disorders can guide treatment approaches and interventions to enhance overall patient outcomes [49]. Moreover, the statistically significant association between ethnicity and occupation with depression underscores the importance of considering cultural factors in understanding mental health outcomes. Previous studies have revealed substantial ethnic disparities in the prevalence of IHD risk factors and the severity of the disease [50, 51]. Additionally, a study conducted in a cardiac centre in Kathmandu, Nepal, highlighted occupation as an influencing variable for the level of depression in IHD patients, with individuals who engaged in housework exhibiting greater levels of depression than those in other occupations [52].

The findings from the regression model concerning anxiety underscored that Type D personality emerged as the most potent predictor, highlighting the close correlation between these variables. Similarly, prior research conducted in the Erasmus Medical Center Rotterdam, Netherlands, indicated that Type D personality correlated with a sevenfold increased risk of anxiety in patients with an implantable cardioverter defibrillator, even after adjusting for other factors [53]. Moreover, in the current study, depression also emerged as a significant predictor of anxiety, indicating a bidirectional relationship between these comorbidities. While anxiety is linked to an elevated risk of mortality in CAD patients, the association is not as strong as that observed with depression [54]. However, previous research has indicated that anxiety independently correlates with increased mortality in CAD patients, particularly when accompanied by comorbid depression [55].

In addition, in the current study, the regression analysis targeting depression revealed anxiety as the foremost predictor of depressive symptoms. Furthermore, ethnicity surfaced as a significant influencer in predicting depression, particularly with individuals of other ethnicities apart from Sinhalese showing predictive value. However, a previous study has indicated that the prevalence of major depressive symptoms can be significantly lower in certain ethnic minority populations in Sri Lanka. Further, financial wellbeing and material characteristics of the home environment, have been associated with depression in Sri Lanka [56].

Moreover, the regression analysis focusing on Type D personality traits identified anxiety as the predominant predictor. Contrary to expectations, Type D personality did not emerge as a predictor of depression in the regression models, despite the strong associations found in both the current study and previous research [57, 58]. These findings suggest a need for further investigation to fully elucidate the relationship between depression and Type D personality traits.

5 Conclusion

The current study revealed substantial proportions of anxiety, depression, and Type D personality traits among IHD patients, with notable associations observed between these conditions. Furthermore, this study underscores the importance of comprehensive assessment and tailored interventions to address the complex interplay between psychological, demographic, and cultural factors in shaping mental health outcomes among individuals with IHD. Specifically, the study highlights the need for targeted strategies to reduce mental health issues and to consider the influence of Type D personality traits on anxiety and depression among IHD patients. Future research, including longitudinal studies and investigations in diverse populations, will be crucial for advancing our understanding of these relationships and informing effective strategies for managing mental health conditions in cardiovascular patients.

Declarations

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

References

1. Roth GA, Mensah GA, Johnson CO, Addolorato G, Ammirati E, Baddour LM, et al. Global burden of cardiovascular diseases and risk factors, 1990–2019. J Am Coll Cardiol. 2020;76(25):2982–3021.
2. Jayawardena JB, Samarutilake GDN, Zacky MHM, De Silva PV, Karunanayake A, Weerasooriya MA. Prevalence of coronary artery disease in a semi urban population in Southern Sri Lanka. Ceylon Med J. 2017;62(1):34.
3. Annual Health Statistics 2019. Sri Lanka. Medical Statistics Unit, Ministry of Health, Sri Lanka; 2021. http://www.health.gov.lk/moh_final/english/public/elfinder/files/publications/AHB/AHS%202019.pdf. Accessed 25 Mar 2024
4. Lichtman JH, Bigger JT, Blumenthal JA, Frasure-Smith N, Kaufmann PG, Lespérance F, et al. Depression and coronary heart disease. Circulation. 2008;118(17):1768–75.
5. Eng HS, Yean LC, Das S, Letchmi S, Yee KS, Bakar RA, et al. Anxiety and depression in patients with coronary heart disease: a study in a tertiary hospital. Iran J Med Sci. 2011;36(3):201–6.
6. Kupper N, Denollet J. Type D personality as a risk factor in coronary heart disease: a review of current evidence. Curr Cardiol Rep. 2018;20(11):104.
7. Lavie CJ, Milani RV, Artham SM, Gilliland Y. Psychological factors and cardiac risk and impact of exercise training programs–a review of ochsner studies. Ochsner J. 2007;7(4):167–72.
8. Carney RM, Freedland KE, Steinmeyer B, Blumenthal JA, Berkman LF, Watkins LL, et al. Depression and five year survival following acute myocardial infarction: a prospective study. J Affect Disord. 2008;109(1–2):133–8.
9. Khawaja IS, Westermeyer JJ, Gajwani P, Feinstein RE. Depression and coronary artery disease. Psychiatry Edgmont. 2009;6(1):38–51.
10. Gehi A, Haas D, Pipkin S, Whooley MA. Depression and medication adherence in outpatients with coronary heart disease. Arch Intern Med. 2005;165(21):2508–13.
11. Peterson JC, Charlson ME, Wells MT, Altemus M. Depression, coronary artery disease, and physical activity: how much exercise is enough? Clin Ther. 2014;36(11):1518–30.
12. Celano CM, Daunis DJ, Lokko HN, Campbell KA, Huffman JC. Anxiety disorders and cardiovascular disease. Curr Psychiatry Rep. 2016;18(11):101.
13. Shibeshi WA, Young-Xu Y, Blatt CM. Anxiety worsens prognosis in patients with coronary artery disease. J Am Coll Cardiol. 2007;49(20):2021–7.
14. Roest AM, Martens EJ, de Jonge P, Denollet J. Anxiety and Risk of Incident Coronary Heart Disease: A Meta-Analysis. J Am Coll Cardiol. 2010 Jun 29;56(1):38–46.
15. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet Lond Engl. 2004;364(9438):937–52.
16. Lane D, Carroll D, Ring C, Beevers DG, Lip GY. Predictors of attendance at cardiac rehabilitation after myocardial infarction. J Psychosom Res. 2001;51(3):497–501.
17. Schweitzer RD, Head K, Dwyer JW. Psychological factors and treatment adherence behavior in patients with chronic heart failure. J Cardiovasc Nurs. 2007;22(1):76–83.
18. Grande G, Romppel M, Barth J. Association between Type D personality and prognosis in patients with cardiovascular diseases: a systematic review and meta-analysis. Ann Behav Med Publ Soc Behav Med. 2012;43(3):299–310.
19. Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL, et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts)Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). Eur Heart J. 2016;37(29):2315–81.
20. Wang Y, Zhao Z, Gao X, Li L, Liu G, Chen W, et al. Type D personality and coronary plaque vulnerability in patients with coronary artery disease: an optical coherence tomography study. Psychosom Med. 2016;78(5):583–92.
21. Denollet J. DS14: standard assessment of negative affectivity, social inhibition, and Type D personality. Psychosom Med. 2005;67(1):89–97.
22. Al-Qezweny MNA, Utens EMWJ, Dulfer K, Hazemeijer BAF, van Geuns RJ, Daemen J, et al. The association between Type D personality, and depression and anxiety ten years after PCI. Neth Heart J Mon J Neth Soc Cardiol Neth Heart Found. 2016;24(9):538–43.
23. Doyle F, McGee H, Delaney M, Motterlini N, Conroy R. Depressive vulnerabilities predict depression status and trajectories of depression over 1 year in persons with acute coronary syndrome. Gen Hosp Psychiatry. 2011;33(3):224–31.
24. Bunevicius A, Brozaitiene J, Staniute M, Gelziniene V, Duoneliene I, Pop VJM, et al. Decreased physical effort, fatigue, and mental distress in patients with coronary artery disease: importance of personality-related differences. Int J Behav Med. 2014;21(2):240–7.
25. Mommersteeg PMC, Kupper N, Denollet J. Type D personality is associated with increased metabolic syndrome prevalence and an unhealthy lifestyle in a cross-sectional Dutch community sample. BMC Public Health. 2010;19(10):714.
26. Wiencierz S, Williams L. Type D personality and physical inactivity: the mediating effects of low self-efficacy. J Health Psychol. 2017;22(8):1025–34.
27. Crawshaw J, Auyeung V, Norton S, Weinman J. Identifying psychosocial predictors of medication non-adherence following acute coronary syndrome: a systematic review and meta-analysis. J Psychosom Res. 2016;90:10–32.
28. Kessing D, Denollet J, Widdershoven J, Kupper N. Psychological determinants of heart failure self-care: systematic review and meta-analysis. Psychosom Med. 2016;78(4):412–31.

29. van Montfort E, Kupper N, Widdershoven J, Denollet J. Person-centered analysis of psychological traits to explain heterogeneity in patient-reported outcomes of coronary artery disease—the THORESCI study. J Affect Disord. 2018;15(236):14–22.

30. Glassman AH, O'Connor CM, Califf RM, Swedberg K, Schwartz P, Bigger JT, et al. Sertraline treatment of major depression in patients with acute MI or unstable angina. JAMA. 2002;288(6):701–9.

31. Honig A, Kuyper AMG, Schene AH, van Melle JP, de Jonge P, Tulner DM, et al. Treatment of post-myocardial infarction depressive disorder: a randomized, placebo-controlled trial with mirtazapine. Psychosom Med. 2007;69(7):606–13.

32. Olafiranye O, Jean-Louis G, Zizi F, Nunes J, Vincent M. Anxiety and cardiovascular risk: review of epidemiological and clinical evidence. Mind Brain J Psychiatry. 2011;2(1):32–7.

33. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol. 2008;61(4):344–9.

34. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361–70.

35. Olssøn I, Mykletun A, Dahl AA. The hospital anxiety and depression rating scale: a cross-sectional study of psychometrics and case finding abilities in general practice. BMC Psychiatry. 2005;5(1):46.

36. Gamage CKW, Zoysa PD, Balasuriya A, Fernando N, Jayamanne D. Cross-cultural adaptation and validation of the Sinhala version of the hospital anxiety and depression scale (HADS) for patients diagnosed with ischemic heart disease (IHD) in Sri Lanka. J Coll Commun Phys Sri Lanka. 2023;29(1):19–28.

37. Montazeri A, Vahdaninia M, Ebrahimi M, Jarvandi S. The hospital anxiety and depression scale (HADS): translation and validation study of the Iranian version. Health Qual Life Outcomes. 2003;28(1):14.

38. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the hospital anxiety and depression scale: an updated literature review. J Psychosom Res. 2002;52(2):69–77.

39. Gamage CKW, de Zoysa P, Balasuriya A, Fernando N, Jayamanne BDW. Cross-cultural adaptation of the Type D personality scale for use with patients diagnosed with Ischemic heart disease in Sri Lanka. Ceylon Med J. 2021;66(1):8–15.

40. Acquadro C, Conway K, Christelle G, Mear I. Linguistic validation manual for health outcome assessments. 2012.

41. Bokhari SS, Samad AH, Hanif S, Hadique S, Cheema MQ, Fazal MAS, et al. Prevalence of depression in patients with coronary artery disease in a tertiary care hospital in Pakistan. J Pak Med Assoc. 2002;52(9):436–9.

42. Todaro JF, Shen BJ, Raffa SD, Tilkemeier PL, Niaura R. Prevalence of anxiety disorders in men and women with established coronary heart disease. J Cardiopulm Rehabil Prev. 2007;27(2):86.

43. Martino PL, Mora-Penagos JP, Kerbage S, Cervigni MA, Bonet JL. Prevalence of depression and clinical anxiety in patients with cardiovascular disease. J Psychol Psychother Res. 2017;4(2):71–7.

44. Bunevicius A, Staniute M, Brozaitiene J, Pop VJ, Neverauskas J, Bunevicius R. Screening for anxiety disorders in patients with coronary artery disease. Health Qual Life Outcomes. 2013;11(1):37.

45. Bergvik S, Sørlie T, Wynn R, Sexton H. Psychometric properties of the Type D scale (DS14) in Norwegian cardiac patients. Scand J Psychol. 2010. https://doi.org/10.1111/j.1467-9450.2009.00793.x.

46. Lambertus F, Herrmann-Lingen C, Fritzsche K, Hamacher S, Hellmich M, Jünger J, et al. Prevalence of mental disorders among depressed coronary patients with and without Type D personality: results of the multi-center SPIRR-CAD trial. Gen Hosp Psychiatry. 2018;50:69–75.

47. John S. Prevalence and pattern of psychiatric morbidity and health related quality of life in patients with ischemic heart disease in a tertiary care hospital. Indian J Psychiatry. 2013;55(4):353–9.

48. Pozuelo L, Panko M, Ching B, Kosty-Sweeney D, Broer K, Bea S, et al. Abstract 1385: prevalence of anxiety and Type D personality in an outpatient ICD clinic. Circulation. 2009;120(suppl_18):S493-4.

49. Mols F, Denollet J. Type D personality in the general population: a systematic review of health status, mechanisms of disease, and work-related problems. Health Qual Life Outcomes. 2010;23(8):9.

50. Abbasi SH, Sundin Ö, Jalali A, Soares J, Macassa G. Ethnic differences in the risk factors and severity of coronary artery disease: a patient-based study in Iran. J Racial Ethn Health Dispar. 2017. https://doi.org/10.1007/s40615-017-0408-3.

51. Gijsberts CM, Seneviratna A, de Carvalho LP, den Ruijter HM, Vidanapthirana P, Sorokin V, et al. Ethnicity modifies associations between cardiovascular risk factors and disease severity in parallel Dutch and Singapore coronary cohorts. PLoS ONE. 2015. https://doi.org/10.1371/journal.pone.0132278.

52. Sharma Dhital P, Sharma K, Poudel P, Dhital PR. Anxiety and depression among patients with coronary artery disease attending at a cardiac center, Kathmandu, Nepal. Nurs Res Pract. 2018;25(2018):4181952.

53. Pedersen SS, van Domburg RT, Theuns DAMJ, Jordaens L, Erdman RAM. Type D personality is associated with increased anxiety and depressive symptoms in patients with an implantable cardioverter defibrillator and their partners. Psychosom Med. 2004;66(5):714.

54. Celano CM, Millstein RA, Bedoya CA, Healy BC, Roest AM, Huffman JC. Association between anxiety and mortality in patients with coronary artery disease: a meta-analysis. Am Heart J. 2015;170(6):1105–15.

55. Szczepańska-Gieracha J, Jóźwik S, Cieślik B, Mazurek J, Gajda R. Immersive virtual reality therapy as a support for cardiac rehabilitation: a pilot randomized-controlled trial. Cyberpsychol Behav Soc Netw. 2021. https://doi.org/10.1089/cyber.2020.0297.

56. Ball HA, Siribaddana SH, Kovas Y, Glozier N, McGuffin P, Sumathipala A, et al. Epidemiology and symptomatology of depression in Sri Lanka: a cross-sectional population-based survey in Colombo District. J Affect Disord. 2010;123(1–3):188–96.

57. AL-Qezweny MNA, Utens EMWJ, Dulfer K, Hazemeijer BAF, van Geuns RJ, Daemen J, et al. The association between Type D personality, and depression and anxiety ten years after PCI. Neth Heart J. 2016. https://doi.org/10.1007/s12471-016-0860-4.

58. Spindler H, Kruse C, Zwisler AD, Pedersen SS. Increased anxiety and depression in Danish cardiac patients with a Type D personality: cross-validation of the Type D Scale (DS14). Int J Behav Med. 2009. https://doi.org/10.1007/s12529-009-9037-5.