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Type D personality and other risk factors associated with acute coronary syndrome: a matched case-control study

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Abstract

Introduction: Acute coronary syndrome stands as a leading cause of cardiovascular-related fatalities. While several established risk factors are linked to acute coronary syndrome, the potential role of the type D personality trait remains a subject of interest, albeit lacking sufficient evidence in our local context, especially considering the influx of patients from Eastern Nepal. The objective of this study was to investigate the relationship between type D personality and other risk factors in association with acute coronary syndrome.

Method: A matched case-control study was performed at a teaching hospital among 120 study participants from 9 June, 2023 to 30 March, 2024. Among them, 60 belong to the case group and 60 belong to the age and sex-matched control group. They were selected by consecutive sampling techniques. Ethical clearance was taken from the Institutional Review Committee of Birat Medical College Teaching Hospital. A structured questionnaires with DS-14 scale were used as study tools, collected data was entered in Microsoft Excel and analyzed by Statistical Package for the Social Sciences version 23.

Result: This study involved 120 participants, comprising 60 cases of acute coronary syndrome and 60 age and sex-matched controls. Type D personality was significantly more prevalent in the acute coronary syndrome group, with an odds ratio of 3.16 ($p=0.007$). Individuals with acute coronary syndrome exhibited significantly higher rates of hypertension ($p<0.001$), smoking ($p<0.001$), dyslipidemia ($p=0.020$), and diabetes mellitus ($p<0.001$) compared to controls.

Conclusion: The study emphasizes a strong connection between acute coronary syndrome and Type D personality traits. Additionally, established risk factors like hypertension, smoking, dyslipidemia, and diabetes mellitus were also linked to acute coronary syndrome.

Keywords: Acute Coronary Syndrome; Matched Case-Control Study; Type D Personality; Risk Factors

INTRODUCTION

Acute coronary syndrome (ACS) remains a leading cause of morbidity and mortality worldwide, accounting for millions of deaths annually.^{1,2} ACS is often the first clinical manifestation of CVD.³ In Nepal, the incidence of ACS has been rising, posing significant challenges to public health.⁴

While traditional risk factors such as hypertension and hyperlipidemia are well-documented, the role of psychological factors, particularly Type D personality, has garnered increasing attention.^{5,6} Type D personality, characterized by negative affectivity and social inhibition, is suggested to exacerbate cardiovascular outcomes.^{7,8}

Our rationale of study was to provide insights into known risk factors and preferably the psychosocial dimensions of ACS to enhance prevention and management strategies in our context. Therefore, this study was conducted to find the association of Type D personality and other risk factors with Acute Coronary Syndrome.

METHOD

A hospital-based, matched case control study was carried out at Birat Medical College Teaching Hospital, Morang, Nepal from 9 June, 2023 to 30 March, 2024. Ethical approval was obtained from the institutional review committee (Registration number: IRC-PA-311/2023) of the same institute. The purpose of the study was explained to each participant and voluntary informed written consent was obtained from each case and control before data collection. Sample size was calculated using formula for matched case control study for qualitative variable.

Sample size $(n) = (r+1)P^* \cdot (1-P^*) \cdot (Z_{\beta} + Z_{\alpha/2})^2 / r(P_1 - P_2)^2$; Where, n =sample size in each group (cases and controls); r = ratio of control to case, 1 for equal number of case and control; P = Average proportion exposed, $1-P$ =proportion of exposed cases + proportion of exposed control/2; Z_{β} = standard normal variate for power=for 80% power it is 0.84; $Z_{\alpha/2}$ =Standard normal variate for level of significance (at 5% type 1 error ($p < 0.05$)) 1.96; $P_1 - P_2$ = Effect size or difference in proportion expected based on previous studies. P_1 is proportion in cases and P_2 is proportion in control. Using reference of an article,⁶ where $P_1 = 26\% = 0.26$, $P_2 = 7.1\% = 0.071$, $r = 1$, $Z_{\beta} = 0.84$, $Z_{\alpha/2} = 1.96$, therefore sample size $n = 1 + 1 \cdot (0.1655) \cdot (1 - 0.1655) \cdot (0.84 + 1.96)^2 / 1 \cdot (0.26 - 0.071)^2 = 2.16556088 / 0.035721 = 60.49$. Hence, we recruited a total of 120 participants (60 cases and 60 controls) for the study.

For case group, patients diagnosed with acute coronary syndrome (ACS) {Unstable angina, Non ST segment elevation myocardial infarction (NSTEMI), ST segment elevation myocardial infarction (STEMI)} at the Department of Cardiology of Birat Medical College Teaching Hospital were included for the study. For the control group, participants without prior or present history of ACS, matched in terms of

age and sex of an individual case from the same hospitals were enrolled. For selection of case group patients were selected consecutively until the required sample size was met and for control group a convenient sampling method was used. The ratio of case to control was 1:1. Participants diagnosed with stable angina and any other cardiac diseases, cognitive impairment, current or past history of psychiatric illness, other major diseases (AIDS, cancer, chronic obstructive pulmonary disease), those on antipsychotic medications and refusal to consent were excluded from the study.

A structured questionnaire on socio demographic variables and known risk factors was used to identify the demographic and clinical characteristics of the participants. The DS-14 (Denollet's Type D Scale-14) was used to measure Type D personality among both the case and controls. Type D personality includes two features i.e. negative affectivity and social inhibition. People with type D personality experience negative emotions such as anxiety, anger, hostile feelings, depressed mood. They avoid social interactions to inhibit these emotions.^{9,10} The DS-14 scale used to measure Type D personality which consists of 14 items, divided equally into two subscales: Negative Affectivity (NA): This subscale assesses the tendency to experience negative emotions such as anger, anxiety, irritability, and sadness. Social Inhibition (SI): This subscale measures the tendency to inhibit self-expression in social interactions due to fears of disapproval or rejection. The internal consistency of the tools measured in coronary and hypertensive subsamples was 0.88 in NA and 0.86 in SI.¹¹ The interviewed participants rated their personality on a 5-point Likert type scale, which ranges from 0 to 4. The NA and SI scales in type D scored as continuous variables (range 0–28) independently. A cut-off of 10 was made to dichotomize participants in both NA and SI. Participants scoring ≥ 10 in both NA and SI indicate type D personality, and scores < 10 in both or either of NA and SI indicate non-type D personality.¹²

We translated the tool first in Nepali and Maithili language and retranslated it in English to validate the internal consistency. Pre testing was done in 10% of the samples in the general population other than study participants and necessary correction was made. Reliability of the translated tool was assessed using Cronbach's alpha (0.7 in each NA and SI).

Data was collected by means of face to face interview in both cases and controls. Collected data was entered in Microsoft Excel and transferred to IBM SPSS version 23. Bivariate analysis was done to find the statistical significant association of Type D personality and other risk factors among cases and controls. Chi square test was calculated. P value less than 0.05 at 95% confidence interval was considered statistically significant. Odds ratio and confidence interval was calculated to find the estimated risk of having ACS with type D and other associated factors.

RESULT

This research involved 120 participants, with 60 individuals diagnosed with Acute Coronary Syndrome (ACS) forming the case group, and 60 age and sex-matched controls. The mean age and standard deviation for both groups were 57.52±12.29 and 57.35±12.14 respectively. Sex distribution was also matched, with 48 (80%) males and 12 (20%) females in each group. Marital status, education level, and family history of cardiovascular problems did not differ significantly between the groups (Table 1).

Within the case group, 28 individuals (46.7%) exhibited Type D personality, whereas in the control group, this was observed in 13 individuals (21.7%). Consequently, the likelihood of having Type D personality (OR=3.16) was notably elevated in the acute coronary syndrome (ACS) group (p=0.007). The case group with ACS had significantly higher rates of hypertension (p<0.001), smoking (p<0.001), dyslipidemia (p=0.020), and diabetes mellitus (p<0.001) compared to the control group (Table 2).

DISCUSSION

In the present study, the prevalence of type D personality among patients with ACS was 46.7% and non-ACS was 21.7% (p value 0.007, CI=1.42-7.02). Type D personality had 3.16 times greater risk of having ACS in comparison to non-ACS in our study. The findings suggest a significant association between Type D personality and the presence of ACS. Similar to our study conducted in Iran also found Type D personality was significantly more prevalent in patients with ACS (26% vs 7.1%; P=0.006). Type D personality has 5.32 times increased risk of having ACS in comparison to non-ACS.⁶ An acute coronary syndrome clinical spectrum, myocardial infarction

(MI), where type D personality has 4.14 times higher risk of developing ACS.^{1,2} In another study, a similar finding was reported where the prevalence of type D personality was significantly higher among cases with MI (35.8%).¹³ In another study, the prevalence of Type D personality was significantly higher with unstable angina (22.6%) and myocardial infarction (67.7%) diagnoses (p=0.02).¹⁴

A significant association was found between adoption of unhealthy lifestyle behaviors among patients having type D personality.¹⁵ Several studies stated that type D Personality is associated with metabolic dysfunction such as decreased heart rate volume, increased stress hormone (serum cortisol level), lipid profiles such as hypercholesterolemia, hyperlipidemia and hypertriglyceridemia.^{16,17,18,19} Increased serum lipid profile and unhealthy lifestyle are already the established risk factor for Coronary Artery Diseases.²⁰

We also calculated the other known risk factors with cases and controls. Patients with history of hypertension (P value <0.001, OR 5.23), smoking (P value<0.001; OR 6), dyslipidemia (p value 0.020, OR 3.56) and diabetes mellitus (P value <0.001, OR 9.1) had increased odds of having ACS which is supported by previous study.²⁰

Our study has various strengths. The matching of cases and controls by age and sex in our study allows for a more nuanced understanding of the relationship between Type D personality and ACS. Previous research has often highlighted that older adults and males are more prone to heart diseases,²¹ potentially confounding the impact of personality traits. By controlling for these variables,

Table 1. Demographic characteristics of case group (n=60) and control group (n=60)

Variables		N (%)		p value	OR (CI)
		Case	Control		
Marital status	Unmarried/widower	7 (11.7%)	1 (1.7%)	0.061	7.79 (0.93-65.43)
	Married	53 (88.3%)	59 (98.3%)		
Education status	Illiterate	13 (21.7%)	19 (31.7%)	0.302	0.597(0.26-1.36)
	Literate	47 (78.3%)	41 (68.3%)		
Family History of cardiovascular problem	Yes	17 (28.3%)	11(18.3%)	0.281	1.76(0.74-4.17)
	No	43(71.7%)	49 (81.7%)		

Table 2. Association of Type D personality and other risk factors with acute coronary syndrome

Variables		N (%)		p value	OR (CI)
		Case	Control		
Type D Personality	Yes	28 (46.7%)	13(21.7%)	0.007	3.16 (1.42-7.02)
	No	32(53.3%)	47 (78.3%)		
Hypertension	Yes	34 (56.7%)	12(20%)	<0.001	5.23 (2.32-11.79)
	No	26(43.3%)	48 (80%)		
Smoking	Yes	24 (40%)	6(10%)	<0.001	6(2.23-16.13)
	No	36(60%)	54(90%)		
Dyslipidemia	Yes	17 (28.3%)	6 (10%)	0.020	3.56(1.29-9.80)
	No	43(71.7%)	54(90%)		
Diabetes mellitus	Yes	35 (58.3%)	8 (13.3%)	<0.001	9.1(3.68-22.48)
	No	25(41.7%)	52 (86.7%)		

our study confirms that the association between Type D personality and ACS is robust and not merely a reflection of demographic risk factors.

The strong association between Type D personality and ACS highlights the need for incorporating psychological assessments into routine cardiovascular care. Early identification of patients with Type D personality can facilitate targeted interventions aimed at stress management, lifestyle modifications, and improved social support. This integrated approach could potentially mitigate the adverse effects of Type D personality on cardiovascular health.

While the study provides valuable insights into the association between Type D personality and acute coronary syndrome (ACS) in an age and sex-matched case-control design, it also has limitations. Despite the case-control design, the study's cross-sectional nature limits the ability to infer causality. We can identify an association between Type D personality and ACS, but we cannot determine whether Type D personality contributes to the development of ACS or if having ACS influences the manifestation of Type D personality traits. Longitudinal studies are necessary to establish a causal relationship.

The reliance on self-reported measures for assessing Type D personality might have response biases. Participants may under report or over report their levels of negative affectivity and social inhibition due to social desirability, recall bias, or lack of self-awareness. This could affect the accuracy and reliability of the data collected.

Even with age and sex matching, other unmeasured confounders may influence the observed association between Type D personality and ACS. Factors such as genetic predispositions, environmental influences, and specific lifestyle behaviors not accounted for in this study might affect the results.

Furthermore, our study population may not be representative of the broader population, which could limit the generalizability of our findings. Future research should also explore the biological pathways linking Type D personality to ACS to develop more targeted interventions.

Based on our findings, we recommend integrating routine psychological screening for Type D personality in cardiovascular care, using tools like the DS-14 scale. Holistic patient management should include personalized interventions focusing on stress reduction and social skills training, with collaboration between epidemiologists, cardiologists and mental health professionals. Future research should conduct longitudinal studies, include diverse populations, and investigate the biological mechanisms linking Type D personality to ACS.

CONCLUSION

The study underscores a significant association between Acute Coronary Syndrome and Type D personality traits. Moreover, established risk factors, including hypertension, smoking, dyslipidemia, and diabetes mellitus, were also correlated with the incidence of Acute Coronary Syndrome.

DECLARATIONS

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I would like to acknowledge all the study participants for their cooperation.

Conflict of Interest

None

Funding

None

Ethical Clearance

The ethical clearance was obtained from the Institutional Review Committee of Birat Medical College Teaching Hospital. The written consent was taken from study participants.

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