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ARTICLE

Type D Personality and Coronary Artery Disease: Exploring Their Relationship in Younger Population of United Arab Emirates

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Abstract
The primary goal of this study was to investigate the relationship between type D personality and coronary artery disease (CAD) in the United Arab Emirates (UAE) using a case-control study design. The sample for case-control study consisted of 90 CAD patients recruited from a local hospital who underwent catheterization due to a heart attack and 90 non-cardiac controls matched with respect to age, gender, and ethnicity. Participants were administered DS14 and CAD assessment. Results indicated that there is no significant difference in the proportion of type D personality among the two groups (Chi^2=0.28, p=0.87). However, heredity, smoking, hypertension, diabetes, body mass index, and sedentary lifestyle were found to be significantly associated with CAD (p<0.05). Possible reasons for no relation between type D and CAD are discussed and recommendations given for future studies on local and non-Western populations.

Key words: Type D personality, cardiovascular disease, UAE youth, personality and heart illness, CAD risk factors.

Introduction

Coronary artery disease (CAD) is a multi-factorial condition, resulting from the convergence of genetics, environment, diet, and lifestyle. Recognized risk factors for the development of heart disease include family history, high blood pressure, smoking, elevated low-density lipoprotein (LDL) cholesterol, diabetes, physical inactivity, and obesity (1), also known as standard risk factors. However, it is estimated that 50% of new coronary heart disease cases cannot be identified on the basis of standard risk factors (2) implying that a more diverse range of risk factors play a role in the context of CAD. Besides standard risk factors, extensive evidence from literature demonstrates that psychological and psychosocial variables can have a significant impact on organic manifestations of CAD (3). Socioeconomic status, psychological distress,

hostility, personality, depression, and social support are among the psychosocial factors that were associated with the pathogenesis and expression of CAD (3-5). Among the psychological variables, personality traits have been shown to have more explanatory power than other psychological variables, such as depression (3-5).

The concept of the type D or distressed personality has recently begun to attract increasing interest as a risk factor in psychosomatic medicine (6). Type D is a taxonomy based on the two stable personality traits of negative affectivity and social inhibition and refers to those individuals who simultaneously experience increased negative emotions and inhibit self-expression in social interactions (6). Type D personality has been associated with a variety of emotional and social difficulties (7-10), and increased morbidity and mortality in patients with established heart disease even after receiving appropriate treatment (8). There is also evidence that type D personality serves as a vulnerability factor for development of cardiovascular disorders among healthy population (11).305

In the UAE, cardiovascular diseases are the leading cause of death and account for 28.69% of deaths in the country. More specifically, acute myocardial infarction represents 28%, cerebrovascular disease 16.2%, hypertensive disease 13.0%, and ischemic heart disease 12.3% of mortality from cardiovascular diseases in the UAE (12). Given these figures, substantial research has been directed toward identifying factors that contribute to the etiology and progression of cardiovascular disease in this country. These efforts have focused primarily on standard risk factors including diabetes, hypertension, hypercholesterolemia, smoking, and lifestyle factors (13-14). However, these variables provide an incomplete account of CAD risk factors, while personality factors have been ignored in studies of cardiac risk factors in this part of world. Therefore, the primary aim of this study was to explore the relationship between type D personality and coronary artery disease (CAD) in a sample of CAD patients in the UAE (15). This work is primarily interested in examining whether type D personality can contribute to coronary artery disease risk factors in the UAE. To achieve this, a case-control study design was employed to investigate the relationship between type D and coronary artery disease. In addition, as a secondary goal, this study aimed to explore the applicability of a type D scale (DS14), among three major ethnic groups residing in the UAE.

Previous studies showed that type D cardiac patients reported more negative mood states and less positive mood states (7). type D patients also had about three to four times greater odds of experiencing higher anxiety, depression and perceived stress scores compared to their non-type D counterparts independent of age, gender, family status, education, disease severity, and cardiac history (16). They also reported higher feelings of subjective stress during a stressor (17) and had poor perception of cardiovascular health status as compared to non-type D patients (18). In an earlier study, type D personality was associated with long-term mortality among patients with established CHD even after adjustment for the severity of cardiac disease (19).

A unique feature of this study was that it examined cardiac risk factors among young population in the UAE because evidence from literature indicates that compared to Western Europe, myocardial infarction in the Middle East, starts at a younger age (20).

Subjects and Methods

Hypotheses

The hypotheses examined are firstly, “the proportion of standard risk factors is significantly higher among CAD patients than control group” and secondly, “the proportion of type D personality is significantly higher among CAD patients than control group”.

Participants

Sample for this case-control study consisted of 180 participants. The case group consisted of 90 patients with CAD and the control group consisted of 90 individuals without history of CAD. Patients with CAD had undergone catheterization due to a heart attack in the last one year. The facility where research was conducted is a full-range Ministry of Health hospital that serves as a referral and acute care center for residents of the UAE. 100 discharged patients under age 45 were interviewed, and patients’ demographics were retrieved from records available in the Department of Medicine. Emirati patients included in the sample had received the treatment in the last one-year and expatriates had undergone the treatment in the last 6 months. A control subject was defined as an individual without prior history of CAD according to self-report indication and matched to case group with respect to age, gender, and ethnicity. Control subjects were recruited locally.

Instruments

Questionnaires used for the study were: a) Basic demographics survey, b) Type D scale (DS14), and c) CAD Assessment. Basic demographics information included in the study were gender, age, ethnicity, marital status, education level, and occupation. Type D scale (DS14) was used to assess negative affectivity (NA), Social Inhibition (SI), and Type D personality. Fourteen items are rated using a 5-point Likert scale ranging from 0= false to 4=true. A cutoff of 10 on NA and SI scales is used to classify subjects as type D (NA≥10 and SI ≥10). This cut-off value has been used in previous research (21,22), and is derived from the median split on negative affectivity and social inhibition scores of participants in those studies. DS14 is a well-recognized personality test for measuring the impact of 'Distressed' type on the heart. Seven items measures NA. Three out of the seven NA items measure dysphoria, anxious apprehension, and irritability. SI items measure discomfort in social situations, lack of social poise, and reticence (21,22). Factor analysis provided evidence for its 2 factor structure (NA and SI). The correlation of NA with neuroticism (r = 0.68), SI with extraversion (r= -0.59/ -0.65), and scale-level factor analysis confirmed the construct validity of the DS14 against the NEO-FFI. The NA and SI scales were found to be internally consistent (α=0.88/0.86) and stable over a 3-month period (test–retest r=0.72/0.82) and were not mood-state-dependent (22). The CAD Assessment was developed by Health-line Networks, a US-based health media company that markets health-related products for self-use (23). This tool is

Table 1. Demographic Characteristics of the 180 Participants in the study. Data on patient (n=90) and control groups (n=90) are presented as number (%).

Characteristics		Study Groups		Statistical Data	
Character	Subgroups	Patients	Controls	χ^2	P value
Gender	Men	86 (95)	82 (91)	-	-
	Women	4 (4)	8 (9)		
Age Groups	20-29 years	7 (8)	15 (17)	3.34	0.19
	30-39 years	64 (71)	57 (63)		
	40-44 years	19 (21)	18 (20)		
Ethnicity	Middle East	20 (22)	30 (33)	2.76	0.09
	South Asia	70 (78)	60 (66)		
Marital Status	Married	86 (96)	67 (74)	-	-
	Unmarried	4 (4)	14 (16)		
	Not reported	0 (0)	9 (10)		
Education	≤ High school	79 (88)	45 (50)	27.41	<0.001
	> High school	11 (12)	42 (47)		
	Not reported	0 (0)	3 (3)		
Occupation	Professional	6 (7)	9 (11)	6.24	0.04
	Not professional	82 (91)	66 (79)		
	Not reported	2 (2)	15 (10)		

Note. Not reported responses were excluded from chi-square analysis. No statistics is provided for gender and marital status due to presence of cells with counts less than 5.

Table 2. Standard Risk Factors among Patients and Controls.

Characteristics		Study Groups		Statistical Data	
Character	Subgroups	Patients	Controls	Statistic	P value
Positive family history of CAD	Yes	39 (43)	10 (11)	$\chi^2 = 23.38$	p=0.000
	No	49 (55)	77 (86)		
	DNK	2 (2)	3 (3)		
Diabetes	Yes	40 (44)	9 (10)	$\chi^2 = 26.11$	p=0.000
	No	50 (56)	79 (88)		
	DNK	0 (0)	2 (2)		
Hyperlipidemia	Yes	4 (4)	10 (11)	-	-
	No	13 (15)	76 (85)		
	DNK	73 (81)	4 (4)		
Hypertension	Yes	34 (38)	12 (13)	$\chi^2 = 13.58$	p=0.000
	No	55 (61)	75 (84)		
	DNK	1 (1)	3 (3)		
Smoking	Yes	65 (72)	16 (18)	χ^2 =53.89	p=0.000
	No	25 (28)	74 (82)		
Sedentary Life	Yes	38 (42)	21 (23)	$\chi^2 = 5.5$	p=0.01
	No	52 (58)	62 (69)		
	DNK	0 (0)	7 (8)		
Obesity	Mean (SD) BMI (Kg/m^2)	27.53 (7.06)	25.2 (4.80)	$T = 2.35$	p=0.02

Note. Not reported responses were excluded from chi-square analysis. No statistics is provided for gender and marital status due to presence of cells with counts less than 5.

Table 3. Type D Personality among Patient and Control Groups. Data are shown as mean (SD).

Characteristics	Study Groups		Statistical Data	
	Patients	Controls	x^2	P value
Type D Personality	23 (27)	22 (29)	0.28	p=0.87
Not Type D Personality	61 (73)	55 (71)		

x^2= Chi Square

endorsed by major health insurance and health educational institutions in North America It consists of nine items that assess standard risk factors of CAD, which are age, gender, smoking, sedentary life style, family history of CAD, high cholesterol level, high blood pressure, diabetes, and BMI. The items are dichotomous and respondents are requested to indicate the presence or absence of these risk factors about themselves. For BMI, respondents are required to report their height and weight. The instruments were translated and back translated by qualified research assistants into several locally spoken languages (Arabic, Urdu, & Hindi). Preliminary validation study of DS14 was conducted on 210 participants from community which provided evidence for its internal consistency. The internal consistency of the DS14 subscales for each translation was assessed with Cronbach's α and the mean inter-item correlation (MIIC). The obtained Cronbach's α (≥70) and MIIC (0.20 to 0.50) were found to be within optimal range and indicated acceptable level of reliability.

Procedures

Data collection for patients was done through phone interviews and hospital records. For control group, individuals without history of CAD were approached in public settings. After obtaining consent, individuals were administered the questionnaires included in the study.

Data analysis

The data were analyzed using Statistical Package for Social Sciences (SPSS) 18.0. Before analyzing data, demographic variables were coded into dichotomous variables. Occupations were classified into professional and non-professional categories. Occupations that require specialized knowledge and advanced skills were classified as professionals. Descriptive statistics were used for all variables included in the study. For comparison between cardiac patients and controls, chi-square test of association and independent sample *t*-test were used. Chi-square was used when dependent variables were categorical, whereas *t*-test was used when the dependent variable was continuous. *P*-values less than 0.05 were considered statistically significant.

Results

Study Population

The general features of cardiac patients and controls are summarized in Table 1. Demographics of patients indicate that 95% were males, 71% were in the 30-39 age group, and 78% were South Asian. Among patients, 96% were married, 12 % had education above high school, and 92% were classified as non-professionals. The patients and controls were similar in gender, age, and ethnicity but participants with higher educational levels were overrepresented in the control group.

Frequency of co-morbid conditions:

Chi-square test of association indicated that patients were more likely to have family history of CAD Chi^2=23.38, p<0.0001). In addition, prevalence of diabetes, hypertension, smoking, and sedentary lifestyle was significantly higher among patients (Table 2). No conclusion regarding level of cholesterol can be made since the majority of patients (81%) did not know their cholesterol level. Independent sample *t*-test indicated that patients tended to have significantly higher BMI compared to controls (t=2.35, p<0.05).

Type D personality and CAD

Results of chi-square test of association indicated that there is no significant relationship between type D personality and CAD. Only 27% of patients indicated themselves as type

Table 4. Mean, Standard Deviation, and t-Statistics for Negative Affectivity and Social inhibition among CAD Patients and Controls. Data are shown as mean (SD).

Characteristics	Study Groups		Statistical Data	
	Patients	Controls	T	P value
Negative affectivity	9.54 (3.68)	9.48 (6.30)	0.08	0.93
Social inhibition	9.29 (3.77)	8.44(5.04)	1.22	0.22

Table 5. Differences between Type D and Not Type D participants on Behavioral Factors.

Characteristics		Study Groups		Statistical Data	
Variable	Subgroups	Type D	Not Type D	Statistic	P value
Smoking	Yes [n (%)]	24 (53)	61 (59)	χ^2 = 0.01	p=0.93
	No [n (%)]	21 (47)	65 (51)		
Sedentary life	Yes [n (%)]	15 (33)	36 (32)	χ^2 =0.7	p=0.86
	No [n (%)]	30 (67)	77 (68)		
Body Mass Index (kg/m2)	[Mean (SD)]	24.6 (4.5)	26.7(6.5)	T = 1.72	p=0.08

D, which does not significantly differ from 29% of control subjects (Table 3). Among cardiac patients, the mean score of NA was 9.54 (*SD*=3.68) and SI was 9.29 (*SD*=3.77). Participants in the control group obtained the mean score of 9.48 (*SD*=6.30) in NA and 8.44 (*SD*=5.04) in SI. The results indicate that cardiac patients scored slightly higher in both NA and SI when compared to controls however the difference was not statistically significant (Table 4).

Type D personality a relevant behavior in patients and controls

Sample was stratified according to type D and not-type D participants. Chi-square test of association was employed to explore relationship between type D and behavioral factors including smoking, BMI, and sedentary life style, the results indicated that there is no significant difference between type D and not-type D participants on behavioral variables (p>0.05) (Table 5). Similar results were obtained for two components of type D personality (p>0.05). Separate analysis among patients and controls also yielded similar results. Relationship between type D personality and demographic variables was also not significant (p>0.05).

Discussion

While previous literature indicated association between type D personality and CAD (24,25), this was not found in this study. In two similar studies among Chinese patients, also no association between type D and CAD was reported (5). There is a possibility that in certain cultures, type D operates differently and by itself is not an indicator of CAD. However, it may affect CAD indirectly through increasing symptoms of anxiety and depression that may eventually lead to CAD. Inclusion of depression and anxiety measures while studying type D personality may be of great benefit to clarify this relationship. Another possible explanation is that people in this part of the world may perceive distress differently making DS14 culturally inappropriate for use in this part of the world. Unrepresentative and convenient sample included in this study may be another reason for the obtained results.

The sample size in the present study is smaller compared to studies conducted elsewhere. This number was not sufficient to estimate prevalence rate of type D personality among CAD patients in the Gulf region. The current sample size yielded small portion of individuals with type D personality and did not allow for gender and ethnic comparison while they could be an important area of investigation. The results indicated that higher proportion of CAD patients smoked tobacco, were diabetic and unaware of their medical condition, and had a family history of heart illness and sedentary lifestyle. This result implies that standard risk factors are strongly associated with CAD and is consistent with other studies conducted in the UAE (15, 26). Diabetes, obesity, hypertension, and smoking have been repeatedly shown to be highly prevalent in the adult population of the UAE (13,27,28), indicating that large number of population are at risk for development of CAD. The prevalence of these risk factors was higher among UAE Nationals (29%) compared to other residents (25%) with prevalence in males twice as high as females (29).

As the study was cross-sectional in nature, it did not allow for the determination of cause and effect. Longitudinal

studies are a better alternative for assessing the effect of type D personality on CAD. Possible confounding variables besides demographic variables (e.g. comorbid mental disorder) were not included in the study. Selection of patients from one hospital in Al Ain and convenient selection of control subjects make the representation of sample questionable and there may be also issues with cultural equivalence of the scale used in this study. Given lack of evidence on validity of type D Scale in this part of the world, efforts should be directed toward development of culturally appropriate measure for type D personality.

Comparing cardiac patients across a variety of cardiovascular diseases will be very informative. Study of type D personality should also include measures of coping strategies, depression, and anxiety to better capture the interaction of various psychological factors in the context of CAD. Since unhealthy lifestyle is found to have significant association with incidence of CAD in the UAE, research in this area can be valuable to identify diverse range of lifestyle factors in the context of CAD. In addition, precise measure of each variable including type and frequency of exhibited behaviors should be investigated. Such studies may provide information for prevention and designing intervention strategies specific to the needs of this population. Given that ethnicity plays an important role in the development of CAD (30), comparative study of ethnicities in the UAE can be another informative area of research in this region.

In conclusions, while type D personality has been found to be a factor in CAD in Western countries, no such relationship was seen in this study. Also, no relationship was found in similar but larger investigations in China and South Korea. This indicates that DS 14 may be culturally inappropriate for non-Western populations. It is possible to replicate the same study in this region on a larger sample with confounding variables including comorbid conditions but the idea of a culturally sensitive scale is recommended.

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