The Relationship between Religious Practices and Markers of Subclinical Coronary Atherosclerosis

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Abstract

This research study the correlation between specific Islamic religious practices (frequency of holy book (Quran) reciting and night prayer) and subclinical coronary atherosclerosis marker (pericardial fat volume(PFV) and coronary artery calcification(CAC)) in patients with suspected coronary artery disease. The research reveal a significant association was observed between religious practices and a low PFV compare compared to patients who were never reading or praying ,without significant correlations were observed between night prayer and holy book reading with CAC.

Keywords: Religion; Pericardial Fat; Coronary Calcification; Atherosclerosis; Coronary Artery Disease

العلاقة بين الطقوس الدينية ومؤشرات تصلب الشرايين التاجية

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الخلاصة

درس هذا البحث العلاقة بين بعض الطقوس الاسلامية (صلاة الليل وقراءة القران الكريم) و بعض مؤشرات تصلب الشرايين التاجية التشخيصية (حجم الدهون حول غشاء التامور ونسبة تكلس الشرايين التاجية) باستخدام جهاز المفراس الحلزوني التخصصي لمجموعة من المرضى المرجح اصابتهم بأمراض تصلب الشرايين التاجية.

أظهرت الدراسة دلالة واضحة على وجود علاقة بين المرضى الممارسين الطقوس الدينية الوارد ذكرها اعلاه وبين انخفاض حجم الدهون حول غشاء التامور مقارنة مقارنة بالمرضى الغير ممارسين لتلك العادات الدينة ،كما لم تجد الدراسة اي علاقة بين ممارسة تلك الطقوس ونسبة تكلس الشرايين التاجية.

الكلمات المفتاحية: ديانة، الدهون حول التامور، التكلس التاجي، تصلب الشرايين، تصلب الشرايين التاجية

Patients and Methods: Two hundred twenty patients with who underwent 64-slice multi-detector CT (MDCT) coronary angiography for exclusion of coronary artery disease were recruited. Of these, 186 patients were enrolled in the study. Frequency of night prayer and holy book reading patients were grouped as regular (daily), infrequent (weekly, monthly and once or twice a year) and never groups according to their responses.

Results: This study consisted of 186 patients (108 females (58%) and 78 males (42%) with a mean age of 51.7 ± 12 years).Patients with regular Holy book

reading and prayer were associated with a lower PFV (r=0.28,p=0.005 and r=0.22,p=0.02 respectively) compared to patients who were never reading or praying.

After adjustment to age, sex, and cardiac risk factors, the association between night prayer and PFV attenuated while the association between frequency of holy book reading and PFV persisted (*P*=0.03).No significant correlations were observed between night prayer and holy book reading with CAC (*P* > 0.05).

Conclusion: A significant association was observed between religious practices and a low PFV.

Introduction

Religion and medicine are related in one way or another among different nations   particularly in developing countries ,where religion serves as a coping recourse through a positive modification in psychological ,social and behavioral aspects.[1]

There is a possible link between spiritual and religious practices with heart disease and cardiac risk factors as a significant correlation has been observed between psychological stressors and coronary artery disease. [2]

Additionally, multiple studies have been found an important relationship between spiritual activities with outcomes following CABG, heart rate variability, cardiac reactivity and cardiovascular inflammatory markers which are further supports the role of religious practices in the cardiovascular health. [2][3][4][5]

However, the potential mechanisms through which the spiritual practices may exert its effects on coronary artery disease have not been fully understood.

Islamic night prayer, commonly coined by the Arabic word *salat*, a form of meditation, and it is an optional prayer after the 5 obligatory prayers that involves the practice of peculiar postural positions, including standing, bowing, prostration, and sitting at the late night time [6,7]

Together with prayer in Islamic religion, the Holy Quran (a measure of religious coping),the sacred text of Islam, provides rules and regulations to guide its followers and Quran recitation is reported to be an dynamic way to boost patient spirituality and also to process life's everyday stress.[2][8]

Cardiac fat is a local fat depot that covers 80% of heart's surface with a close anatomic proximity to the epicardial coronary arteries and pericardial fat volume (PFV) assessed by multi-detector computed   tomography (MDCT)angiography is an emerging imaging biomarker that has been reported to be involved in the coronary atherosclerosis .[9][10]

The primary aim was to assess the relationship of religious practices (frequency of holy book reading and night prayer) with subclinical coronary atherosclerosis markers (PFV and coronary artery calcification (CAC) in patients with suspected coronary artery disease (CAD) assessed using MDCT.

Patients and Methods

A cross-sectional study was carried out at the Cardiology Center at Al-Sader Teaching Hospital in Najaf city between June 2014 and January 2016. Informed consent was obtained from all patients enrolled in the study. The study was approved by education board of Medicine College of Kufa University.

Two hundred twenty consecutive patients with suspected CAD who underwent 64-slice MDCT angiography were recruited. Of these, 186 patients were found to be eligible and were enrolled in the study.

Thirty-four patients were excluded from 186 enrolled patients because of a bad or difficult examination technique or motion

artifact (*n*=12), had a prior history of an implanted stent in the coronary artery or coronary revascularization (*n*=3), difficulty in accurate PFV calculation or segmentation of fat (*n*=7) or data were missing or incomplete (*n*=12). Using standard physician-based questionnaires, a history of conventional cardiac risk factors for CAD was obtained from each patient at the time of coronary MDCT angiography examination including a positive family history of premature CAD (occurring before the age of 55 years in men and before 65 years in women), current smoking history (more than 10 cigarettes per day in the last year), a history of hypertension or use of anti-hypertension medications, hyperlipidemia was defined as total cholesterol ≥200 mg/dl or triglyceride levels ≥150 mg/dl or use of lipid lowering drugs, a history of diabetes mellitus or use of insulin or diabetic lowering drugs and Body weight and height were measured for each patient to calculate BMI.

Religious practices were measured according to patients responses to a questionnaire (how often do you recite the holy book) or (how often do you practice the night prayer apart from regular praying) at the time of MDCT examination. Frequency of Holy book (Quran) reciting and night prayer were determined by responses (daily, weekly, monthly, once or twice a year or never). Frequency of night prayer was determined by responses (daily, weekly, monthly, once or twice a year or never). For holy book reciting, patients were grouped as regular (daily), infrequent (weekly, monthly and once or twice a year) and none-reciting according to their responses.

For frequency of night praying, patients were grouped as regular (daily), infrequent (weekly, monthly and once or twice a year) and none–night prayer according to their responses.

CT scan protocol

CT coronary angiography was performed with a 64-slice scanner (Aquilon 64, v. 4.51 ER 010; Toshiba Medical Systems, Tochigi, Japan). Before multi-slice CT angiography was performed, a non-contrast CT was obtained to calculate the calcium score according to the Agatston for total heart calcium (summed across all lesions identified within coronary arteries) using a sequence scan with a slice thickness of 3 mm.Coronary calcification area was defined as at least three contiguous voxels with a CT density >130 Hounsfield units. When the patient's heart rate was more than 65 beat per minute, a β-blocker (metoprolol; 20–120 mg orally) was given before the scan. A bolus of 80 ml contrast medium (Omnipaque; 350 mg/ml iodine) was injected intravenously at a rate 5 ml/s, followed by 30 ml of normal saline. The scan was obtained from the aortic arch to the level of the diaphragm during a single breath hold. Using retrospective ECG-gating and ECG-dependent tube current modulation, the following parameters were performed: collimation, width 32.5 × 32.5 cm; slice thickness, 0.5 mm; rotation time, 0.35 s; tube voltage, 120 kV; maximum effective tube current, 890 mA; and table feed, 0.3 mm/rotation at 75% of R-R cardiac cycle. Examination time took ~10 s. MDCT images were rearranged using a smooth kernel (B25f) with a slice thickness of 0.5 mm (increment of 0.3 mm). CT data sets were transferred to a dedicated workstation (Vitrea 2 Workstation; Vital Image, Plymouth, MN, USA) for image analysis. [9]

PFV was defined as any fatty tissue located within the pericardial sac and measured three-dimensionally with the contrast-enhanced phase. PFV measured three-dimensionally with the contrast-enhanced phase. The layer of the

pericardium was manually traced and a three-dimensional image of the heart was constructed. Then the PFV was quantified by calculating the total volume of the tissue whose CT density ranged from -250 to-20 HU within the pericardium by using three D workstation. [9]

The analysis of MDCT images were performed by two independent radiologists with more than 5 years' experience in coronary MDCT angiography data interpretation.

Statistical analysis

Data are presented as mean ± standard deviation or as numbers with percentages, as appropriate. Categorical data are expressed as frequencies and group comparisons were performed using Pearson's chi-square test. PFV and CAC were non normally distributed and presented as median (inter-quartile range(IQR)) and were compared using Non Parametric test (Mann Whitney U test) or Spearman's rank correlation, as appropriate. Multiple regression was used to analyze the correlations of dependent variables(CAC and PFV) with age, gender, cardiac risk factors, Holy Quran reciting and night praying. A P-value of less than 0.05 was considered statistically significant. SPSS ver. 13.0 (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis.

Results

This study comprised 186 patients (108 females (58%) and 78 males (42%) with a mean age of 51.7 ± 12 years and range from 34 to 71 years) with a prior history of chest pain (n=129), dyspnea (n=35) syncope (n=9), an equivocal exercise tolerance test (n=8) and other (n=5) who underwent 64-slice MDCT angiography examinations for assessment of CAD.PFV median(IGR) was 68(15-112) cm^3 and coronary calcium score median(IQR) was 0(0-52) with CAC percentage of 40%.

Holy book reciting: Patients who were never reciting the holy book tended to have a lower prevalence of hypertension compared to a regular reciting patients (P=0.001). Patient characteristics are summarized in Table 1

Patients with regular Holy book reciting were associated with a lower PFV (r=0.28,P=0.005) compared to patients who were none-reciting the holy book as in figure 1.

The association between frequency of holy book reciting and PFV persisted after adjustment to age, gender and cardiac risk factors (P=0.03) as in table 2

No significant correlation was observed between frequency of holy book reciting with CAC ($P > 0.05$).

Frequency of night prayer: Patients who were none-night prayer tended to have a lower prevalence of hypertension compared to regular prayer patients (P<0.000). Patient characteristics are summarized in Table 3.

Regular night prayer patients were associated with a lower PFV (r=0.22,P=0.02) compared to patients who were none-night prayer as in figure 2.

However, this association between frequency of night prayer and a low PFV was not persisted and became non-significant ($P > 0.5$) after adjustment to age, gender and cardiac risk factors.

No significant correlation was observed between night prayer frequencies with CAC ($P > 0.05$).

Discussion

In the present study, a significant correlation was observed between religious practices and a low PFV while no significant correlation was observed between religious practices with CAC.

Religion is a multi-dimensional complex organized system of beliefs, practices, behaviors and rituals that may be held or practiced in private or public settings

while spirituality is often free of rules, regulations, and responsibilities associated with religion. [2]

However, a considerable overlap between religion and spirituality definition is exists making the interpretation and validation of results from health research one of the most controversial issues in religious practices and health research. [2][11]

Religious and spiritual activities have been consistently associated with improved health status and outcomes.

Of 19 studies that examined associations between religion and spiritual activities with ischemic heart disease, 12 (63%) reported a significant inverse relationship while other studies reported a positive relationship or no significant relationship. [11]

However, the uni-dimensional measurement of religious practices and absence of measurement of subclinical coronary atherosclerosis (CAC or plaque) are notable limitations of these studies. [11]

A two large follow up studies (CARDIA and MESA) have been studied the influence of religious activities on CAC and CAD in both young and older age participants using CT angiography. [12][13]

A large MESA study (52.4% female; mean age, 63 years) has been reported no consistent relationship between religiosity measures and presence/extent of coronary artery disease measured by coronary artery calcium score at baseline or incident CAD events during longitudinal follow-up in the course of 4 years. [12]

On the same vein, CARDIA study assessed the religious activities in 2433 participants, aged 20 to 32, who were followed for 18 years and reported that no significant association between religious activities and prevalence of CAC after adjustment for demographics and baseline risk factors. [13]

Pericardial fat has emerged as a new imaging biomarker with a significant association with endothelial dysfunction, inflammatory mediators, metabolic derangement, cardiac dysfunction and coronary disease severity and progression. [9][14]

Several clinical imaging studies reported a significant direct link between the amount of cardiac adipose tissue and general body adiposity particularly abdominal visceral adiposity. [15]

Obesity is a state of low to moderate grade inflammation, which may related to pericardial fat that act as a depot for inflammatory mediators, which may later contribute to the development and progression CAD if remains untreated. [16]

A cross sectional study conducted in 16,557 individuals above 50 years in Europe showed that individuals with regular religious and spiritual practices are associated with low body weight and clustering of cardiac risk factors. [17]

It has reported that patients who performed regular yoga, which is one of the spiritual practices developed in India to facilitate a meditation and for achieving self-realization, showed a significant improvement in metabolic indices and obesity markers. [18][19]

Yoga practices may improve the adiponectin level, serum lipids, percentage of body fat, lean body mass, waist circumference, visceral fat area and metabolic syndrome risk factors in obese postmenopausal women. [18]

Moreover, an 8-week of yoga- training program demonstrated a significant improvement in body weight, fat mass, body fat percentage and total cholesterol in obese adolescent boys. [19]

The effects of spiritual and religious practices on improvement in metabolic derangements could be attributed to a reduction in weight and stress leading to

a reduction in inflammation that halts the progression of the disease. [16]

There were several limitations in the present study. First, the study was a single center investigation, and the population was not randomly selected, as it involved only patients with suspected CAD based on physician referral. Therefore, the possibility of selection bias. Second, a causal relationship between religious practices and PFV cannot be inferred because of the cross-sectional nature of our study. Third, there may inability to fully account for residual confounding related to geographic and cultural considerations.

Conclusions

Frequency of holy Quran reciting was associated with a low PFV while religious practices showed no significant relationship with CAC. The significant association between religious practices with PFV raise important question about the role of PFV in linking religious activities with coronary atherosclerosis

Recommendations

The significant association between PFV and religious practices in the present study merit further studies using increased population sizes and with follow-ups to investigate the links between religious practices with CAD and PFV.

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Tables

Table (1) The distribution of clinical parameters between Holy Quran reciting groups

Parameter	None-reciting group 20(11%)	Infrequent reciting group 80(43%)	Regular reciting group 86(46%)	*P* value
PFV median(IQR)	102(50-155)	69(19-139)	48(10-92)	**0.03**
CAC median(IQR)	0(0-82)	0(0-24)	0(0-79)	**0.22**
Age	51.7±13	53.5±10	50±13	**0.44**
Male	20%	40%	49%	**0.1**
Female	80%	60%	51%	**0.1**
BMI	30.7±5	29.7±5		**0.43**
Hypertension	12(60%)	52(65%)	32(37%)	**0.001**
Diabetes mellitus	4(20%)	24(30%)	24(28%)	**0.6**
Smoking	2(10%)	4(5%)	4(4.5%)	**0.6**
Hyperlipidemia	2(10%)	5(6%)	6(7%)	**0.8**
Family history	2(10%)	24(30%)	16(19%)	**0.07**

Table (2) Relationship of PFV with cardiac risk factors ,age, gender, Holy Quran reciting and night prayer using multiple regression analyses

	PFV		
	Regression coefficient	SE	P value
BMI	0.33	1.4	0.000
Hypertension	8.33	0.26	0.000
Smoking	0.07	40	0.2
Diabetes	0.07	9.45	0.2
Hyperlipidemia	0.03	14.9	0.6
Family history	11.6	43.5	0.7
Age	0.14	0.44	0.09
Male	0.01	13.6	0.8
Night prayer	0.06	9.63	0.5
Quran reciting	6.20	0.18	0.03

Table (3) Distribution of clinical parameters between night prayer groups

| Parameter	None- night prayer group 30(16%)	Infrequent night prayer group 70(38%)	Regular night prayer group 86(46%)	P value
PFV median(IQR)	93(28-128)	70(11-128)	48(11-95)	**0.02**
CACmedian(IQR)	0(0-0)	0(0-50)	0(068)	**0.1**
Age	49±12	52±11	52±13	**0.6**
Male	7(44%)	12(34%)	20(46%)	**0.5**
Female	9(56%)	23(66%)	23(54%)	**0.5**
BMI	28.7±4	30.3±5	28.8±3	**0.3**
Hypertension	18(60%)	46(66%)	30(35%)	**0.000**
Diabetes mellitus	5(17%)	26(37%)	22(25%)	**0.08**
Smoking	1(3%)	2(3%)	3(3%)	**0.9**
Hyperlipidemia	2(7%)	8(11%)	6(7%)	**0.5**
Family history	11(37%)	12(17%)	18(21%)	**0.09**

Figure legends
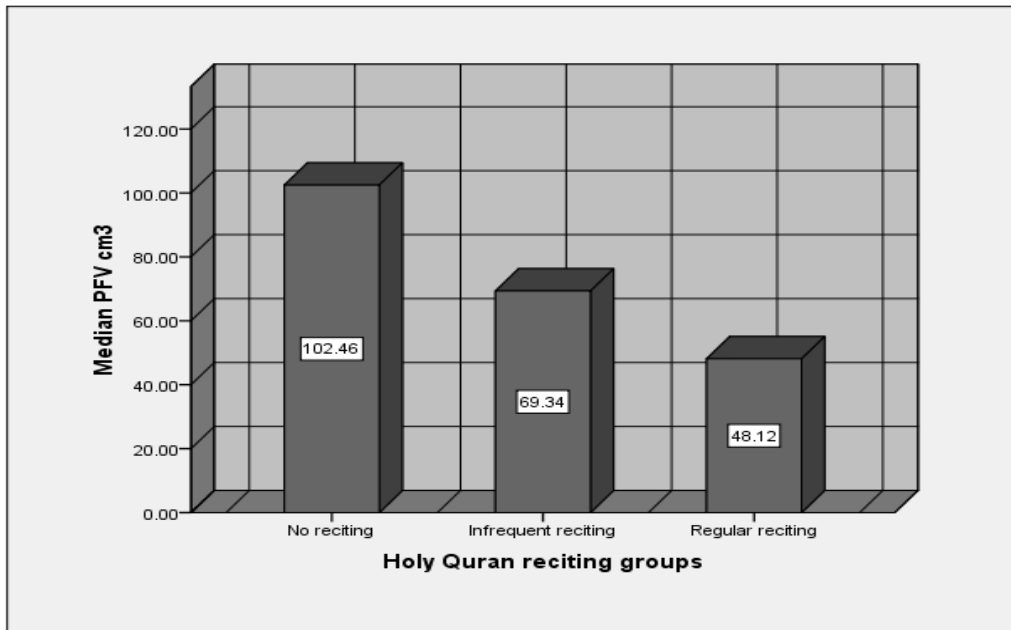
Figure (1) Relationship of holy Quran reciting and pericardial fat volume (PFV). Regular holy Quran reciting was associated with a low PFV
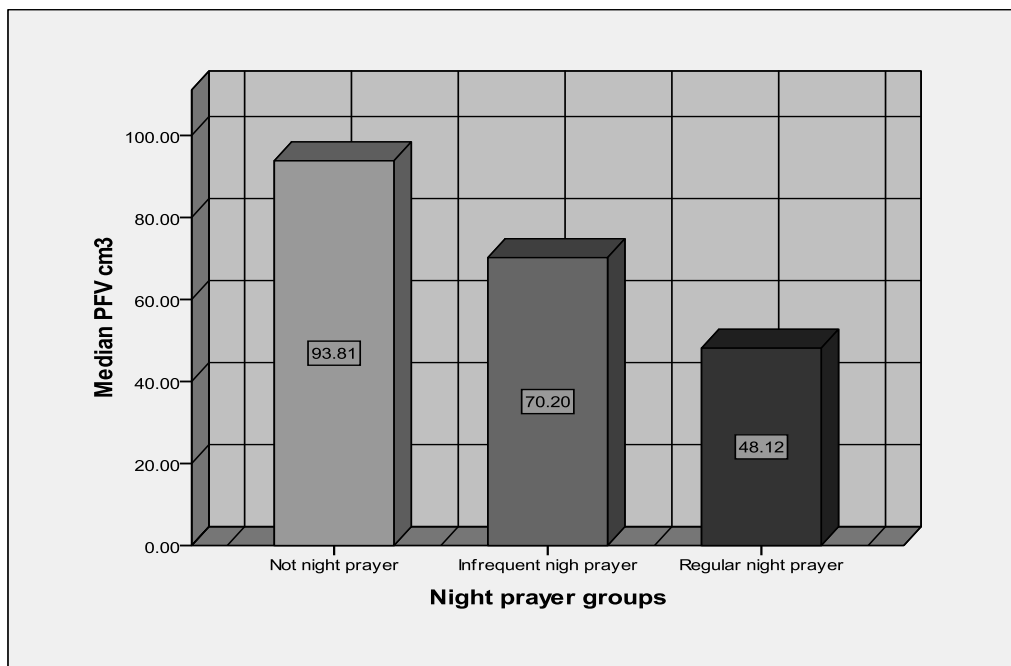

Figure (2) Relationship of frequency of night prayer pericardial fat volume (PFV). Patients with a regular night prayer were associated with a low PFV

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