

ORIGINAL RESEARCH

Correlation of Cardiovascular Diseases and Coronary Dominance: A Study of Central Rajasthan Population

Dr. Renuka Saini¹, Dr. Ranjana Barjatya², Dr. Sushila Shekhawat³, Dr. Ashish Agarwal⁴, Dr. Praveen Chouhan⁵,
Dr. Yamini Singh⁶

¹Ph.D Scholar, Department of Anatomy, J.L.N. Medical College, Ajmer, Rajasthan, India.

²Senior Professor & Head, Department of Anatomy, J.L.N. Medical College, Ajmer, Rajasthan, India.

³Associate Professor, Department of Anatomy, J.L.N. Medical College, Ajmer, Rajasthan, India.

⁴Assistant Professor, Department of Cardiology, J.L.N. Medical College, Ajmer, Rajasthan, India.

⁵Assistant Professor, Department of Anatomy, RAJMES Medical College, Hanumangarh, Rajasthan, India.

⁶Senior Medical Officer, Department of Anatomy, J. L. N. Medical College, Ajmer, Rajasthan, India.

Corresponding Author

Dr. Sushila Shekhawat

Associate Professor, Department of Anatomy, J. L. N. Medical College, Ajmer, Rajasthan, India.

Email: dr.sush08@gmail.com

Received: 13 August, 2023

Acceptance: 28 September, 2023

ABSTRACT

Background: Coronary circulation is the circulation of blood in the blood vessels that supply the heart muscle (myocardium). Coronary arteries supply oxygenated blood to the heart muscle. Cardiac veins then drain away the blood after it has been deoxygenated. Because the rest of the body, and most especially the brain, needs a steady supply of oxygenated blood that is free of all but the slightest interruptions, the heart is required to function continuously. Therefore its circulation is of major importance not only to its own tissues but to the entire body and even the level of consciousness of the brain from moment to moment. Interruptions of coronary circulation quickly cause heart attacks (myocardial infarctions), in which the heart muscle is damaged by oxygen starvation. Such interruptions are usually caused by coronary ischemia linked to coronary artery disease, and sometimes to embolism from other causes like obstruction in blood flow through vessels.

Aims & Objectives: The aim of this study is to know the association of cardiovascular diseases and coronary dominance of Central Rajasthan population. **Materials & Methods:** Male and female patients of age group of 30-70 years who present to the Cath lab of Cardiology Department of J.L.N. Hospital, Ajmer for coronary angiography for different indications are included in the study. Patients with history of Myocardial infarction, Angina pectoris, Congestive Heart failure and Arrhythmia were included in this study. **Results:** This study shows significant correlation between cardiovascular diseases and coronary dominance. **Conclusion:** This study shows maximum percentage of cases that is 56.60 are recorded with ST-elevated myocardial infarction in the age group of 41-50 years and the least number of cases are recorded with arrhythmia i.e. 1.69% in the age group of 61-70 years.

Keywords: Coronary, Myocardium, Dominance.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution -Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Cardiovascular disease (CVD) is any disease involving the heart or blood vessels. Prevention of CVD involves improving risk factors through: healthy eating, exercise, avoidance of tobacco, smoke and limiting alcohol intake. Treating risk factors, such as high blood pressure, blood lipids and diabetes is also beneficial. Cardiovascular diseases are the leading cause of death worldwide except Africa. Together CVD resulted in 17.9 million deaths (32.1%) in 2015, up from 12.3 million (25.8%) in 1990. Coronary artery disease and strokes account for 80% of CVD deaths in males and 75% of CVD deaths in

females.¹ Most cardiovascular disease affects older adults. In the United States 11 % of people between 20 and 40 have CVD, while 37% between 40 and 60, 71% of people between 60 and 80, and 85% of people over 80 have CVD. The average age of death from coronary artery disease in the developed world is around 80, while it is around 68 in the developing world. CVD is typically diagnosed 7 to 10 years earlier in men than in women.² CVDs constitute a class of diseases that includes: coronary artery disease (e.g. Angina, Heart attack) stroke, heart failure, hypertension heart disease, rheumatic heart disease, cardiomyopathy, abnormal heart rhythms, congenital

heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, venous thrombosis.³It is estimated that upto 90% of CVD may be preventable.^{4,5}

MATERIALS& METHODS

This study is based on coronary angiography reports of 200 patients whose angiography was done in cardiology department of J.L.N. Medical College & Hospital, Ajmer. Reports from the Cardiology

department were collected and analysed for information pertaining to the study, to find out the dominance pattern in different patients and then categorized them into right coronary artery dominant, left coronary artery dominant or balanced circulation type and to correlate the dominance pattern with cardiovascular disorders. Patients with history of Angina Pectoris, myocardial infarction, arrythmia and Congestive heart failure were included during the study period.

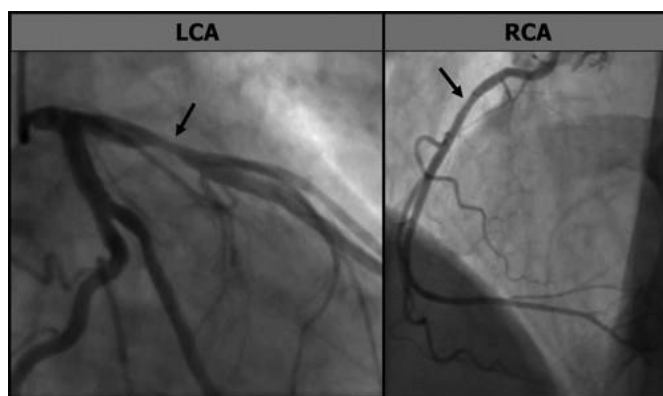


Fig 1: Angiographic images showing Left and Right Coronary Artery

Table 1: Comparative distribution of subjects according to Dominance Pattern and Cardiovascular Disorders

Dominance Pattern	Total	Cardiovascular disorder									
		Angina Pectoris		STMI		NSTEMI		Arrhythmia		CHF	
		No.	%	No.	%	No.	%	No.	%	No.	%
Right	178	71	39.89	96	53.93	8	4.49	1	0.56	2	1.12
Left	21	8	38.10	12	57.14	1	4.76	0	0.00	0	0.00
Co-dominance	1	1	100.0	0	0.00	0	0.00	0	0.00	0	0.00
Total	200	80	40.00	108	54.00	9	4.50	1	0.50	2	1.00

Chi-square =1.917 with 8 degrees of freedom; P = 0.983

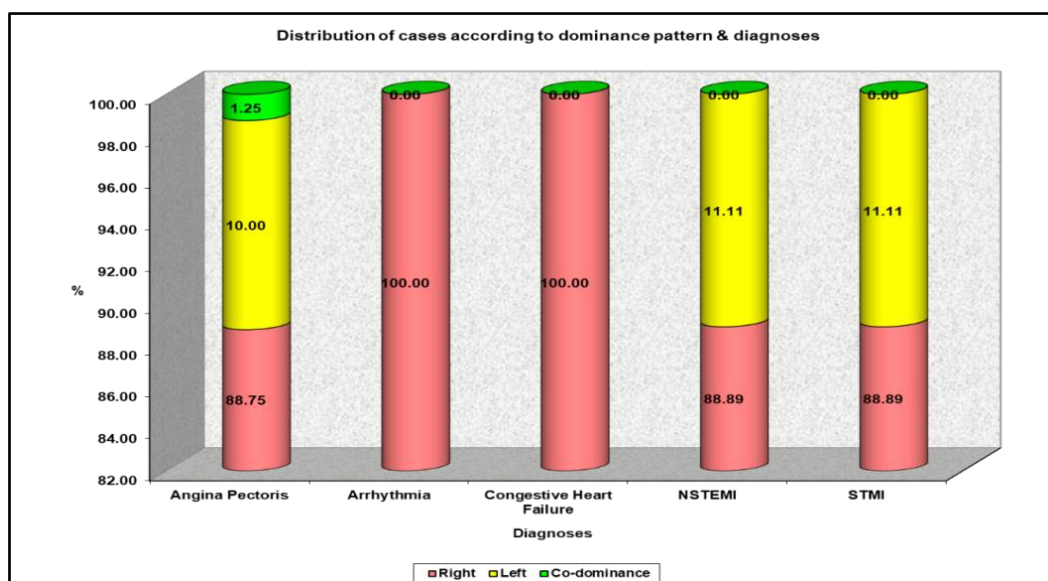


Fig 2: Distribution of cases according to dominance pattern and diagnosis

RESULTS AND DISCUSSION

Normal cardiac function is predicated on a continuous supply of oxygen and nutritive substances. When coronary perfusion is interrupted, profound myocardial damage can occur at both microscopic and macroscopic levels. Clinically this scenario gives rise to acute coronary syndromes manifesting as angina, or in the most severe form, acute myocardial infarction. An acute ST-elevation myocardial infarction (STEMI) is an event in which transmural myocardial ischemia results in myocardial injury or necrosis.⁶ The current 2018 clinical definition of myocardial infarction (MI) requires the confirmation of the myocardial ischemic injury with abnormal cardiac biomarkers.⁷ It is a clinical syndrome involving myocardial ischemia and chest pain.

An ST-elevation myocardial infarction occurs from occlusion of one or more of the coronary arteries that supply the heart with blood. The cause of this abrupt disruption of blood flow is usually plaque rupture, erosion, fissuring or dissection of coronary arteries that results in an obstructing thrombus. The major risk factors for ST-elevation myocardial infarction are dyslipidemia, diabetes mellitus, hypertension, smoking, and family history of coronary artery disease.^{8,9} Summary&Conclusion- Out of total 200 subjects studied maximum number of subjects were recorded with right dominance and the cardiovascular disorder which is more prevalent is ST elevated myocardial infarction in 53.93% in right dominant individuals and 57.14% in left dominant subjects. according to Dominance Pattern and Cardiovascular Disorders, right dominance is observed in the major population and the percentage of cases of angina pectoris is 39.89% STMI is 53.93%, NSTEMI is 4.49%, arrhythmia is 0.56% and CHF is 1.12% Left dominance when associated with angina pectoris it is 38.1%, STMI is 57.14%, NSTEMI is 4.76%, Arrhythmia and CHF is 0%. Dominance can be a significant determinant of prognosis in acquired coronary artery disease. In most individuals with left coronary dominance, the right coronary artery is usually small and often fails to reach the acute (right) margin of the heart decreasing the potential for rapid development or re-opening of collateral vessels. Thus the knowledge of the morphological variations of the coronary arteries, particularly of coronary dominance, is not only important for management of cardiac trauma but also for prevention of arrhythmia during cardiac surgery resulting from coronary artery occlusion. This study highlights the significance of determining dominance in coronary artery anatomy within multiple aspects of treating cardiac pathology.

REFERENCES

1. Murphy ES, Rösch J, Rahimtoola SH. Frequency and significance of coronary arterial dominance in isolated aortic stenosis. *Am J Cardiol.* 1977 Apr;39(4):505-9.
2. Shanthi M, Pekka P, Norrving B (2011). Global Atlas on Cardiovascular Disease Prevention and

Control (PDF). World Health Organization in collaboration with the World Heart Federation and the World Stroke Organization. pp. 3–18. ISBN 978-92-4-156437-3. Archived (PDF) from the original on 2014-08-17.

3. Naghavi M, Wang H, Lozano R, Davis A, Liang X, Zhou M, et al. (GBD 2013 Mortality and Causes of Death Collaborators) (January 2015). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013". *Lancet.* 385 (9963): 117–71. doi:10.1016/S0140-6736(14)61682-2. PMC 4340604. PMID 25530442.
4. McGill HC, McMahan CA, Gidding SS (March 2008). Preventing heart disease in the 21st century: implications of the Pathobiological Determinants of Atherosclerosis in Youth (PDAY) study. *Circulation.* 117 (9):1216–27. doi:10.1161/CIRCULATIONAHA.107.717033. PM ID 18316498.
5. O'Donnell MJ, Chin SL, Rangarajan S, Xavier D, Liu L, Zhang H, et al. (August 2016). Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (INTERSTROKE): a case-control study. *Lancet.* 388 (10046): 761–75. doi:10.1016/S0140-6736(16)30506-2. PMID 27431356. S2CID 39752176.
6. Alpert JS, Thygesen K, Antman E, Bassand JP. Myocardial infarction redefined--a consensus document of The Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *J Am Coll Cardiol.* 2000 Sep;36(3):959-69.
7. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, White HD., ESC Scientific Document Group. Fourth universal definition of myocardial infarction (2018). *Eur Heart J.* 2019 Jan 14;40(3):237-269.
8. Wilson PW. Established risk factors and coronary artery disease: the Framingham Study. *Am J Hypertens.* 1994 Jul;7(7 Pt 2):7S-12S.
9. Canto JG, Kiefe CI, Rogers WJ, Peterson ED, Frederick PD, French WJ, Gibson CM, Pollack CV, Ornato JP, Zalenski RJ, Penney J, Tiefenbrunn AJ, Greenland P., NRMI Investigators. Number of coronary heart disease risk factors and mortality in patients with first myocardial infarction. *JAMA.* 2011 Nov 16;306(19):2120-7.