

**OUTCOMES OF TRANSFEMORAL VERSUS TRANSRADIAL APPROACH IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY.**

Mehboob Hussain<sup>1</sup>, Shahid Hussain Memon<sup>2</sup> Ghulam Fareed Shah<sup>3</sup>, Nadia Munir<sup>4</sup>, Jagdish Kumar<sup>5</sup>, Shafaq Nazi<sup>6</sup>, Abdul Ghaffar Memon<sup>7</sup>.

**ABSTRACT**

**Objective:** This study aims to compare the outcomes of transfemoral versus transradial approach in patients undergoing coronary angiography. **Material and Methods:** All patients who planned for elective coronary angiography / angioplasty at NICVD, Karachi and fulfilled the inclusion criteria and exclusion criteria were included in the study after taking informed consent. Patients were divided into two groups. Group A (Transfemoral route group) or Group B (Transradial route group) by randomization. All the baseline and clinical collected data were entered SPSS version 21.0 for final analysis and a p value of <0.05 were considered as statistically significant. **Results:** A total of 126 patients were finally analysed and their mean  $\pm$  SD of age was 54.93 $\pm$ 8.19 years. Out of 126 patients 89 (71%) were male and 37 (29%) were female. The most common risk factor associated with CAD in our study subjects was hypertension (n = 57, 45.23%). Significant association has been observed when comparing the procedure time and post-procedural hospital stay in transfemoral versus transradial approaches 18.89 $\pm$ 2.72 vs. 11.33 $\pm$ 2.82

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1. Clinical Fellow, Department of Emergency, NICVD, Karachi
2. Assistant Professor, Department of Cardiology, Liaquat University of Medical & Health Sciences, Jamshoro
3. Senior Registrar, Department of Cardiology, Peoples University of Medical and Health Sciences, Nawabshah
4. Clinical Fellow, NICVD, Karachi
5. Assistant Professor, Department of Cardiology, Peoples University of Medical and Health Sciences, Nawabshah
6. Assistant Professor, Department of Medicine, Liaquat University of Medical & Health Sciences, Jamshoro

**Corresponding Author:** Dr. Shahid Hussain Memon, MBBS, MCPS (Medicine), FCPS (Cardiology) Assistant Professor, Department of Cardiology Liaquat University of Medical & Health Sciences, Jamshoro Email address: [shahidcrd2010@yahoo.com](mailto:shahidcrd2010@yahoo.com)  
Contact Number: 0333-3088126

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**INTRODUCTION:**

Coronary artery disease (CAD) is one of the most common causes of morbidity and mortality associated with cardiovascular disease worldwide involving more than 18.3 million adults between the ages of 20 years to 65 years and also responsible for around more than 3.6 million deaths in 2017 (1;2).

For the diagnosis and management of patients with coronary artery disease, coronary angiography (CAG) and percutaneous coronary intervention (PCI) / coronary angioplasty are the methods interventional cardiologists perform through femoral or radial artery access (3;4). Transfemoral (TF) approach through femoral artery has long been the access site for doing coronary angiography and angioplasty because of the large vessel size & diameter, simplicity of technique and operator friendly approach but sometimes it may be associated with certain complications such as high chances of bleeding when interventional cardiologist take femoral approach and the prevalence of bleeding risk is

around 10% in some of the previously conducted studies. Besides this common complication, some patient may experience development of hematoma at the punctured site, arterial pseudoaneurysms, and arteriovenous fistula (5-7).

Percutaneous arm approach via the radial artery is becoming more popular now throughout the world as an alternative to the femoral artery technique due to a lower incidence of access site complications, earlier patient ambulation, improved patient satisfaction, and lower cost. Comparing the femoral approaches and radial, associated with a higher mean contrast volume (71.63  $\pm$  25.41ml v/s. 67.52  $\pm$ 22.54 ml, P = 0.32), fluoroscopy time (2.83 $\pm$ 1.31 v/s 2.46 $\pm$ 1.22 minutes, P = 0.32) and procedure time was (9.33 $\pm$ 2.82 v/s 8.89 $\pm$ 2.72 minutes, P = 0.56) also radial approach for coronary intervention characterized by less frequent hemorrhage at the access site, improved patient tolerability and shorter hospitalization stay (7-10). Angiography is the main stay for the

diagnosis of coronary artery disease and its further management. Prolonged fluoroscopic times result in higher radiation doses delivered to the patients and more contrast volumes used are associated with higher rates of contrast induced nephropathy. The study will help the cardiologist in identifying the better technique in terms of lesser fluoroscopic time, procedure and volume of contrast used which would result in reduced radiation dose and reduced rate of contrast induced kidney disease in patients indicated for coronary angiography.

**PATIENTS AND METHODS:**

All diagnosed patients including both genders and having age  $\geq 30$  to  $\leq 70$  years planned for elective coronary angiography or angioplasty in the department of Cardiology, National Institute of Cardiovascular Diseases (NICVD), Karachi through either route (femoral / radial) were included in our study after taking informed and written consent between the periods of six months from June 2<sup>nd</sup>, 2019 to 1<sup>st</sup> December 2019.

**DATA COLLECTION AND ANALYSIS:**

Data collection was started after taken approval ethical committee of the institute. All patients presenting to Cardiology department of National Institute of Cardiovascular Diseases (NICVD) fulfilling inclusion criteria and planned for coronary angiography were included in the study. Preoperatively informed written consent was taken after explaining the potential benefits and risks of procedure from each patient. Initial data about age, contact number and date of admission was recorded on predesigned proforma. Detailed history and clinical examination were done before procedure. The patients were randomized to either Group A (Transfemoral route group) or Group B (Transradial route group) by using computer generated sequential number placed in sealed envelopes and opened only before the commencement of the study by single blind fashion. In Group A procedure was performed through femoral artery puncture and catheterization. In Group B, Allen’s test was performed to confirm patency of ulnar artery followed by radial artery puncture and catheterization. Fluoroscopic time, procedure

time was recorded in minutes and volume of contrast milliliters was calculated and recorded by researcher himself under the supervision of consultant Cardiology more than 5 years of experience in the prescribed data collection Performa.

**DATA ANALYSIS**

All the gathered data was analyzed using Statistical Package for Social Sciences (SPSS) version 20. Mean  $\pm$  standard deviation was calculated for age, height, weight, BMI, fluoroscopic time, volume of contrast used, and procedure time. Frequency and percentages were calculated for gender, hypertension, diabetes mellitus and smoking status. Independent student t-test was used to compare mean fluoroscopic time, procedure time, and mean volume of contrast used in both groups. Consider  $P \leq 0.05$  as statistically significant.

**RESULTS:**

In this study 126 patients were included to compare the outcomes of transfemoral versus transradial approach in patients undergoing coronary angiography and the results were analyzed as the overall mean  $\pm$  SD of age was  $54.93 \pm 8.19$  years and among most of them were males (n = 89, 71%) and 37 (29%) were females.

Hypertension was the most common risk factor of CAD in our study subject was observed (n = 57, 45%) followed by type 2 diabetes mellitus (n = 53, 42%) and smoking (n=56, 37%, respectively.

Our main objective of this study was to compare the outcomes of transfemoral versus transradial approach in patients undergoing coronary angiography. There is an insignificant association has been observed when comparing the fluoroscopic time and volume of contrast in transfemoral versus transradial approaches  $3.9 \pm 2.4$  vs.  $4.1 \pm 2.5$  minutes and  $52.5 \pm 12.5$  vs.  $47.5 \pm 10.0$ , respectively,  $p > 0.05$ .

While on the other hands, significant association has been observed when comparing the procedure time and post-procedural hospital stay in transfemoral versus transradial approaches  $18.89 \pm 2.72$  vs.  $11.33 \pm 2.82$  minutes and  $8.15 \pm 2.13$  vs.  $3.5 \pm 1.14$ , respectively,  $p < 0.05$ .

<b>TABLE NO. 01: DESCRIPTIVE STATISTICS OF DIFFERENT QUANTITATIVE VARIABLES (N = 126)</b>		
<b>Variables</b>	<b>Mean</b>	<b>Standard Deviation</b>
Age – Years	54.93	8.19
Weight – Kg	65.48	11.36
Height – m	1.73	0.51
BMI - kg/m <sup>2</sup>	29.16	5.49
Fluoroscopic Time – min	4.2	3.2
Volume of contrast – ml	55	15
Procedure Time - min	9.21	3.43

GRAPH NO. 01: GENDER WISE DISTRIBUTION OF STUDY SUBJECTS (N = 126)

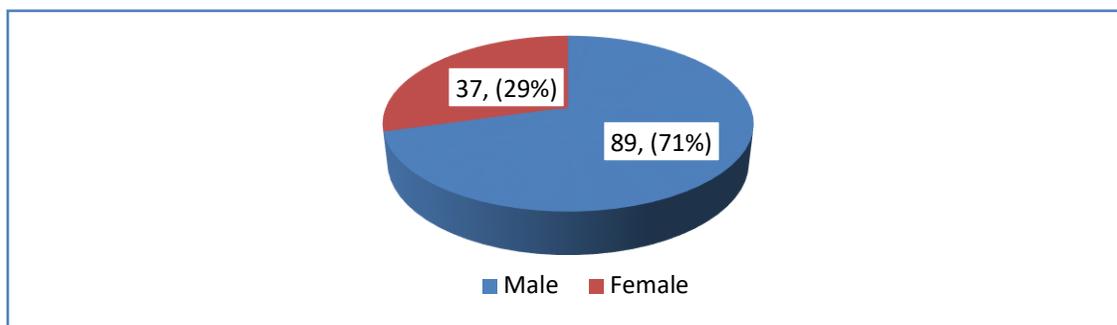


TABLE NO. 03: ASSOCIATION BETWEEN TRANSFEMORAL VERSUS TRANSRADIAL APPROACHES (N=126)

Catheterization Variables	Transfemoral	Transradial	p - value
	(N=63)	(N=63)	
	Mean	SD	
Fluoroscopy Time - min	3.9±2.4	4.1±2.5	0.34
Procedure Time - min	18.89±2.72	11.33±2.82	0.001*
Volume of Contrast - ml	52.5±12.5	42.5±10.0	0.07
Post-Procedure hospital stay - hours	8.15±2.13	3.5±1.14	0.03*

\*p- value <0.05 is statistically significant

**DISCUSSION:**

Ischemic heart disease or coronary artery disease is the number one cause of hospitalization and associated deaths worldwide and its burden continue to increase even after in the advancement of healthcare facilities. Researchers are working hard to reduce the burden of this disease hence innovation and inventions in the diagnostic and management side is growing exponentially for the betterment of patients. For this purpose, in the intervention such as access routes of coronary angiography / angioplasty there have been data discussing about the risks and benefits of these two approaches and most of them are favoring radial access for the purpose of both coronary angiography and angioplasty (11-13). In our study we have equally divided the total number of patients into two main groups, Group A (n=63) in which patients coronary angiography / angioplasty was performed through femoral access and Group B (n=63) in which patients coronary angiography / angioplasty was performed through radial access. Interventional cardiologists are now considering radial approach is the best way to perform coronary angiography / coronary angioplasty due to multiple reasons such as less procedural time required, shorter duration of hospital stay, less complications rate, operator friendly approach as compared to femoral access (14;15). These findings can be observed in our study in which we have observed significant association when comparing the procedure time and post-procedural hospital stay in transfemoral versus transradial approaches 18.89±2.72 vs.

11.33±2.82 minutes and 8.15±2.13 vs. 3.5±1.14, respectively, p<0.05. Our findings can be validated by the previously conducted studies. The reason behind this significant association is absolutely understandable like, patients with radial access are easily approached by the operator and there is no post procedural immobility required by the patient as it is the case in femoral approach (16). The chances of post-procedural complications like hematoma formation at the punctured site, increased risk of bleeding, patients cannot move for at least four hours hence increasing the duration of post-procedural hospital stay are more frequently seen in patients in which femoral approach chosen for the purpose of coronary intervention (17;18). These morbidities are usually not life-threatening, but they are troublesome for patients. Same was observed in a study conducted by Mann et al (19) also agrees with the findings of our study and has observed less number of patients have experienced access site complications when approached through radial route as compared to femoral; P <0.01). Based on the available data from international studies and data from our study radial approach should be consider over femoral approach for the benefit and safety of patients.

**CONCLUSION**

Our study proves significant beneficial effects if operator chooses radial approach for performing coronary angiography / coronary angioplasty but further studies still needed on larger scale so that this association can be explored more.

**ETHICS APPROVAL:** The ERC gave ethical review approval

**CONSENT TO PARTICIPATE:** written and verbal consent was taken from subjects and next of kin

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**CONFLICT OF INTEREST:** No competing interest declared.

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