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RESEARCH ARTICLE

"FLOW MEDIATED DILATATION, CAROTID INTIMA MEDIA THICKNESS, ANKLE BRACHIAL PRESSURE INDEX AND PULSE PRESSURE IN YOUNG MALE POST MYOCARDIAL INFARCTION PATIENTS"

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Abstract

Introduction:Due to increase in Coronary Artery Disease (CAD) at a younger age, we should try to diagnose atherosclerotic process and population at risk, at the earliest. Flow Mediated Dilatation (FMD), Carotid Intima-Media Thickness (CIMT) and Ankle-Brachial Pressure Index (ABI) are probable markers for early atherosclerosis and may be useful in coronary risk stratification

Objectives: To compare and correlate the FMD, CIMT, ABI and Pulse Pressure (PP) in young male patients of Myocardial Infarction (MI) with age and sex matched healthy controls

Method50 patients of MI aged ≤45 years, who presented to iccu of Department of Medicine Indira Gandhi medical college Nagpur India, were recruited consecutively for this case control study and same number of age and sex matched healthy controls were also analyzed. 3 days after Myocardial infarction FMD of the brachial artery, intima media thickness of carotid artery, ABPI and PP were measured in the cases and compared with healthy control

Results: The FMD was lower among young patients of MI than controls . CIMT was higher among cases than controls . ABI was lower among cases than controls . Compared to controls, PP was higher among cases . In all subjects, a negative correlation between FMD and CIMT and a positive correlation between FMD and ABPI was found. A statistically significant negative correlation was found between endothelial dependent FMD and PP among cases and control groups

Conclusion: Biophysical parameters were deranged in young post MI patients. Majority of our young male patients fell in low risk Framingham risk score but still they manifested with CAD. Despite 3 days of treatment among young male patients of MI, various biophysical parameters were stillderanged

Introduction:-

Coronary Artery Disease (CAD) is a major threat worldwide. Indians are at a 3 to 4 fold greater risk for development of CAD than the rest of the world population [1–3]. In the Indian subcontinent there is a rising trend of CAD among younger people (age ≤45 yrs). In view of increasing CAD at a younger age, we should try to diagnose

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atherosclerotic process and population at risk, at the earliest. Various biophysical methods include - Flow Mediated Dilatation (FMD) for assessment of endothelial function, Carotid Intima Media Thickness (CIMT) which is considered as a surrogate marker of atherosclerosis and Ankle Brachial Pressure Index (ABI) to diagnose Peripheral Vascular Disease (PVD).

Brachial artery reactivity is a non-invasive ultrasonographic assessment of FMD. It is used to measure endothelium-dependent response to shear stress [4]. Studies have shown that FMD is a marker for increased cardiovascular risk. It has been observed that FMD correlates with impaired endothelium-dependent relaxation in the coronary arteries [5]. CIMT is a non-invasive tool that can be used for cardiovascular risk stratification in individuals [6].

ABI is a useful tool for prediction of overt atherosclerosis and marker of cardiovascular risk (<0.9)ABI is strongly associated with cardiovascular diseases. Previous studies have found that those with lower extremity arterial disease are 1.5 to 2 times more likely to experience a clinical cardiovascular event [7]. As shown in studies, ABI has an inverse association with mortality [8]. Many prospective studies have shown that a low ABI (<0.9) can predict CVD. ABI, particularly in elderly men with morbidities as hypertension and type II diabetes can be used to predict mortality [9].

Pulse Pressure (PP) is an index of morphologic deterioration reflecting arterial thickening, fibrosis and calcification of blood vessels. Amongst PP, systolic or diastolic blood pressure, PP was found to be a better predictor of cardiovascular events [10].

Various studies have been done on biophysical parameters among the MI patients. However, there is scarce data on biophysical parameters among the young patients of MI in India

The objectives of this study were:

Primary:
To compare the FMD, CIMT, ABI and PP in young male patients of Myocardial Infarction (MI) with age and sex matched healthy controls.

Secondary:
To correlate FMD with CIMT, ABI and PP among cases and control

Materials and Methods:-

We consecutively recruited the patients of MI aged ≤ 45 yrs [11] whopresented to iccu of Department of Medicine Indira Gandhi medical college Nagpur India,, from 2018 to August 2019. The study was a case control study. Those who qualified the criteria of inclusion and exclusion and gave consent for the study were enrolled. The post MI survivors were followed up in preventive cardiac clinic and OPDs of medicine. After 3 days or more of MI - FMD, CIMT and ABI were measured. The controls were age and sex matched volunteers from hospital staff and unrelated attendants of patient.

Healthy controls were recruited based on history, examination including blood pressure and investigations including lipid profile, blood sugar, HbA1c and ECG, only healthy controls were recruited. Controls with any risk factor for CAD were excluded. All ultrasound measurements were performed in the morning by a single immensely experienced radiologist. Cases were on their regular therapy (ecospirin, ramipril, atorvastatin, propranolol, clopidogrel) and had taken their usual dose of morning medicine. The smokers abstained from smoking. Finally the data of 50 male patients of MI and same number of age and sex matched healthy controls were analysed. The study was approved by Institution Review Board and ethical clearance was obtained. The informed consent was taken from the patients. The diagnosis of MI was made by - Revised Definition of MI [12].

Criteria for Acute, Evolving, or Recent MI
Either of the following criteria satisfies the diagnosis for acute, evolving, or recent MI:
Typical rise of biochemical markers of myocardial necrosis with at least one of the following:
1. Ischemic symptoms.
2. Development of pathological Q waves in the ECG.
3. ECG changes indicative of ischemia (ST segment elevation or depression).

4. Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.

Patients fulfilling these criteria were labelled as Cases (Group 1).

Exclusion Criteria

1. Patients with family history of premature (≤ 55 yrs) CAD.
2. Patient with liver disease [serum aminotransferase >3 fold of normal (>120 IU/l)] or renal disease (serum creatinine levels >1.5 mg/dl).
3. Patients with congestive heart failure, bronchial asthma and chronic allergic condition on medication, Buerger's disease, collagen vascular disease and Raynaud's disease.
4. Patients with chronic diseases such chronic renal failure, chronic liver disease, acute and chronic infectious diseases, malignancy dementia or other psychiatric illness.

CIMT was performed as below:

CIMT was measured on both sides 1.5cm proximal to the carotid bifurcation in Common Carotid Artery (CCA) bilaterally in a plaque-free region by gray scale longitudinal image of the artery obtained with the help of 7.5 MHz - 10MHz transducer on HDI 5000 or HDI 1500 ultrasound (Philips). Presence of any plaque, ulceration or calcification was also noted. Ankle Brachial Pressure Index The systolic blood pressure in both arms was taken with the blood pressure cuff and doppler probe, after a minimum of 10 min rest, greater of the two was taken as systolic BP of upper limb. If the difference between both the arms was greater than 10mmHg, the candidate was excluded. Systolic blood pressure in the Posterior Tibial (PT) or Dorsalis Pedis (DP) artery in the leg was taken. The higher of the two reading was taken as systolic BP at ankle. In case either the PT or DP ankle pulse was absent, the measurable reading was used to calculate the ABI.

The ABI was measured by dividing the systolic BP values obtained for leg by that of the brachial artery.Value <0.9 was highly significant for increased cardiovascular risk . Pulse Pressure (PP) Systolic and diastolic blood pressures were measured with an aneroid sphygnomanometer after a minimum of 10 min rest in the sitting position. PP was calculated as systolic minus diastolic blood pressure

Results and Observations:-

This Hospital based Descriptive Case Control Study titled "the Flow MediatedDilatation, Carotid Intima Media Thickness, Ankle Brachial Pressure Index and PulsePressure in Young Male Post Myocardial Infarction Patients" was carried out in ourinstitution from 2018 to August 2019.

50 cases 50 controls were recruited for the study.

1) There were 5(10%) cases in between age group 21-30,18(34%) casesbetween 31-40, and 7(14%) cases in between 50-55 total study population &most of the cases 20(40%) were in the age group of 41- 50 years

2) 23 cases & 5 controls had bmi more than 25

3) In our study, the percentage of smokers in young CAD was 26(52%)& 9(18%)cases had h/o DM &11 (22%) were hypertensive & 18(36%) were alcoholic.

4) Majority of the patients in the groups did not have any post MI complicationduring hospital stay; 92% in cases were without any complications.

5) Mean value of serum high density lipoprotein, serum low density lipoproteins,serum total cholesterol, serum triglyceride and very low density lipoproteinswas 38.05 ± 6.24 mg/dl, 96.42 ± 25.32 mg/dl, 170.8 ± 20.94 mg/dl, 173.82 ±83.89 mg/dl and 34.73 ± 16.78 mg/dl respectively

6) The number of cases with Framingham risk score < 10% (Low risk) were28(60.87%), 10%-20% (Intermediate risk) were 11 (13.91%) and score > 20%(High risk) were 7(15.22%).

7) majority of the patients in cases had IWMI(44%) followed by lateral MI (32%).

8) Average CIMT of both CCA(mm) among cases was found to be 0.91 ± 0.07

mm. 43 cases(86%) & 6 (12%)controls were found to have CIMT>0.8mm whlie

7(14%) cases & 44 (88%)controls were found to have CIMT<0.8mm.CIMT value ≥ 0.8 mm, which is taken to be significant for cardiovascular risk.

11)FMD after inflation of cuff (mean+s.d) among cases was found to be 4.7± 0.08mm & FMD after Sorbitrate (mean+s.d) among cases was found to be 5.2± 0.09mm .37 cases(74%) & 3 (6%) controls were found to have % FMD<=11.3%.while13 cases(26%) & 47 (94%) controls were found to have % FMD>11.3%Cardiovascular event significantly morecommon in subjects with FMD<11.3% rather than >11.3%.

14)controls Ankle Brachial Pressure Index (mean+s.d) among cases was found tobe0.88 ± 0.05. 38 cases(76%)& 4 (24%) controls were found to have abpi <0.9The incidence of cardiovascular events increased significantly with abpi <0.9
15PULSE PRESSURE(mmhg) (mean+s.d) among cases was found to be 54.98± 8.11 mmhg43 cases(86%) were found to have PP > 50& 3 (6%) controls were found to
have PP > 50
19) The incidence of cardiovascular events in subjects with pp>50mmhg increases.
20) No correlation was seen between flow mediated dilatation after sorbitrate,pulse pressure, flow mediated dilatation(%) and flow mediateddilatation after inflaton of cuff with Framingham risk score with correlationcoefficient of 0.139 ,0.19 ,0.06 and 0.049 respectively.

Discussion:-

Our This Hospital based Descriptive Case Control Study was carried out from Jan 2018 to August 2019 (18 months) to assess the Flow Mediated Dilatation, Carotid Intima Media Thickness, Ankle Brachial Pressure Index and Pulse Pressure in Young Male Post Myocardial Infarction Patients We studied 50 cases 50 controls who fulfilled the eligibility criteria. Case record form was duly filled, clinical examination was done and appropriate samples were taken. The study was undertaken to assess the biophysical parameters in post MI young male patients at three days of follow-up. We assessed and compared the biophysical parameters i.e., FMD of brachial artery, CIMT and ABPI in young male post MI patients with age-sex matched healthy controls. Controls were taken as healthy i.e., without any risk factor. We also assessed various risk factors associated with young CAD. Biophysical parameters were assessed at three days to determine the usefulness of these parameters in follow-up of patients of MI. Since these parameters remain deranged post MI, they may be used for patient follow-up and aggressive treatment of CAD. 3 days was taken as an arbitrary period so that these parameters may be assessed as early as possible and may be an indicator for an aggressive management.We took patients below the age of 45years as there have been previous studies in India as Narsingan SN who defined young CAD as CAD occurring in patients less than 45years of age in Indian population [15]. CAD among young population is on the rise. Various Indian studies report that the patients suffering from acute MI below 45years to be 25%-40% [16].

It was observed that various risk factors as smoking, hypertension, diabetes, dyslipidemia and central obesity were significantly associated with premature CAD in male patients. In our study, the percentage of smokers in young CAD was observed to be 86.2%.

Increased CIMT is conventionally considered to be a marker of subclinical atherosclerosis. In our study, we observed that mean CIMT was significantly higher among cases as compared to controls. In our study, 43 cases(86%) cases had average CIMT value ≥ 0.08 cm, which is taken to be significant for cardiovascular risk [17,18].

FMD correlates with impaired endothelium-dependent relaxation in the coronary arteries [5]. In our study, we observed the mean value of endothelium dependent dilatation i.e., FMD after inflation of cuff among cases was significantly lower than the control group. These results were comparable to previous study as reported by Otikunta A. Naidu et al., who demonstrated significantly decreased flow mediated dilatation in patients when compared to control (9.42 ± 7.20% vs. 21.11 ± 9.16% p<0.01) [19]. FMD improves in response to drugs that have proven benefit on cardiovascular outcomes such as statins, anti-hypertensive drugs (including ACE-Inhibitors, angiotensin I receptor blockers, and calcium channel blockers) [20,21]. Despite the fact that our patients were on most of the above mentioned drugs for 3 days, the endothelial dependent dilatation was still significantly lower among cases than controls.

Various studies have shown the role of ABI in predicting cardiovascular risk. In our study, mean value of ABI was significantly lower amongst the cases as compared with controls. Previous studies have found that those with lower extremity arterial disease are 1.5 to 2 times more likely to experience a clinical CVD event [14]. Our results were in concordance with previously done studies by Erzen et al., and Gopal Premlatha et al., [10,22].

PP has been shown to be a risk factor for cardiovascular disease in many studies. High PP signifies an increased atherosclerotic process among the vessels. In our study, we found a statistically significant higher PP among cases as compared to controls. PP was found to be a better predictor of cardiovascular events than either systolic or diastolic blood pressure in the Framingham Heart Study [23].

As large artery stiffness increases, SBP rises and DBP falls, with a resulting increase in PP [24]. DBP falls with central artery stiffness and thus, may negative association with CAD [25].

Both PP and SBP components rise with increase in vascular resistance and large artery stiffness and hence, are correlated to each other. It was seen that increments in PP at a fixed SBP was associated with a greater risk for CHD than was increment in SBP at a fixed PP [23].

Majority of our young male patients fell in low risk Framingham risk score. Despite this finding, our young male patients with various risk factors suffered MI. This may be due to the fact that Framingham risk score is heavily dependent on age, which underestimates CV risk in young individuals [26] as shown in studies.

CAD is an overt manifestation of atherosclerosis. Atherosclerosis being a generalized process affects all the vessels. Thus, many patients with CAD develop other complications of atherosclerosis, one being the Peripheral Artery Disease (PAD). Patients with PAD have attenuated flow-mediated dilatation of the brachial artery, which suggests the loss of nitric oxide activity [27]. Thus, atherosclerosis forms a common basis of impairment of endothelium function, increased thickness of carotid intima and PAD. In this present study, a highly significant negative correlation (r= -0.220, p=0.005) was found between FMD and CIMT among all the subjects (cases and control). In all subjects together (cases and controls), Erzen et al [10] also found a significant negative correlation between FMD and CIMT. In our study, a highly significant positive correlation was also found between FMD and ABI among cases and control groups. A statistically significant negative correlation was found between endothelial dependent FMD and PP among cases and control groups. These results were significant despite six weeks of regular medications for CAD which might have improved endothelial function in these patients.

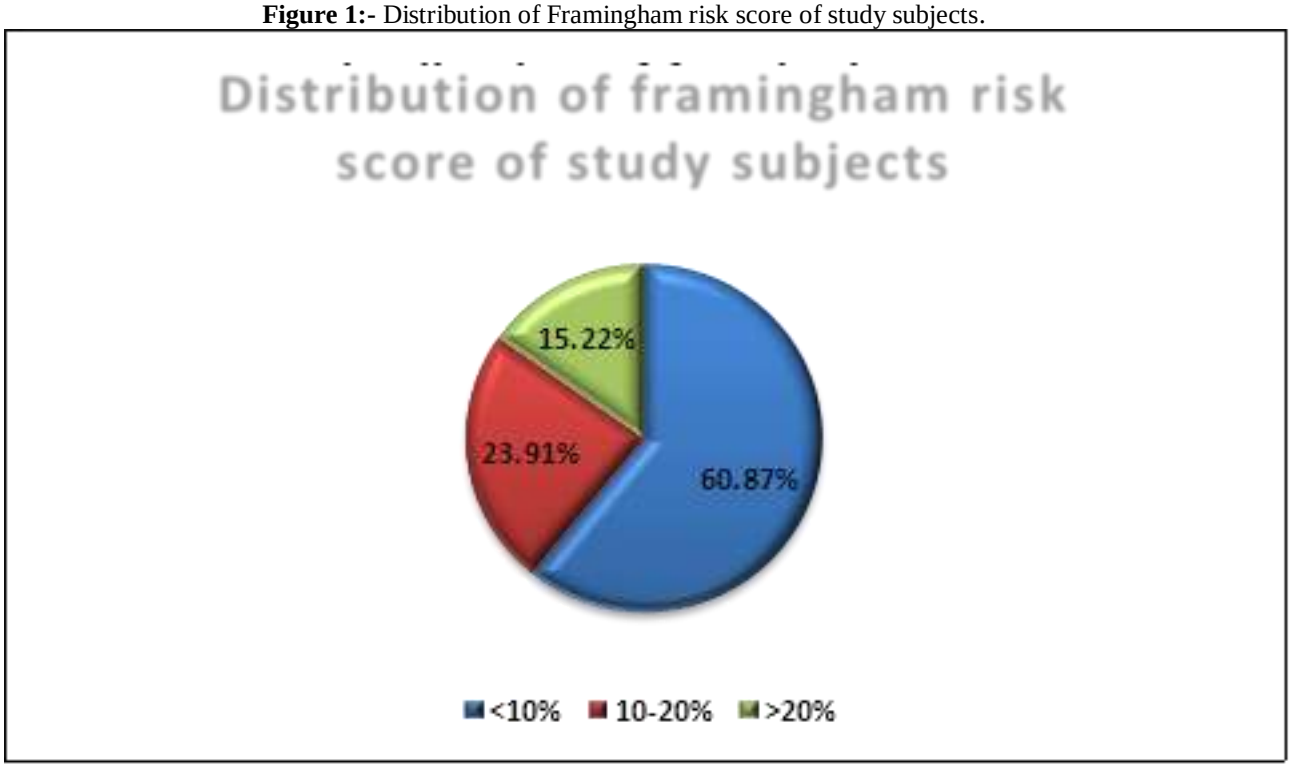
A multivariate regression analysis was done between various risk factors and FMD, CIMT and ABI among cases. However, none of the risk factor correlated with these biophysical parameters significantly. Thus, these risk factors in our cases did not contribute significantly to FMD, CIMT, ABI and PP and thus to the atherosclerotic process. Thus taking controls with no risk factors did not create a bias to the values of FMD, CIMT, ABI and PP.

Some authors have measured endothelial dysfunction as an additional marker of coronary risk. They estimated the risk on the basis of endothelial dysfunction and found that endothelial dysfunction has a higher predictive value than risk estimated from the presence of classical risk factors [28–30]. from the presence of classical risk factors (212-214)

Table 1:- Comparison of age between cases and controls.

Age distribution in years	**Group**		**Total**	**P value**
	Case(n=50)	**Control(n=50)**		
<=30	5 (10.00%)	5 (10.00%)	10 (10.00%)	1*
31-40	18 (36.00%)	18 (36.00%)	36 (36.00%)	
41-50	20 (40.00%)	20 (40.00%)	40 (40.00%)	
>50	7 (14.00%)	7 (14.00%)	14 (14.00%)	
Mean ± Stdev	41.64 ± 8.28	41.64 ± 8.28	41.64 ± 8.24	1#
Median(IQR)	42(35 - 48)	42(35 - 48)	42(35 - 48)	

Figure 1:- Distribution of Framingham risk score of study subjects.



Anthropometric parameters	Group		Total	P value
	Case(n=50)	Control(n=50)		
Body mass index (kg/m^2)				
Underweight (< 18.5)	0 (0.00%)	4 (8.00%)	4 (4.00%)	0.0002#
Normal (18.5 -24.9)	27 (54.00%)	41 (82.00%)	68 (68.00%)	
Overweight (25-29.9)	22 (44.00%)	4 (8.00%)	26 (26.00%)	
Obese (>=30)	1 (2.00%)	1 (2.00%)	2 (2.00%)	
Mean ± Stdev	25.26 ± 2.65	21.53 ± 2.83	23.4 ± 3.31	<.0001$
Median(IQR)	24.65(23.200 - 27.700)	21.25(19.100 - 23)	23.1(21.250 - 25.200)	
Weight (kg)				
Mean ± Stdev	72.58 ± 5.15	60.82 ± 8.54	66.7 ± 9.17	<.0001$
Median(IQR)	71(69 - 77)	60(56 - 66)	68.5(60 - 73)	
Height (cm)				
Mean ± Stdev	169.8 ± 4.55	168.1 ± 6.8	168.95 ± 5.82	0.145*
Median(IQR)	170(167 - 173)	167(164 - 173)	169.5(164 - 173)	

Table 2:- Comparison of anthropometric parameters between case and control.

Table 3:- Comparison of blood pressure between case and control.

Blood pressure (mmHg)	Case(n=50)		Control(n=50)		P value
	Mean ± Stdev	Median(IQR)	Mean ± Stdev	Median(IQR)	
Systolic blood pressure	126.08	128(120 - 135)	111.72	110(105 - 120)	<.0001*

(mmHg)	± 10.53		± 8.13		
Diastolic blood pressure (mmHg)	72.6 ± 10.92	70(65 - 80)	73.3 ± 7.53	75(70 - 80)	0.559*

Figure 3:- Comparison of blood pressure between case and control.

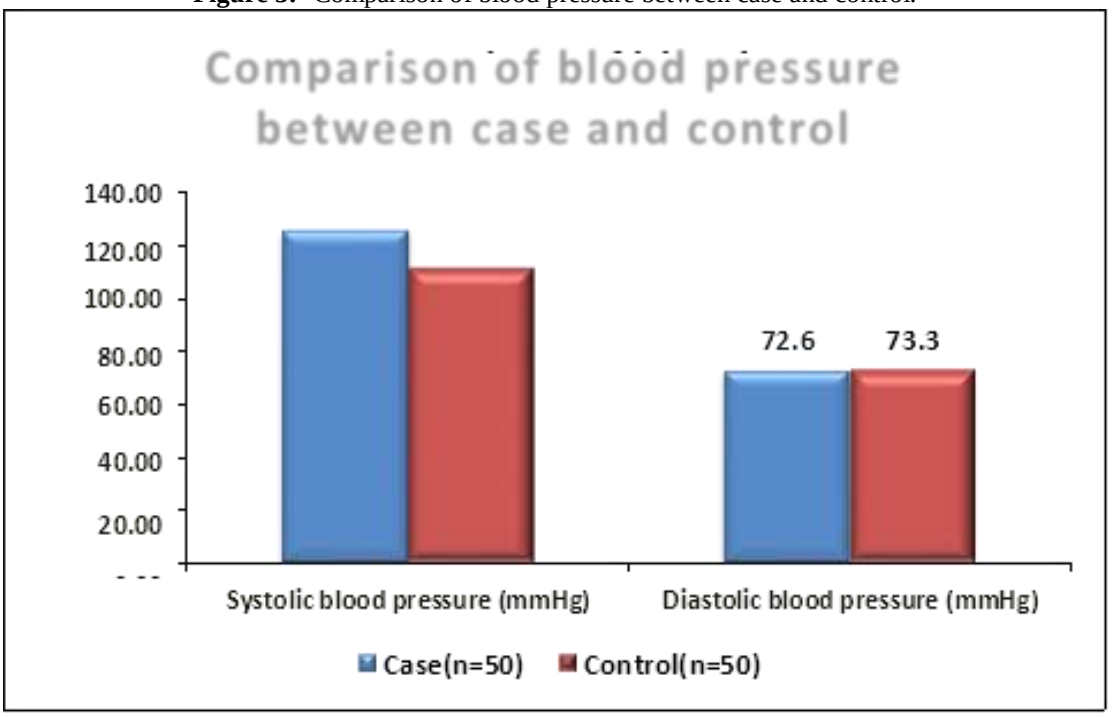


Table 4:- Comparison of type of MI between case and control.

Type of MI	**Group**		**Total**	**P value**
	Case(n=50)	**Control(n=50)**		
AWMI	12 (24.00%)	0 (0.00%)	12 (12.00%)	<.0001*
IWMI	22 (44.00%)	0 (0.00%)	22 (22.00%)	
Lateral MI	16 (32.00%)	0 (0.00%)	16 (16.00%)	
Sinus rhythm	0 (0.00%)	50 (100.00%)	50 (50.00%)	
Total	50 (100.00%)	50 (100.00%)	100 (100.00%)	

Table 5:- Comparison of Post MI complication during hospital stay between case and control.

Post MI complication during hospital stay	**Group**		**Total**	**P value**
	Case(n=50)	**Control(n=50)**		
No	46 (92.00%)	50 (100.00%)	96 (96.00%)	0.125*
Atrial fibrillation	1 (2.00%)	0 (0.00%)	1 (1.00%)	
Shock	3 (6.00%)	0 (0.00%)	3 (3.00%)	
Total	50 (100.00%)	50 (100.00%)	100 (100.00%)	

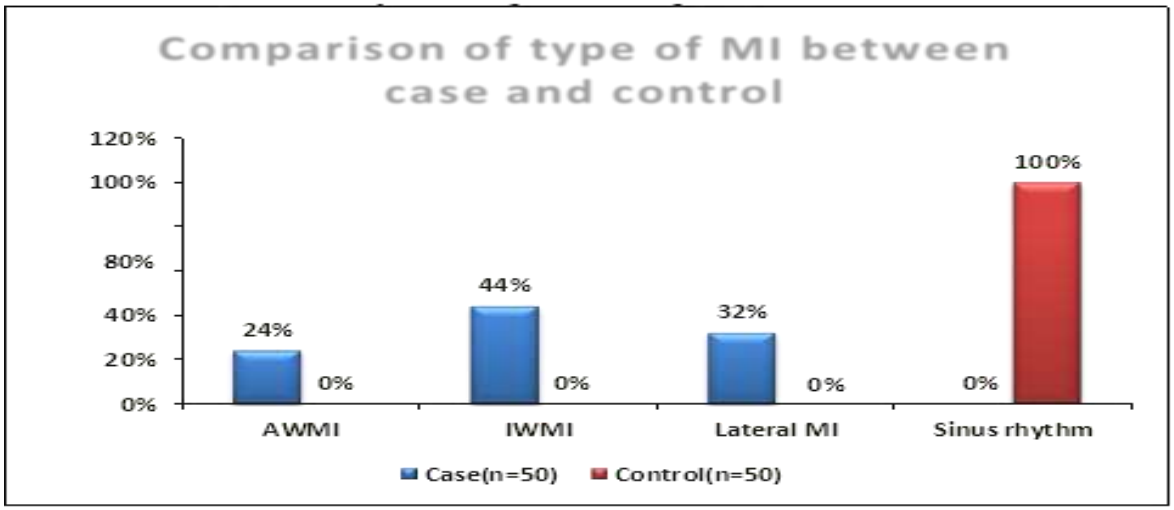


Figure 4:- Comparison of type of MI between case and control.

Figure 5:- Comparison of Post MI complication during hospital stay between case and control.

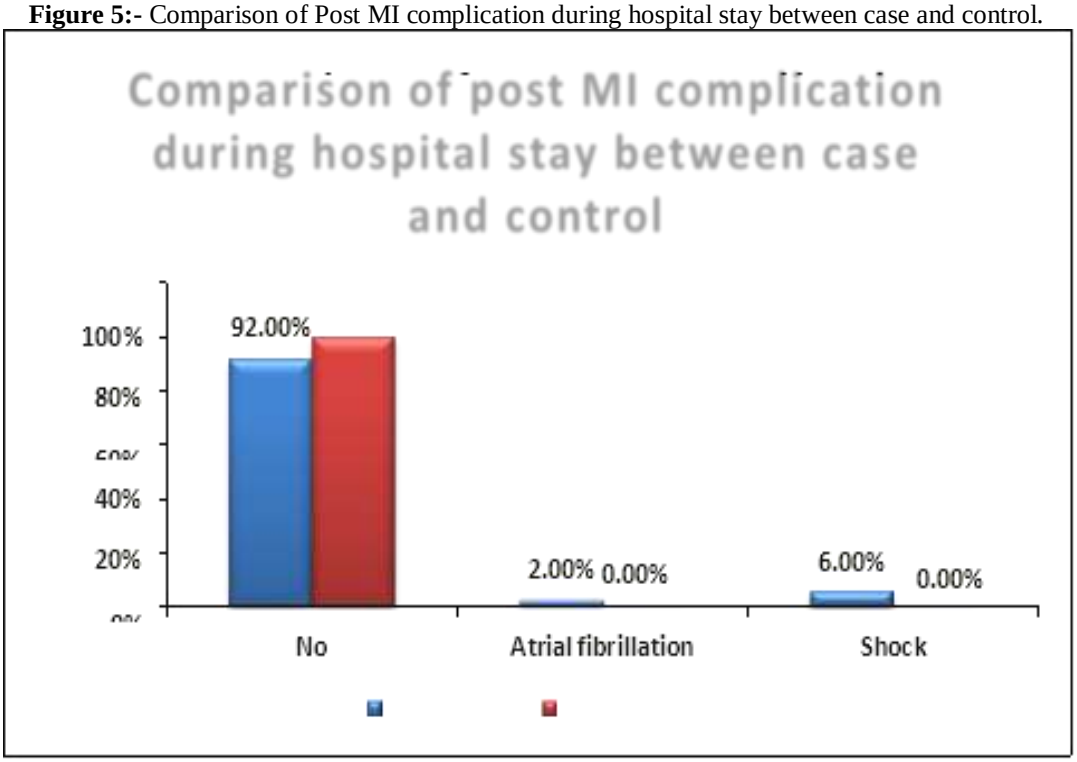


Table 6:- Comparison of ankle systolic between case and control.

	Case(n=50)		Control(n=50)		P value
Ankle systolic	**Mean ± Stdev**	**Median(IQR)**	**Mean ± Stdev**	**Median(IQR)**	
	111.78 ± 10	111.5(100 - 120)	115.7 ± 6.85	120(110 - 120)	0.069*

Figure 6:- Comparison of ankle systolic between case and control.

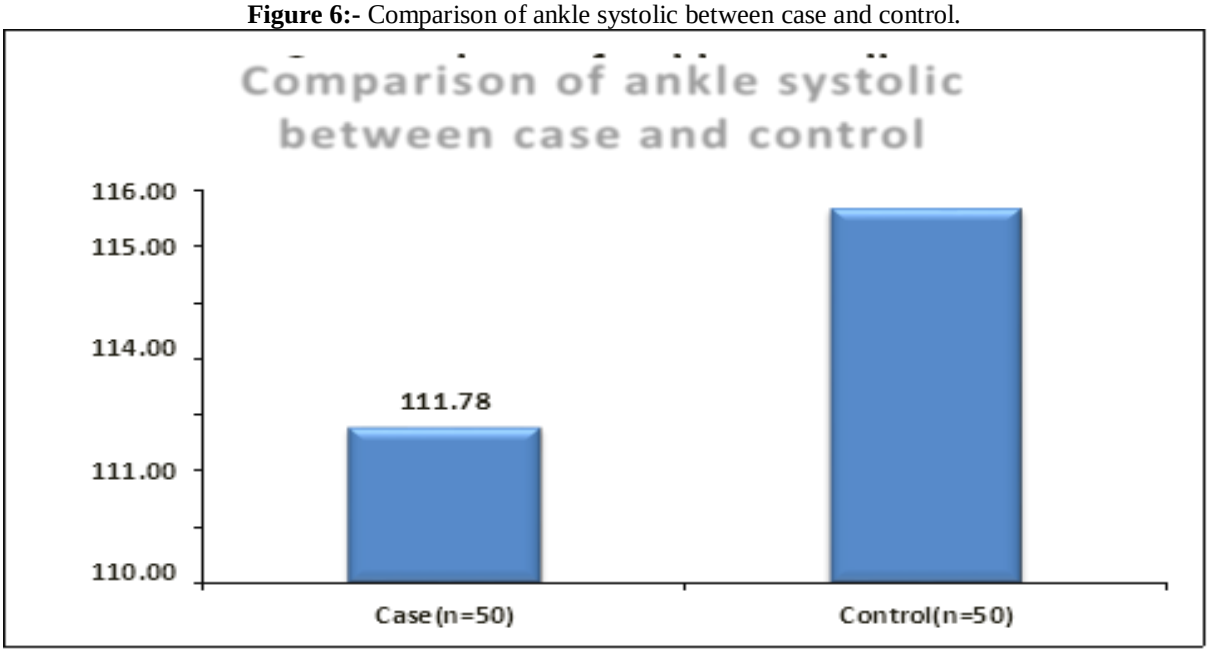


Table 7:- Comparison of carotid intima media thickness between case and control.

Carotid intima media thickness (mm)	Case(n=50)	Control(n=50)		
<=0.8	7 (14.00%)	44 (88.00%)	51 (51.00%)	<.0001*
>0.8	43 (86.00%)	6 (12.00%)	49 (49.00%)	
Mean ± Stdev	0.91 ± 0.07	0.73 ± 0.08	0.82 ± 0.12	<.0001#
Median(IQR)	0.94(0.840 - 0.970)	0.71(0.680 - 0.780)	0.8(0.710 - 0.935)	
Carotid intima media thickness of right CCA (mm)				
Mean ± Stdev	0.92 ± 0.08	0.73 ± 0.08	0.82 ± 0.12	<.0001#
Median(IQR)	0.94(0.850 - 0.980)	0.71(0.680 - 0.780)	0.8(0.710 - 0.940)	
Carotid intima media thickness of left CCA (mm)				
Mean ± Stdev	0.91 ± 0.07	0.73 ± 0.08	0.82 ± 0.12	<.0001#
Median(IQR)	0.94(0.840 - 0.970)	0.71(0.680 - 0.780)	0.81(0.710 - 0.940)	

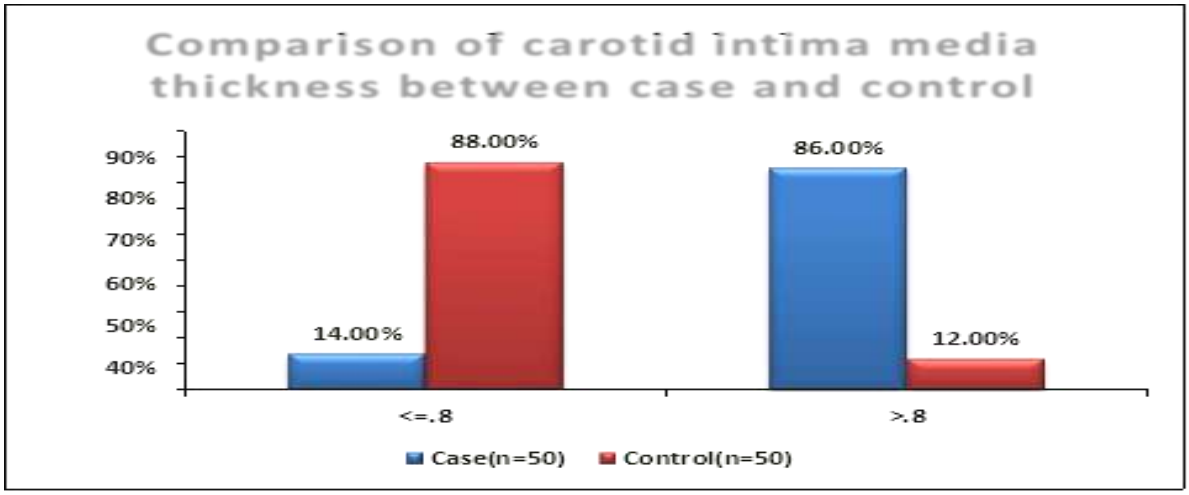


Figure 7:- Comparison of carotid intima media thickness between case and control.

Table 8:- Comparison of brachial artery diameter between case and control.

Brachial artery diameter(mm)	Case(n=50)		Control(n=50)		P value
	Mean ± Stdev	Median(IQR)	Mean ± Stdev	Median(IQR)	
	4.28 ± 0.09	4.3(4.200 - 4.300)	4.76 ± 0.09	4.8(4.700 - 4.800)	<.0001*

Figure 8:- Comparison of brachial artery diameter between case and control.

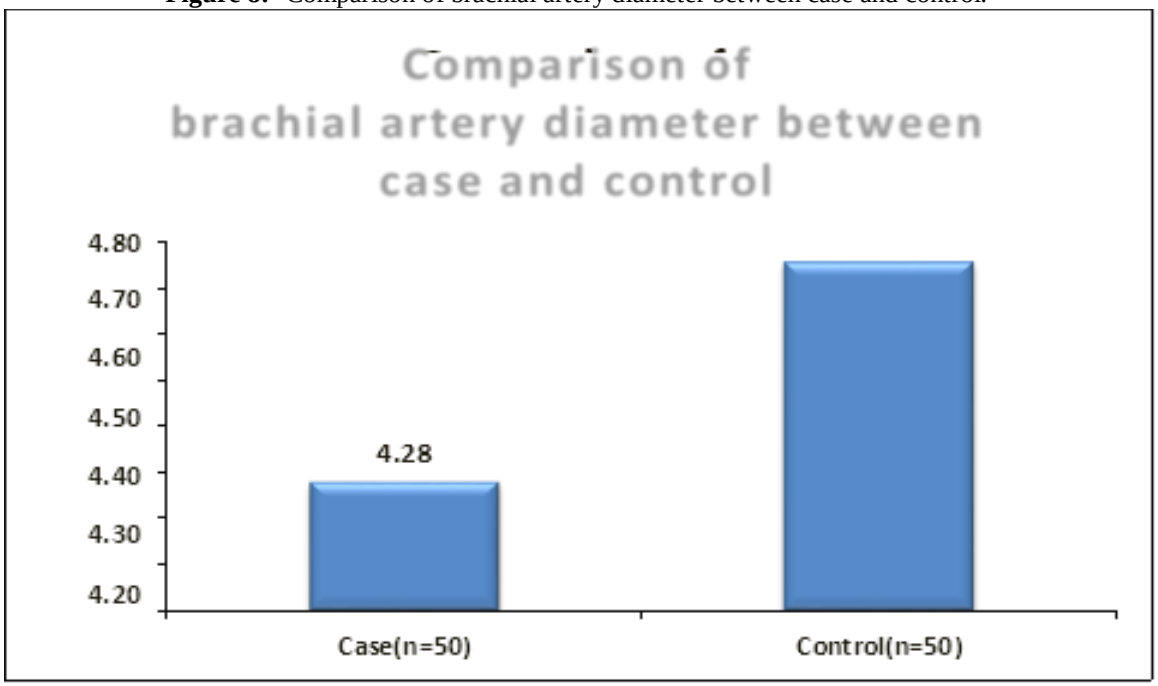


Table 9:- Comparison of flow mediated dilatation between case and control.

Flow mediated dilatation (%)	Group		Total	P value
	Case(n=50)	Control(n=50)		
<=11.3%	37 (74.00%)	3 (6.00%)	40 (40.00%)	<.0001*
>11.3%	13 (26.00%)	47 (94.00%)	60 (60.00%)	
Mean ± Stdev	9.64 ± 1.99	20.63 ± 3.78	15.14 ± 6.29	<.0001#
Median(IQR)	9.3(9.300 - 11.620)	20.83(19.140 - 22.910)	13.24(9.300 - 20.830)	
Flow mediated dilatation after inflaton of cuff(mm)				
Mean ± Stdev	4.7 ± 0.08	5.74 ± 0.17	5.22 ± 0.54	<.0001#
Median(IQR)	4.7(4.600 - 4.700)	5.8(5.700 - 5.800)	5(4.700 - 5.800)	
Flow mediated dilatation after sorbitrate(mm)				
Mean ± Stdev	5.2 ± 0.09	6.13 ± 0.08	5.66 ± 0.48	<.0001#
Median(IQR)	5.2(5.100 - 5.300)	6.2(6.100 - 6.200)	5.6(5.200 - 6.200)	

Figure 9:- Comparison of flow mediated dilatation between case and control.

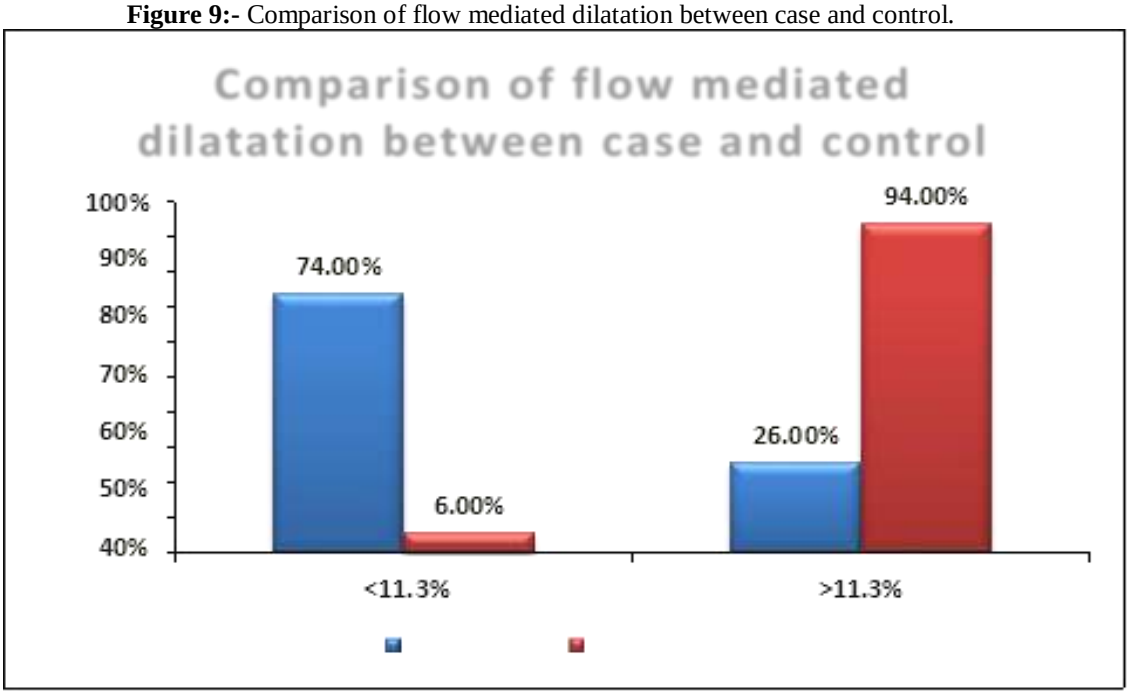


Figure 9.1:- Comparison of flow mediated dilatation between case and control.

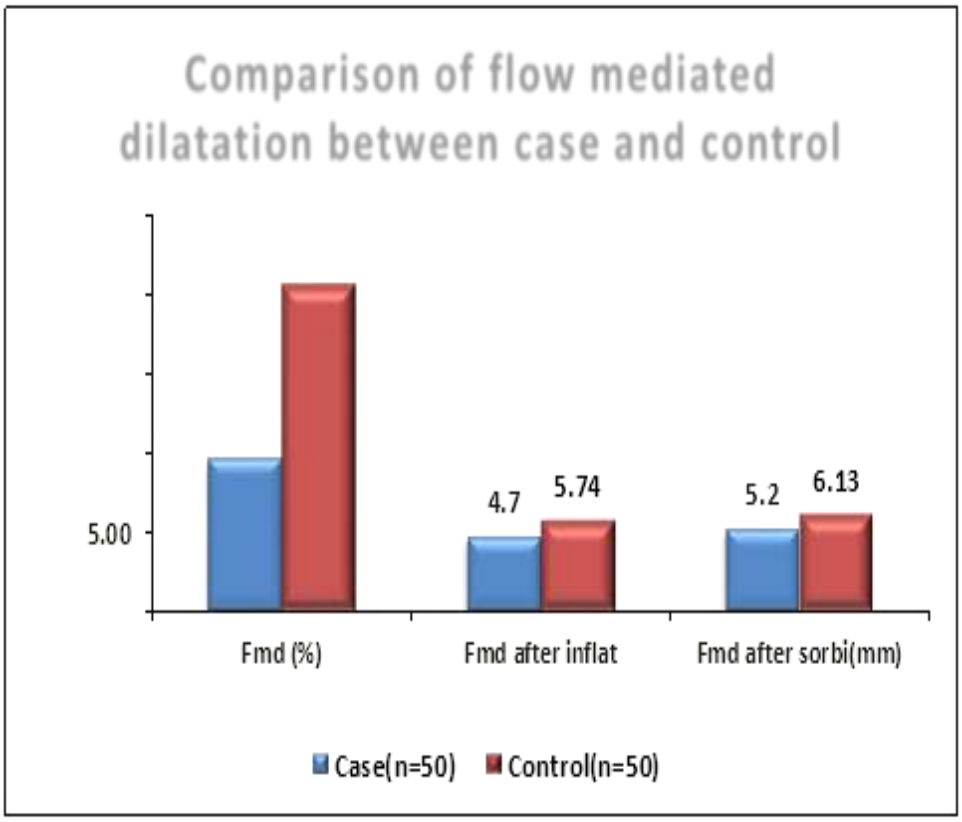


Table 10:- Comparison of ankle brachial pressure index between case and control.

Ankle brachial pressure index	Group		Total	P value
	Case(n=50)	Control(n=50)		
<0.9	38 (76.00%)	4 (8.00%)	42 (42.00%)	<.0001*
>=0.9	12 (24.00%)	46 (92.00%)	58 (58.00%)	
Mean ± Stdev	0.88 ± 0.05	1.03 ± 0.08	0.96 ± 0.1	<.0001#
Median(IQR)	0.88(0.850 - 0.890)	1.04(1 - 1.100)	0.95(0.875 - 1.040)	

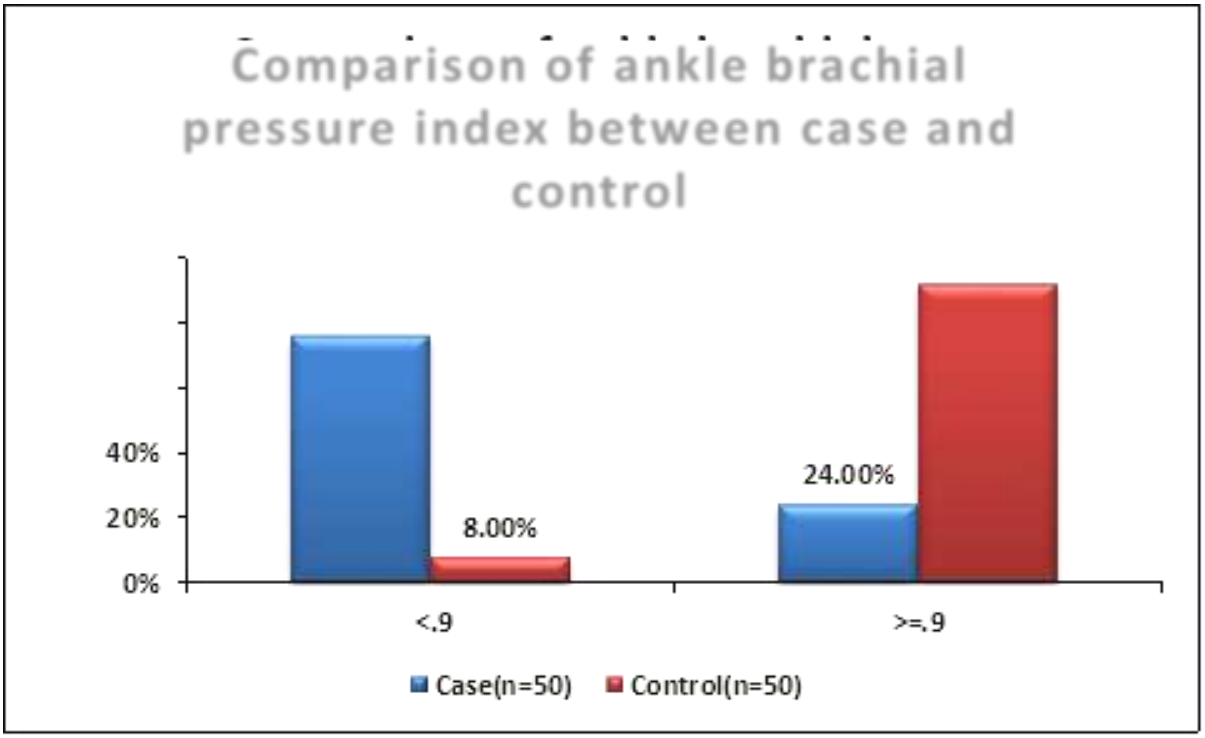


Figure 10:- Comparison of ankle brachial pressure index between case and contro.

Table 11:- Comparison of pulse pressure between case and control.

Pulse pressure (mmHg)	Group		Total	P value
	Case(n=50)	Control(n=50)		
<50	7 (14.00%)	47 (94.00%)	54 (54.00%)	<.0001*
>=50	43 (86.00%)	3 (6.00%)	46 (46.00%)	
Mean ± Stdev	54.98 ± 8.11	38.42 ± 5.66	46.7 ± 10.85	<.0001#
Median(IQR)	55(50 - 60)	40(35 - 40)	45(40 - 55)	

Figure 11:- Comparison of pulse pressure between case and control.

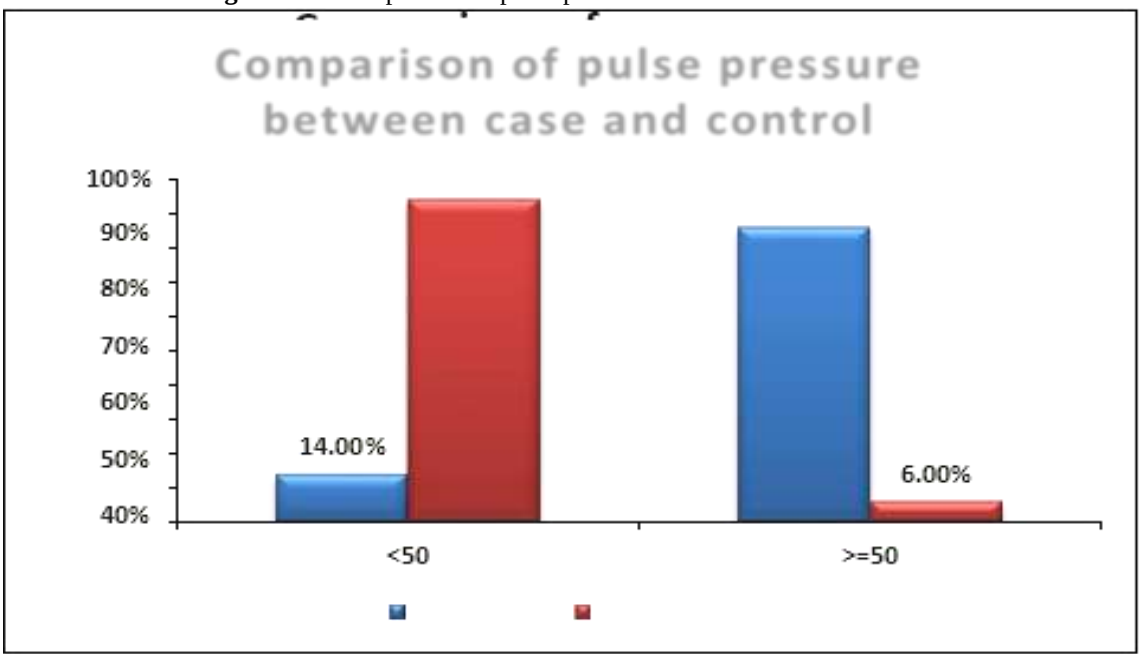


Table 18:- Correlation of pulse pressure, ABI, CIMT and FMD with framingham risk score in cases.

Correlation matrix		Framingham risk scor e
Ankle brachial pressure index	Correlation Coefficien t	-0.207
	P value	0.1679
	n	46
Average carotid intima media thickness of both CCA (mm)	Correlation Coefficien t	0.45
	P value	0.0017
	n	46
Carotid intima media thickness of left CCA (mm)	Correlation Coefficien t	0.456
	P value	0.0014
	n	46
Carotid intima media thickness of right CCA (mm)	Correlation Coefficien t	0.416
	P value	0.004
	n	46
Flow Mediated Dilatation after inflaton of cuff(m m)	Correlation Coefficien t	0.049
	P value	0.7473
	n	46
Flow Mediated Dilatation after sorbitrate (mm)	Correlation Coefficien t	0.139
	P value	0.3579
	n	46
Flow Mediated Dilatation (%)	Correlation Coefficien t	0.06
	P value	0.6945
	n	46
Pulse pressure (mmHg)	Correlation Coefficien t	0.19
	P value	0.2056
	n	46

Conclusion:-

Biophysical parameters were deranged in young post MI patients.Majority of our young male patients fell in low risk Framingham risk scorebut still they manifested with CAD. Despite 3 days of treatment amongyoung male patients of MI, various biophysical parameters were stillderanged

Strengths & What The Study Adds

Simple, non-invasive, cost effective investigation like FLOW MEDIATEDDILATATION, CAROTID INTIMA MEDIA THICKNESS, ANKLE BRACHIALPRESSURE INDEX AND PULSE PRESSURE may be taken as a predictor for riskstratification of myocardial infarction instead of classical risk factor.

Limitations

1. Relatively small sample size.
2. The study was conducted at one centre only
3. There was a short follow-up.
4. Radiological assessment was made by a single radiologist.

Implications

These biophysical parameters can be used for risk stratification among young patients of post myocardial infarction.

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