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RESEARCH ARTICLE

OUTCOME OF CORONARY ANGIOGRAMS AMONG RURAL POPULATION

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Coronary Artery Disease, Angiographic Profile, Acute Coronary Syndrome, CAD- Coronary Artery Disease, LAD- Left Anterior Descending Artery, LCX – Left Circumflex Artery, RCA- Right Coronary Artery

Abstract

Background: In India Coronary artery disease manifests almost a decade earlier than in western countries. This is a study to discuss the distribution of coronary angiograms among the patients admitted to cardiology department, Stanley Medical college.

Objective: This study examined the Coronary angiographic profile of men and women admitted with a diagnosis of coronary artery disease in in our hospital with special emphasis on non obstructive CAD.

Methods: The methodology used was single centre retrospective analysis.

Results: Among the case that underwent CAG in our hospital 8.7% come under 20 – 40 years; 64.5 % come under 40 – 60 years and 26.8% of cases are above 60 years. Females account for 35.8% and males account 64.2%. Among CSA patients, Non obstructive CAD make up 63% of the cases. Among UA/ NSTEMI, non obstructive CAD make up 42% of cases.

Conclusion: Normal coronaries although might appear as benign are not benign and could be responsible for CSA and ACS. Further testing must be done to prove the endothelium dysfunction or microvascular dysfunction in these subset of patients.

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Introduction:-

Worldwide, especially in India, there has been a rapid increase in the number of persons undergoing “coronary angiography” (CAG). The causes are multifactorial. The morbidity of CAD is a severe strain to the patient.

Cardiovascular diseases (CVDs) and its associated complications alone accounts for approximately 12 million deaths annually in the Indian subcontinent. As per the statistics of the World Health Organization in 2014, 26% of total mortality in India is contributed by CVD. Mortality due to coronary artery disease (CAD) is higher in South India. Studies carried out in India, and other places suggest that Asians in general and Indians, in particular, are at an increased risk of myocardial infarction (MI) at a younger age (<40 years). Epidemiologic data collected through various studies also suggested that risk factors may be different in young as compared to older patients, and the clinical presentation of coronary heart disease (CHD) may also vary in these populations. Acute coronary syndrome (ACS) is less frequent in adult younger than 40 years of age than in elderly adults but is increasing clinical interest in young adults because of the potential of premature death and long-term disability. In contrast to developed countries, where mortality from CHD is rapidly declining, it is increasing in developing countries. This increase is driven by industrialization, urbanization, and related lifestyle changes and is called epidemiological transition. This transition affected the developed world, including countries of Europe and North America, in the early 20th century and spread to developing countries 50 years later.

Obstructive CAD producing symptoms is well known and a number of studies have been done to prove this. Non obstructive CAD has generally been considered to be benign and the studies based on non obstructive CAD is far fetched. Normal angiography in patients with chest pain is five times more common in women than in men. Among patients with chest pain and normal angiography, an unknown number are suffering from cardiac pain of ischemic origin.

In this study we plan to discuss the results of CAGs done in GSH with special emphasis on non obstructive CAD.

Aim :

Our objective was to study the prevalence and pattern of CAD in patients undergoing CAG from January 2018 to December 2018.

Methodology:-

The data of patients suspected to have CAD and underwent CAG over a period of 1 year from January 2018 to December 2018. The discharge summaries, coronary angiograms and angiogram reports were studied to get information about angiographic profiles. They were classified based on gender and age.

In this study, obstructive CAD was defined as at least 50% stenosis of luminal diameter of LMCA or at least 70% stenosis of luminal diameter of at least one of the major epicardial coronary arteries.

Non-significant lesion was defined as less than 50% stenosis of left main coronary artery and less than 70% of epicardial artery. Depending on the number of major epicardial arteries involved, they are classified as SVD, DVD and TVD. Normal coronaries include myocardial bridging and slow flow. The prevalence and pattern of CAD in these patients were analysed.

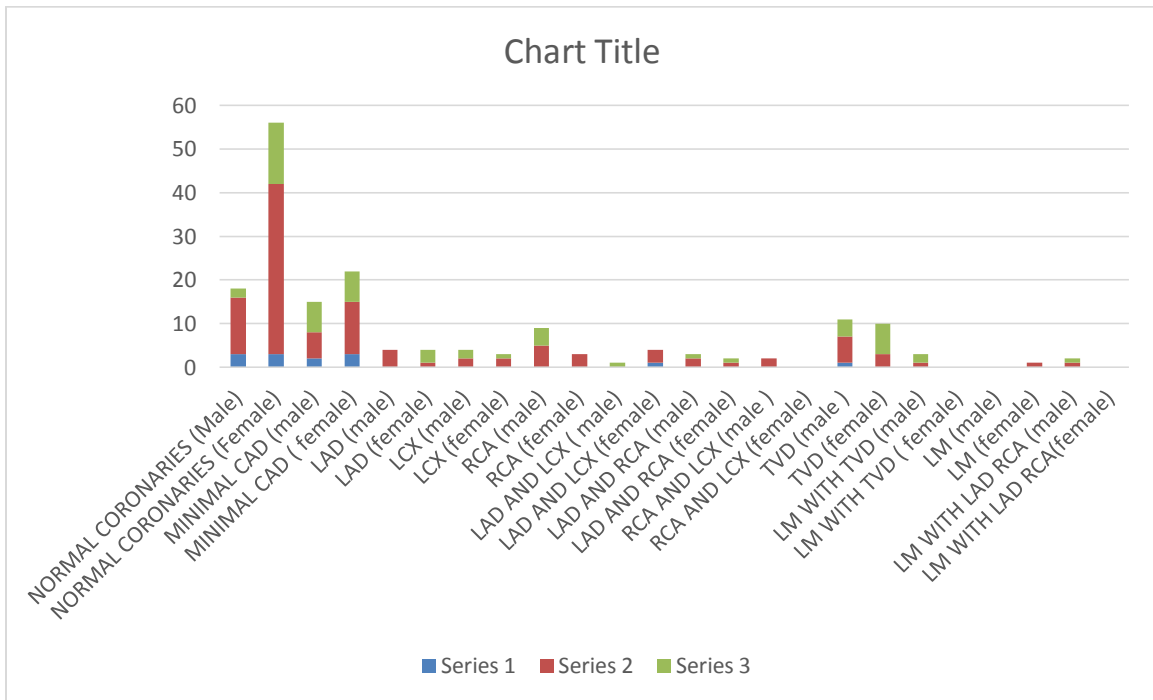
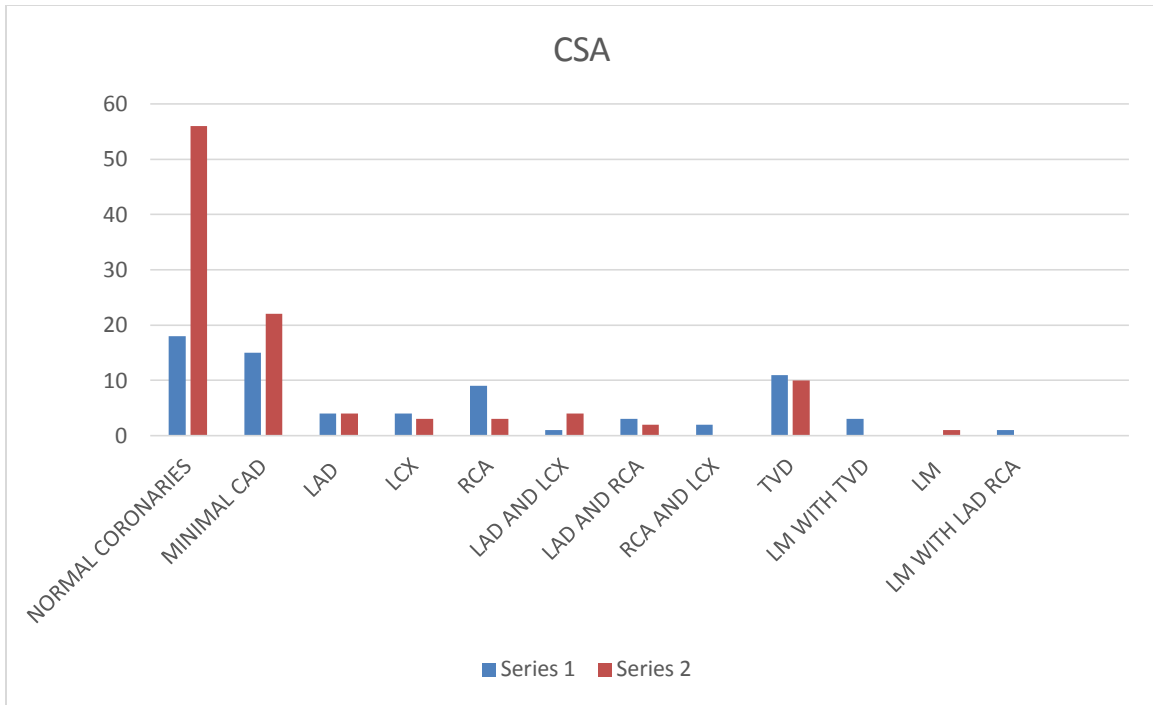
Results:-

Chronic Stable Angina:

Totally 176 csa were admitted in the last 1 year.

	MALE	FEMALE	TOTAL
NORMAL CORONARIES	18 (3,13,2)	56 (3, 39, 14)	74
MINIMAL CAD	15 (2,6,7)	22(3,12,7)	37
LAD	4(0,4,0)	4(0,2,2)	8
LCX	4(0,2,2)	3 (0,2,1)	7
RCA	9(0,5,4)	3(0,3,0)	12
LAD AND LCX	1 (0,0,1)	4 (1,3,0)	5
LAD AND RCA	3 (0,2,1)	2 (0,1,1)	5
RCA AND LCX	2 (0,2,0)	0	2
TVD	11(1,6,4)	10 (0,3,7)	21
LM WITH TVD	3 (0,1,2)	0	3
LM	0	1 (0,1,0)	1
LM WITH LAD RCA	1 (0,1,0)	0	1
TOTAL	71(6,42,23)	105 (7,66,32)	176(13,108,55)

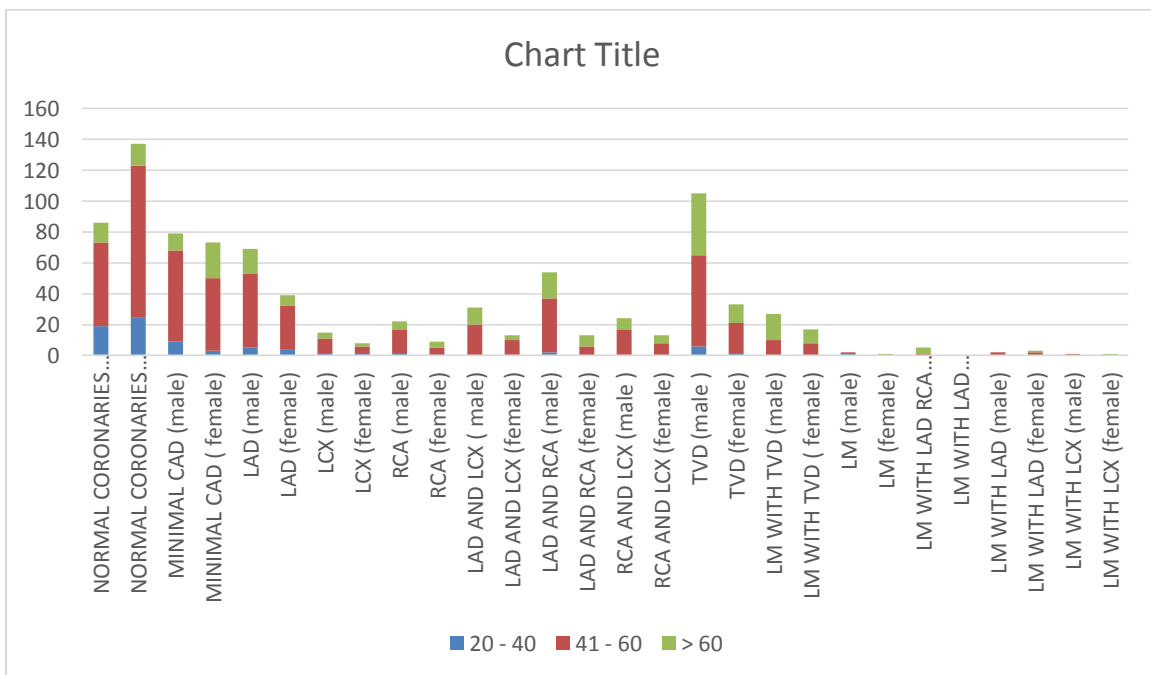
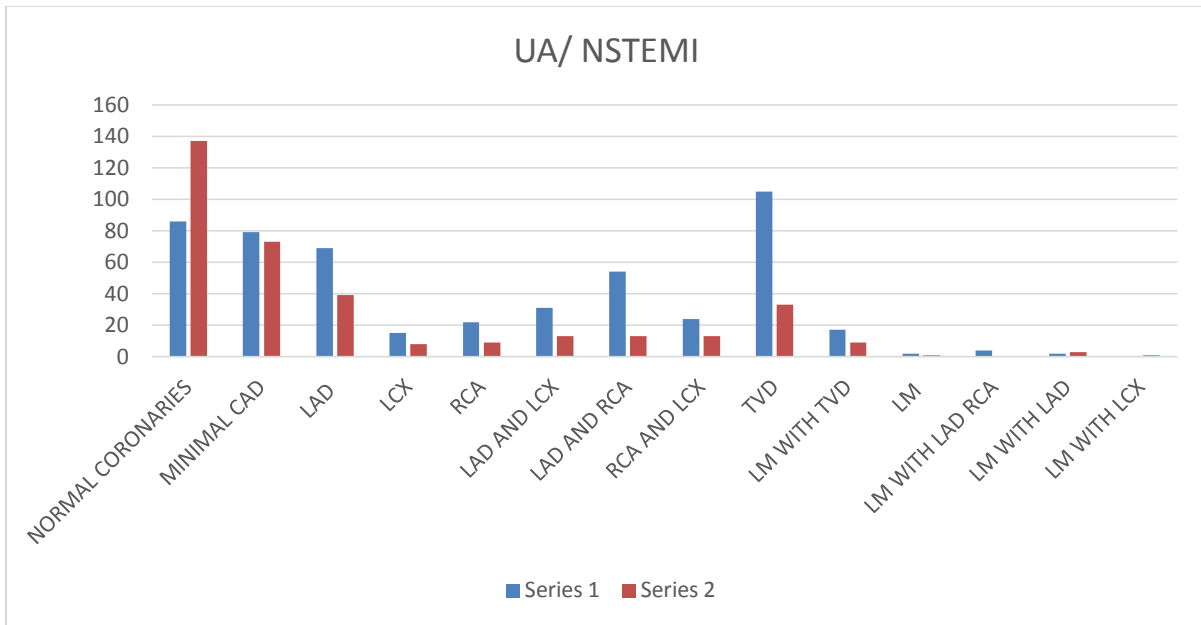
Minimal CAD cases make up 21% of the cases (males 41% females 59%). Among the age distribution, age group of 20 – 40 years had 14% (males 40%, females 60%); 40- 60 years had 49% (males 33% females 67%) and more than 60 years make up 37% (males 50% females 50%).



UA / NSTEMI :There are 882 UA /NSTEMI cases.

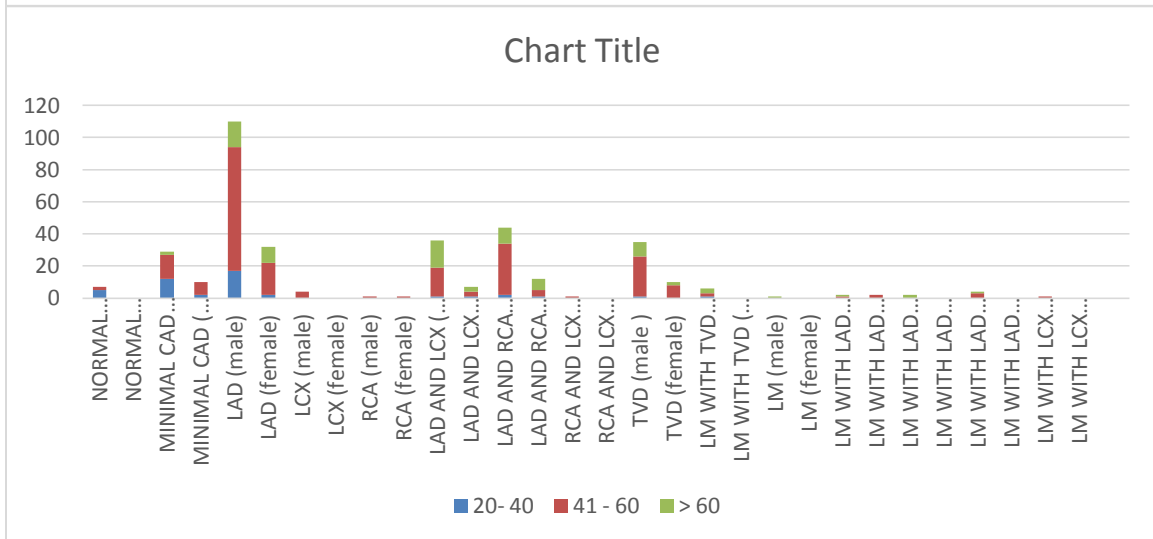
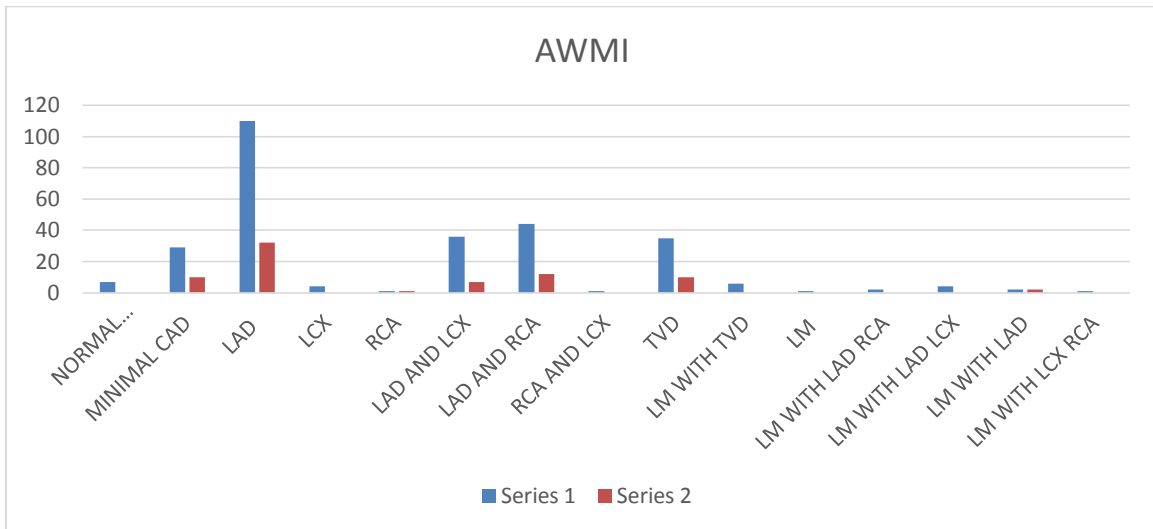
	MALE	FEMALE	TOTAL
NORMAL CORONARIES	86(19,54,13)	137 (25,98,14)	223
MINIMAL CAD	79 (9,59,11)	73 (3,47,23)	152
LAD	69 (5,48,16)	39 (4,28,7)	108
LCX	15 (1,10,4)	8 (1,5,2)	23
RCA	22 (1,16,5)	9 (0,5,4)	31

LAD AND LCX	31 (0,20,11)	13 (0,10,3)	44
LAD AND RCA	54 (2,35,17)	13 (0,6,7)	67
RCA AND LCX	24 (0,17,7)	13 (0,8,5)	37
TVD	105 (6,59,40)	33 (1,20,12)	138
LM WITH TVD	27 (0,10,17)	17 (0,8,9)	44
LM	2 (1,1,0)	1 (0,0,1)	3
LM WITH LAD RCA	5 (0,1,4)	0	5
LM WITH LAD	2(0,2,0)	3 (0,2,1)	5
LM WITH LCX	1 (0,1,0)	1 (0,0,1)	2
	522(44, 333,145)	360(34,237,24)	882(78, 570,169)



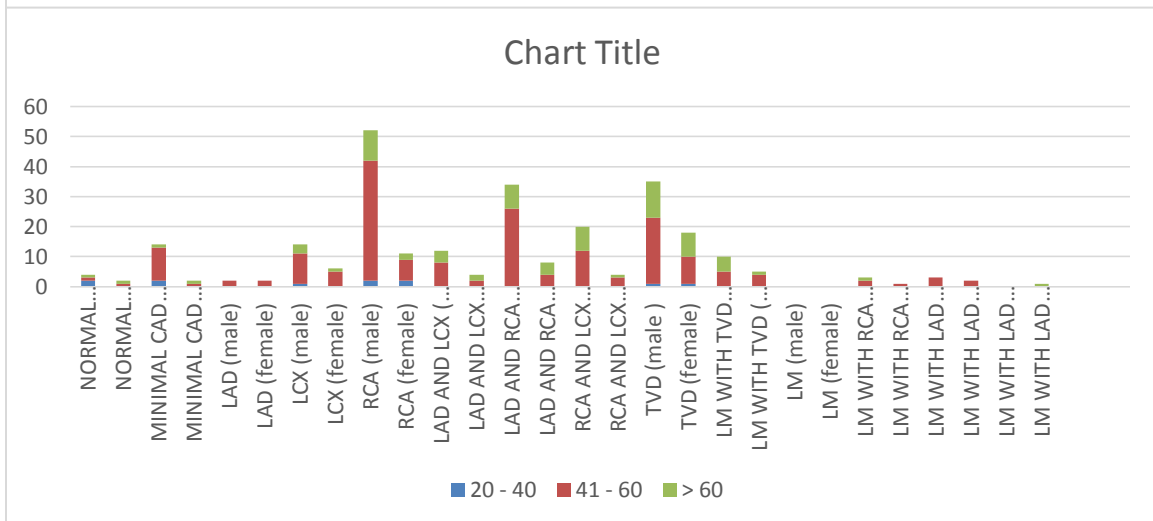
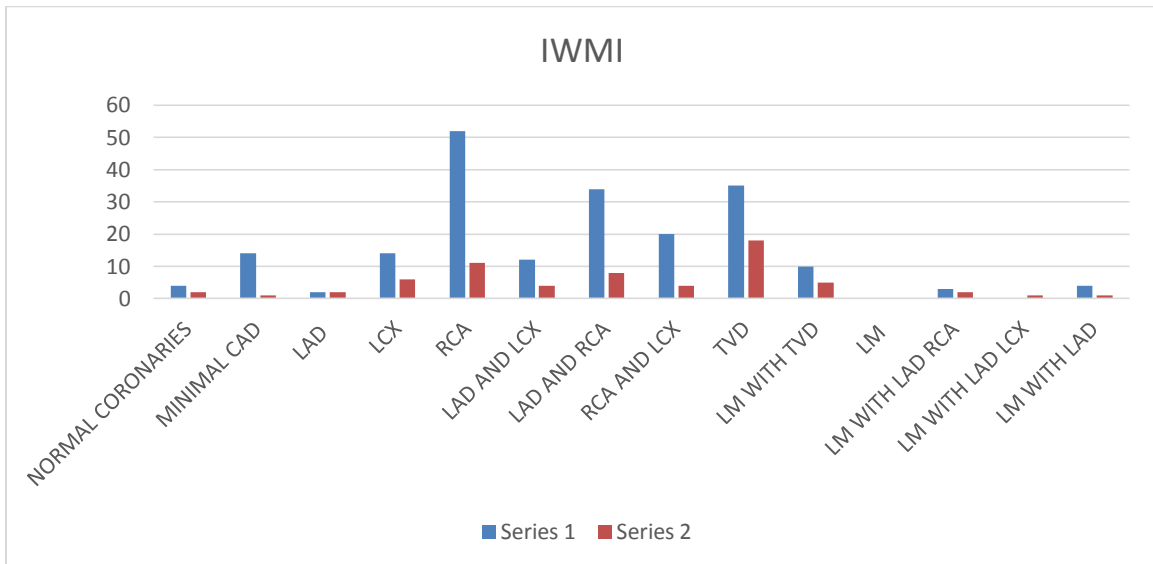
Awmi:- There are 357 cases.

	MALE	FEMALE	TOTAL
NORMAL CORONARIES	7 (5,2,0)	0	7
MINIMAL CAD	29 (12,15,2)	10 (2,8,0)	39
LAD	110 (17,77,16)	32 (2,20,10)	142
LCX	4 (0,4,0)	0	4
RCA	1 (0,1,0)	1 (0,1,0)	2
LAD AND LCX	36(1,18,17)	7 (1,3,3)	43
LAD AND RCA	44 (2,32,10)	12(1,4,7)	56
RCA AND LCX	1 (0,1,0)	0	1
TVD	35 (1,25,9)	10 (0,8,2)	45
LM WITH TVD	6 (1,2,3)	0	6
LM	1 (0,0,1)	0	1
LM WITH LAD RCA	2 (0,0,2)	0	2
LM WITH LAD LCX	4 (0,3,1)	0	4
LM WITH LAD	2 (0, 1, 1)	2 (0,2,0)	4
LM WITH LCX RCA	1 (0,1,0)	0	1
	283(39,182,62)	74(6,46,22)	357(45, 228, 84)

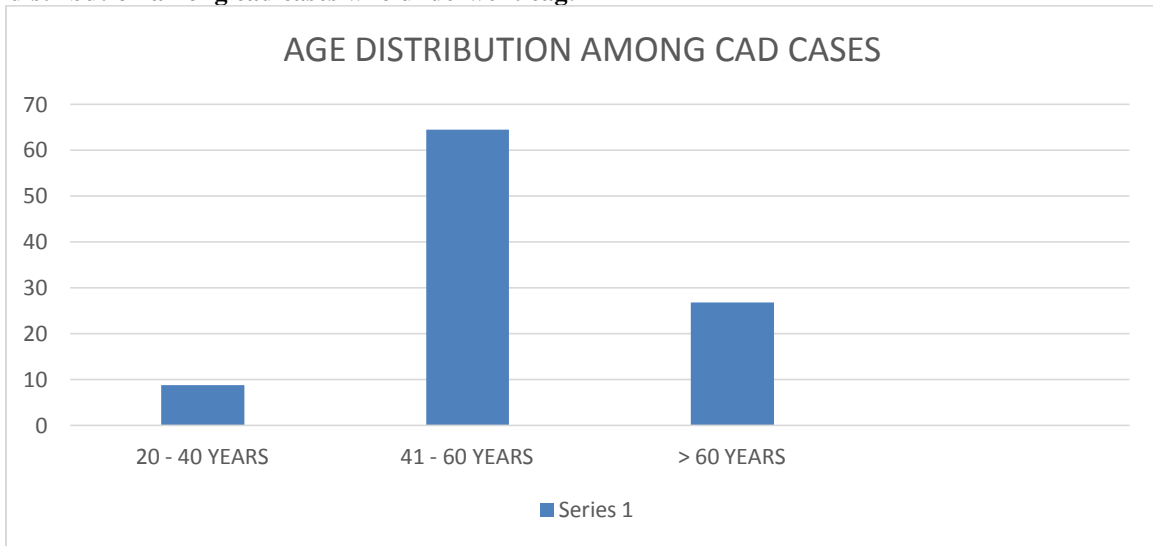


Iwmi :- There are 269 cases.

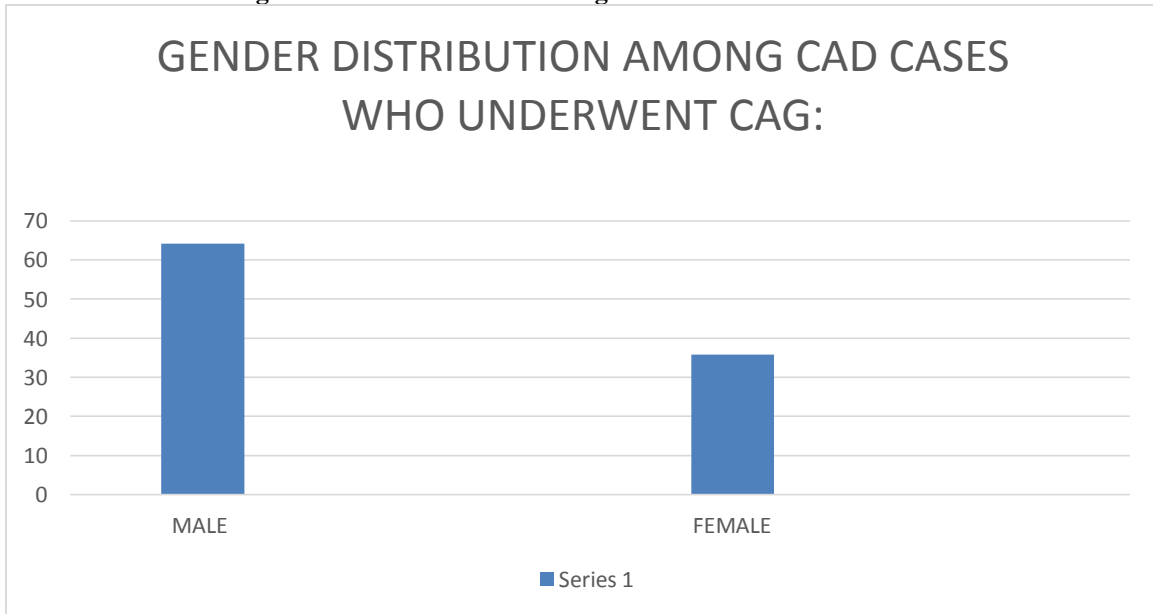
	MALE	FEMALE	TOTAL
NORMAL CORONARIES	4 (2,1,1)	2 (0,1,1)	6
MINIMAL CAD	14 (2,11,1)	1 (0,1,0)	15
LAD	2 (0,2,0)	2 (0,2,0)	4
LCX	14 (1,10,3)	6 (0,5,1)	20
RCA	52 (2,40,10)	11(2,7,2)	63
LAD AND LCX	12 (0,8,4)	4 (0,2,2)	14
LAD AND RCA	34 (0,26, 8)	8 (0,4,4)	42
RCA AND LCX	20 (0,12,8)	4 (0,3,1)	24
TVD	35 (1,22,12)	18(1,9,8)	53
LM WITH TVD	10 (0,5,5)	5 (0,4,1)	15
LM	0	0	0
LM WITH LAD RCA	3 (0,3,0)	2 (0,2,0)	5
LM WITH LAD LCX	0	1(0,0,1)	1
LM WITH LAD	4 (0,1,3)	1(0,0,1)	5
	204 (8,141,55)	65(3,40,22)	269(11, 181, 77)



Age distribution among cad cases who underwent cag:



Gender distribution among cad cases who underwent cag:



Discussion:-

A total of 1684 patients with a diagnosis of CAD underwent angiogram from January 2019 to December 2019.

Csa :

CSA patients make up around 10% of the total patients. Females make up around 60% of the CSA population with 32 % of them having normal epicardial coronaries. 5% of females have TVD. Normal coronaries make up 42% of the coronary artery distribution. Minimal CAD cases make up 21% (males 40%, females 60%). TVD make up 12% among CSA cases with almost equal distribution among makes and females. Normal coronaries make up 42% of the total CSA cases (males 24%, females 76%).

Patients between the age group of 40 – 60 years make up majority of the cases among both the males and females. They make up 61 % of the study population. Among the normal coronaries 70% of the population are between 40 – 60 years of age with female comprising more than half. Among the TVD cases males between 40 – 60 years comprise more than 50% of cases and among females 70% are above 60 years of age.

Ua / nstemi :

UA / NSTEMI cases make up 52% of all the patients undergoing angiogram. Among the UA / NSTEMI cases patients with normal coronaries make up around 25% of the cases with more females (61%) than males (39%). Patients with TVD make up 16% of unstable angina case with male constituting the majority (76%). Patients with LM and TVD show form 5% of UA and NSTEMI cases with males being the majority (61%). Minimal CAD makes up 17% of UA cases with an almost equal distribution between male and females. Among single vessel diseases LAD was predominantly involved (12%) with males making up 64% and females 36%. Among the DVDs LAD and RCA is most frequently involved with 7.6% with males being involved the most (54%).

Among the UA/NSTEMI cases, age group between 40 – 60% make up 65% of the total cases with males making up 58% and females comprising 42%. Among normal coronaries, people between the age group of 40 – 60% comprise 68% with males comprising 44% and females 56%. People between the age group of 20 to 40 years comprise 20% of the total cases and people among the > 60 years comprise 12%. Among minimal CAD cases, people between the age group of 40 – 60% comprise 70% with males comprising 56% and females 44%. People between the age group of 20 to 40 years comprise 8% of the total cases and people among the > 60 years comprise 22%. Among SVD of LAD cases, people between the age group of 40 – 60% comprise 70% with males comprising 63% and females 37%. People between the age group of 20 to 40 years comprise 8% of the total cases and people among the > 60 years comprise 22%. Among DVD OF LAD AND LCX cases, people between the age group of 40 – 60% comprise 68% with males comprising 67% and females 33%. People among the > 60 years comprise 32%. Among DVD of LAD AND RCA cases, people between the age group of 40 – 60% comprise 61 % (males 81% and females 19%). People between the age group of 20 to 40 years comprise 4% of the total cases and people among the > 60 years comprise 35%. Among TVD cases, people between the age group of 40 – 60% comprise 57% (males 75% and females 27%). People between the age group of 20 to 40 years comprise 5% (males 86% females 14%) of the total cases and people among the > 60 years comprise 38% (males 77% females 23%). Among LM with TVD cases, people between the age group of 40 – 60% comprise 41% (males 56% and females 44 %). People among > 60 years comprise 59 % (males 65% females 35%).

Awmi:

There are totally 357 acute AWMI patients who were subjected to coronary angiogram. Among them 283 (79%) were males and 21 percent were females. Among them LAD was recanalized in 46 patients (normal and minimal CAD) 12% of AWMI patients. SVD of LAD constituted 40% with males comprising 110 (77%) of the 142 people. DVD of LAD and LCX comprise 12% with a predominance of males. DVD of LAD and RCA constitute 56% with a predominant male population. TVD comprise 45 patients (13%) with a predominant male (78%) population.

Patients between the ages of 40 – 60 years are predominant making up 64% (males 80%, females 20%); Age group of 20 – 40 make up 13% (males 87% females 15%) and > 60 years group make up 23% (males 74% females 26%). Among the SVD OF LAD, people between the age group of 40 – 60% comprise 68% (males 79% and females 21%); Patients among 20 – 40 years of age make up 13% (males 90% females 10%) and > 60 years make up 19% (males 62% females 38%). Among the DVD OF LAD and LCX, people between the age group of 40 – 60% comprise 49 % (males 86% and females 14%); Patients among 20 – 40 years of age make up 5% (males 50% females 50%) and > 60 years make up 46 % (males 85 % females 15 %). Among the DVD OF LAD and RCA, people between the age group of 40 – 60% comprise 64% (males 89 % and females 11 %); Patients among 20 – 40 years of age make up 5% (males 67% females 33%) and > 60 years make up 31 % (males 59 % females 41%). Among the TVD cases, people between the age group of 40 – 60% comprise 73 % (males 76% and females 24 %); Patients among 20 – 40 years of age make up 3% (males 100 %) and > 60 years make up 24 % (males 82% females 18%).

Iwmi :

269 patients with acute IWMI underwent CAG last year. Majority were male making up 76% of the population. SVD of RCA was the most frequent (23%) outcome of the angiogram with males (83%) forming the majority. TVD make up 20% of the angio report among IWMI cases with males forming 66%. DVD of LAD and RCA form 16% with again a masculine majority. Recanalized vessel was seen in 8% of IWMI patients. SVD of LCX was seen in 7.4% of IWMI patients with again a majority of males (70%). LM with TVD was seen 15 cases (5.5%) with again a masculine majority (67%).

Patients between the ages of 40 – 60 years are predominant making up 67% (males 78%, females 22%); Age group of 20 – 40 make up 4 % (males 72 % females 28%) and > 60 years group make up 29 % (males 71 % females 29 %). Among the SVD OF RCA, people between the age group of 40 – 60 years comprise 75 % (males 85 % and females 15 %); Patients among 20 – 40 years of age make up 6 % (males 50 % females 50 %) and > 60 years make up 19 % (males 83 % females 17%). Among the SVD OF LCX, people between the age group of 40 – 60 years comprise 75 % (males 67 % and females 33 %); Patients among 20 – 40 years of age make up 5 % (males 100 %) and > 60 years make up 20 % (males 75 % females 25 %). Among the DVD OF LAD and RCA, people between the age group of 40 – 60 years comprise 71 % (males 87 % and females 13 %); Patients among > 60 years make up 29 % (males 67 % females 33 %). Among the DVD OF RCA and LCX, people between the age group of 40 – 60 years comprise 63 % (males 80 % and females 20 %); Patients among > 60 years make up 37 % (males 89 % females 11%). Among the TVD cases people between the age group of 40 – 60 years comprise 58 % (males 71 % and females 29 %); Patients among 20 – 40 years of age make up 4 % (males 50 % females 50 %) and > 60 years make up 38 % (males 60 % females 40 %). Among the LM with TVD, people between the age group of 40 – 60 years comprise 60 % (males 56% and females 44 %); Patients > 60 years make up 40 % (males 83 % females 17 %).

So, among all cases 8.7% come under 20 – 40 years; 64.5 % come under 40 – 60 years and 26.8% of cases are above 60 years. This is in stark contrast to the western population where the most number of ischemic heart disease patients were more than 75 years of age. Females account for 35.8% and males account 64.2%.

Among CSA patients, non obstructive CAD make up 63% of the total CSA with females making the predominant contribution (males 30% females 70%). The predominant age group was between 40 – 60 years which contributed to 63% (males 27% females 73 %)

Among UA/ NSTEMI, non obstructive CAD make up 42% of cases (males 44% females 56%). The predominant age group was between 40 – 60 years which contributed to 69 % (males 44 % females 56 %)

The reason for this could be microcirculation abnormalities in the regulation of coronary blood flow. The pathophysiological explanations of the disease process could be.

Vascular dysfunction:

Abnormality of both endothelium-dependent and independent vasodilatation due to early atheroma could be a cause of vascular dysfunction.

A normally functioning vascular endothelium is required for appropriate dilatation of arteries during exercise. Endothelial dysfunction could lead to increased vasoconstriction to stimuli because of impairment of endothelium mediated vasodilatation

“Occult” atherosclerosis:

Acute coronary syndromes often result from disruption of modestly stenotic plaques, not detectable by angiography, but only by intravascular ultrasound. Plaque rupture and erosion often leads to thrombotic complications, or occasionally plaques may rupture and debris may be washed downstream, leading to peripheral coronary microembolization often associated with rhythm abnormalities. Disturbed microvascular integrity could therefore be due to “hidden” epicardial atherosclerosis and its complications.

Endothelial function testing could be of some benefit to these patients.

Conclusion:-

Normal coronaries although might appear as benign are not benign and could be responsible for CSA and ACS. Further testing must be done to prove the endothelium dysfunction or microvascular dysfunction in these subset of patients.

More trials and research have to be done to bring out the exact mechanism and pathophysiology of CSA and ACS among non obstructive CAD.