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Original article:

Lipoprotein (a): A marker for cardio vascular disease and target for emerging therapies

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ABSTRACT:

Background : Lipoprotein(a) [Lp(a)] is identical to low-density lipoprotein(LDL) except for the addition of apolipoprotein A (apoA),which is highly glycosylated[1]Thus, Lp(a) may play an important role in the transition fromatherosclerosis to thrombosis, because it activates monocyte adhesion and migration of macrophage foam cells intothe arterial wall.[2]Lp(a) is often considered a marker ofthrombosis

Aims: To studyLipoprotein (a) as a marker for cardio vascular disease and target for emerging therapies

Objective: To study variation in Plasma Lp(a) levelsin patients with CHD.and association between Plasma Lp(a) levels and risk for CHD)

Results: The mean Total Cholesterol, HDL, LDL, VLDL and Triglycerides were 243.0± 91.3, 59.5±17.6, 155.0±20.9, 47.8±9.7 and 298.3 ±55.2 mg/dl, respectively. The mean serum Fibrinogen, Homocysteine, Lp(a) and Uric acid levels of the patients were 625.9±82.1 mg/dl, 65.0±19.7mmol/L, 6.7±1.4mg/dl and 10.2±2.5mg/dl, respectively.

Conclusion: Lp(a) is a marker of particular risk for poor outcomes in terms of severity and progression of CVD

INTRODUCTION:

Lipoprotein(a) [Lp(a)] is identical to low-density lipoprotein(LDL) except for the addition of apolipoprotein A (apoA),which is highly glycosylated. There is a striking homologybetween the amino acid sequences of apoA and plasminogen, which is recognized to be a cardiovascular risk factor.[1]Thus, Lp(a) may play an important role in the transition fromatherosclerosis to thrombosis, because it activates monocyte adhesion and migration of macrophage foam cells intothe arterial wall.[2]Lp(a) is often considered a marker ofthrombosis.[3]Cardiovascular disease (CVD) is a major cause of deathin patients with peripheral arterial disease (PAD). Thesepatients also tend to suffer from complications whenthey have diabetes, dyslipidemia and hypertension. Theymay also develop severe systemic atherosclerosis, leading to increased mortality due to coronary artery disease(CAD).High Lp(a) is positively associated with coronary arterycalcification, CAD and PAD.[4,5]It also promotes thrombosis by binding to fibrin, thus blocking the fibrinolytic action ofplasmin.[2]Strong evidence in epidemiological, genetic, and prospective cohort studies verified that circulating Lp(a) levels were associated with the presence of cardiovascular disease (CVD) [6-8]. In the Atherothrombosis Intervention in Metabolic Syndrome with Low HDL/High Triglycerides: Impact on Global Health Outcomes (AIM-HIGH) study, Lp(a) was also associated with increased cardiovascular event (CVE) risk in patients with established CVD and remains predictive for CVE risk at LDL cholesterol (LDL-C) levels ,1.8 mmol/L[9].Lp(a) may be a predictor of

peripheral and centralCVD in younger men and women with dyslipidemia.Several observations suggest that targeting Lp(a) coulddecrease total residual cardiovascular risk, as increased plasma Lp(a) concentrations are significantly associated with higher risk of CAD.[10]Lp(a) is a marker of particular risk for poor outcomes interms of severity and progression of CVD. Several prospective studies have correlated Lp(a) levels with vasculardisease in general, and plasma Lp(a) >30 mg/dl with increased cardiovascular risk.[4]

AIM & OBJECTIVES:

Aim: To studyLipoprotein (a) as a marker for cardio vascular disease and target for emerging therapies

Objective:

1. To study variation in Plasma Lp(a) levelsin patients with CHD.
2. To study association between Plasma Lp(a) levels and risk for CHD.

MATERIAL AND METHODS:

Study design: Analytical cross sectional

Study population: Patients diagnosed with Coronary Artery Disease (CAD) attending

Study period:2 years

Sample size: Considering prevalence of CAD as 10%[11], the calculated sample at 99% confidence level is 139 which is rounded off to 150.

Ethical clearance: The study will be initiated after approval of Institutional Ethical committee.

Selection criteria: Patients diagnosed with Coronary Artery Disease (CAD) attending **noor hospital** will be subjected to the following inclusion and exclusion criteria.

Inclusion criteria:

1. Patients diagnosed with Coronary Artery Disease (CAD) attending **NOOR HOSPITAL**
2. Patients of age 18 years or above of either gender.
3. Patients willing to give written informed consent to participate in the study.

Exclusion criteria:

1. Patients not willing to participate in the study.

   Patients who will satisfy the above inclusion and exclusion criteria will be included in the study. Written informed consent will be taken in all patients.

Study procedure:

After taking consent, patient's demographic data will be collected. Data regarding the following variables will be collected:

1. Patients' sociodemographic characteristics will be collected based on their clinical records.
2. Their clinical,anthropometric, biochemical and cardiovascular characteristics will also be analyzed and recorded.
3. Cardiovascular risk will be calculated based on the Framingham risk score(FRS)

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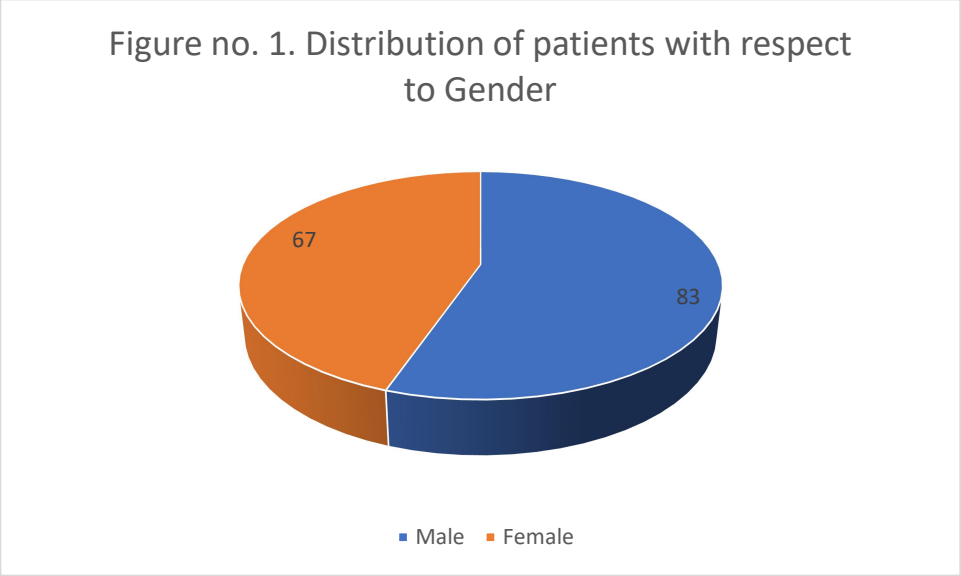
RESULTS:

Hundred and fifty patients were included in the study.

Table no. 1. Distribution of patients with respect to Gender		
Gender	Frequency	Percent
Male	83	55.3
Female	67	44.7
Total	150	100.0



Of these, 83 (55.3) were males, while 67 (44.7%) were females.

Table no. 2. Distribution of patients with respect to Comorbidities		
	Frequency	Percent
Hypertension	58	31.7
Diabetes	60	32.8
Obesity	2	1.1
Hypothyroid	29	15.8
Obesity	34	18.6
Total	183	100

The common Comorbidities of the patients were Diabetes (60, 32.8%), Hypertension (58, 31.7%), Obesity (34, 18.6%) and hypothyroidism (29, 15.8%).

Table no. 3. Distribution of patients with respect to ExSmoker Status		
ExSmoker Status	Frequency	Percent
No	120	80.0
Yes	30	20.0
Total	150	100.0

30 patients (20%) were Exsmokers.

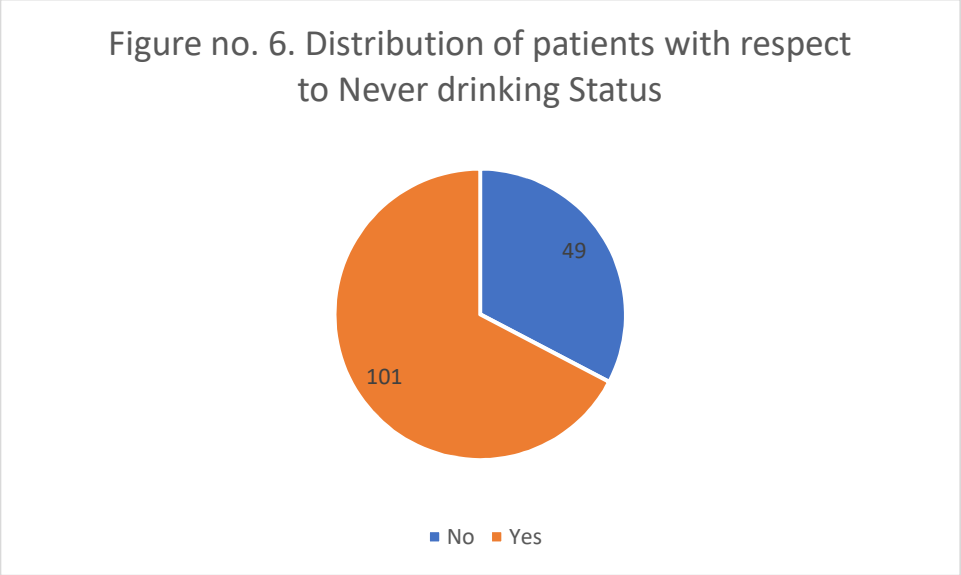
Table no. 4. Distribution of patients with respect to Never-Smoker Status		
Never-Smoker Status	Frequency	Percent
No	49	32.7
Yes	101	67.3
Total	150	100.0

101 (67.3%) patients had history of Never-smoker status.

Table no. 5. Distribution of patients with respect to Current-Smoker Status		
Current-Smoker Status	Frequency	Percent
No	130	86.7
Yes	20	13.3
Total	150	100.0

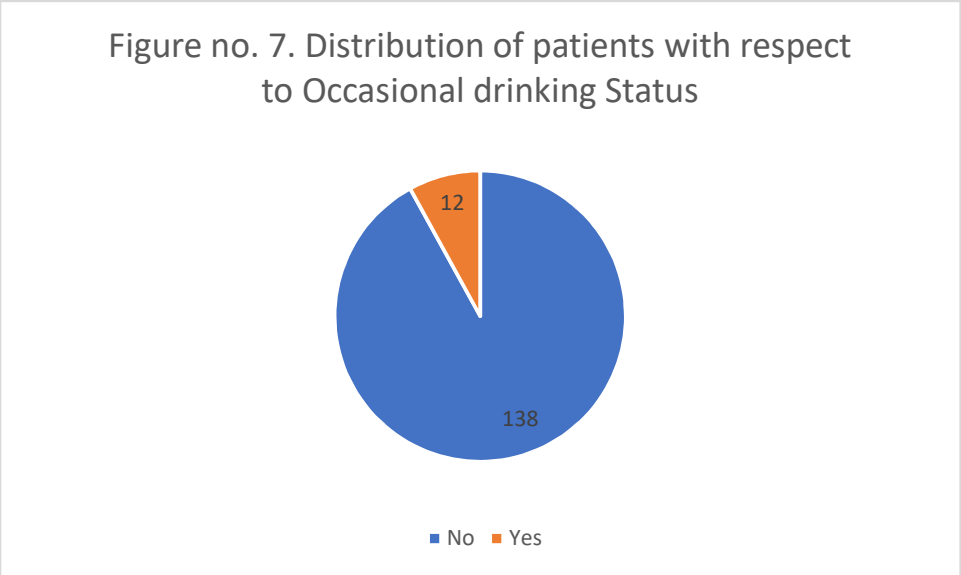
20 (13.3%) were current smokers.

Table no. 6. Distribution of patients with respect to Never drinking Status		
Never drinking Status	Frequency	Percent
No	49	32.7
Yes	101	67.3
Total	150	100.0



101 (67.3%) patients had history of Never drinking status.

Table no. 7. Distribution of patients with respect to Occasional drinking Status		
Occasional drinking Status	Frequency	Percent
No	138	92.0
Yes	12	8.0
Total	150	100.0

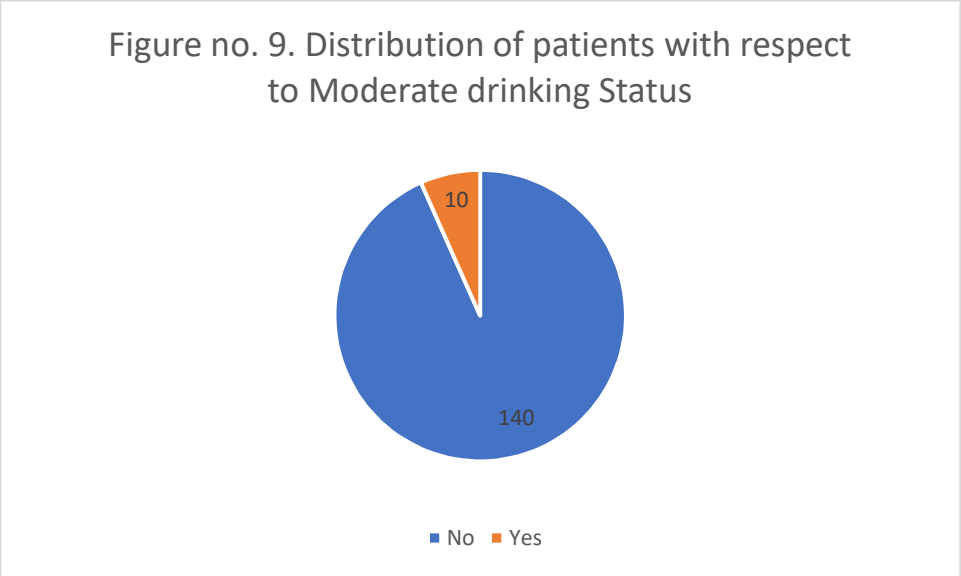


12 (8%) patients had history of Occasional drinking.

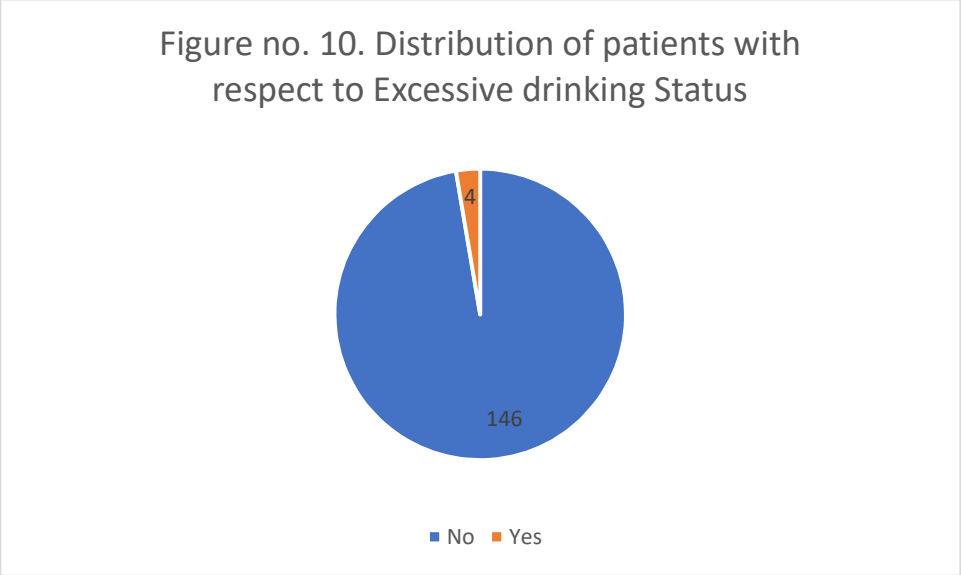
Table no. 8. Distribution of patients with respect to Regular drinking Status		
Regular drinking Status	Frequency	Percent
No	143	95.3
Yes	7	4.7
Total	150	100.0

7 (4.7%) had history of Regular drinking status.

Table no. 9. Distribution of patients with respect to Moderate drinking Status		
Current-Smoker Status	Frequency	Percent
No	140	93.3
Yes	10	6.7
Total	150	100.0



10 (6.7%) patients were Current Smoker.



4 (2.7) patients had history of Excessive drinking.

Table no. 11. Distribution of patients with respect to Alcoholic Status		
Alcoholic Status	Frequency	Percent
No	141	94.0
Yes	9	6.0
Total	150	100.0

9 (6%) patients were Alcoholic.

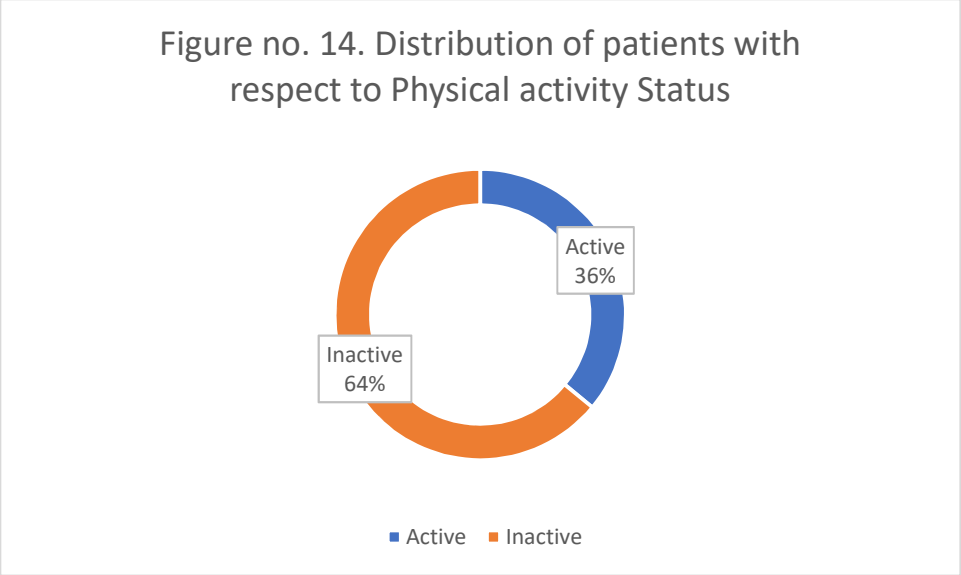
Table no. 12. Distribution of patients with respect to Alcohol Abstinent Status		
Alcohol Abstinent Status	Frequency	Percent
No	144	96.0
Yes	6	4.0
Total	150	100.0

6 (4%) patients had Alcohol abstinent status.

Table no. 13. Distribution of patients with respect to Alcohol drinking Status		
Alcohol dinking Status	Frequency	Percent
Never drinking	144	96.0
Yes	6	4.0
Total	150	100.0

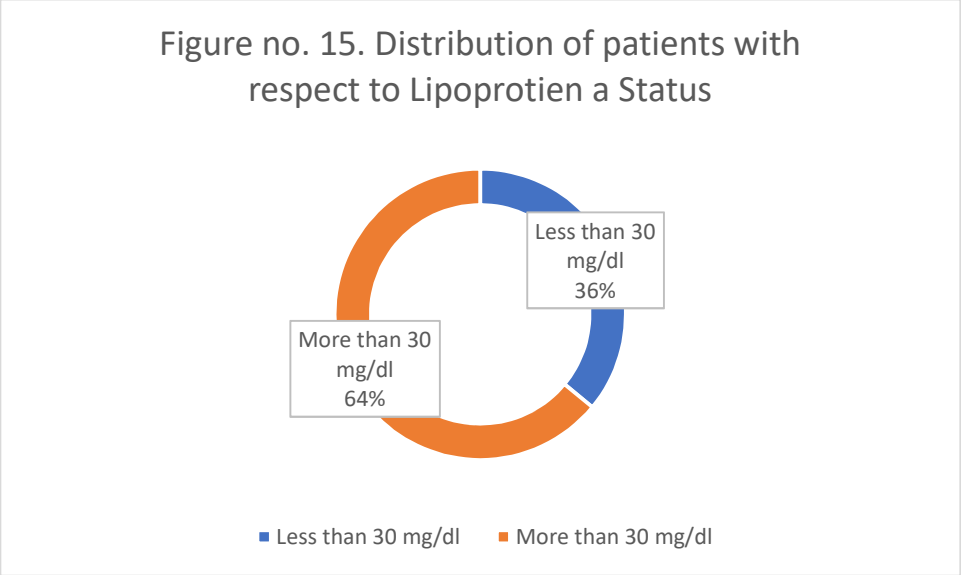
6 (4%) patients were Never drinkers.

Table no. 14. Distribution of patients with respect to Physical activity Status		
Physical activity Status	Frequency	Percent
Active	54	36.0
Inactive	96	64.0
Total	150	100.0



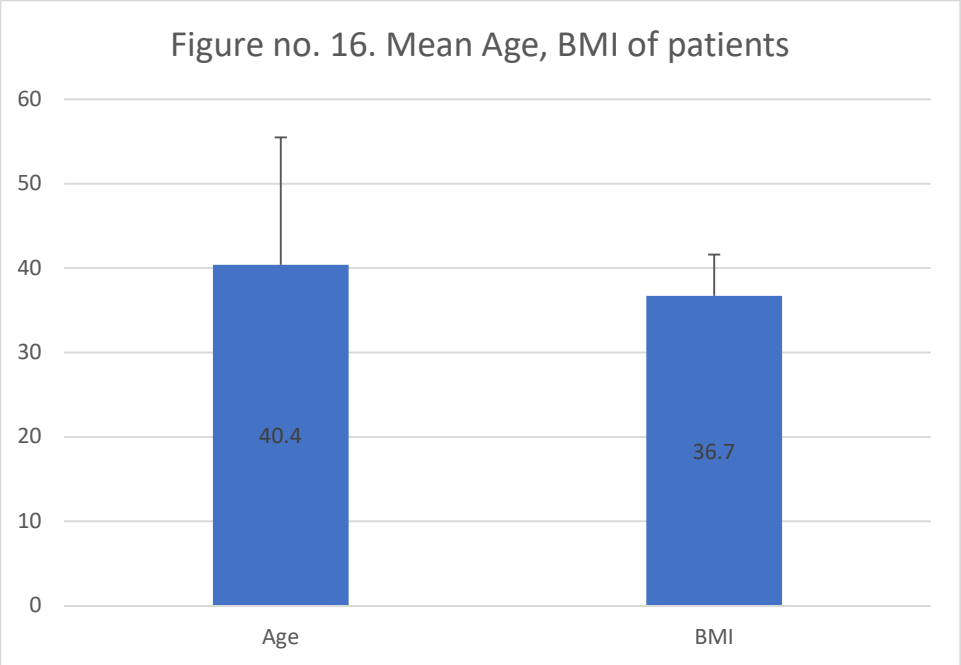
54 (36%) of the patients had active physical status, while 96 (64%) patients were physically inactive.

Table no. 15. Distribution of patients with respect to Lipoprotien a Status		
Lipoprotien a Status	Frequency	Percent
Less than 30 mg/dl	54	36.0
More than 30 mg/dl	96	64.0
Total	150	100.0



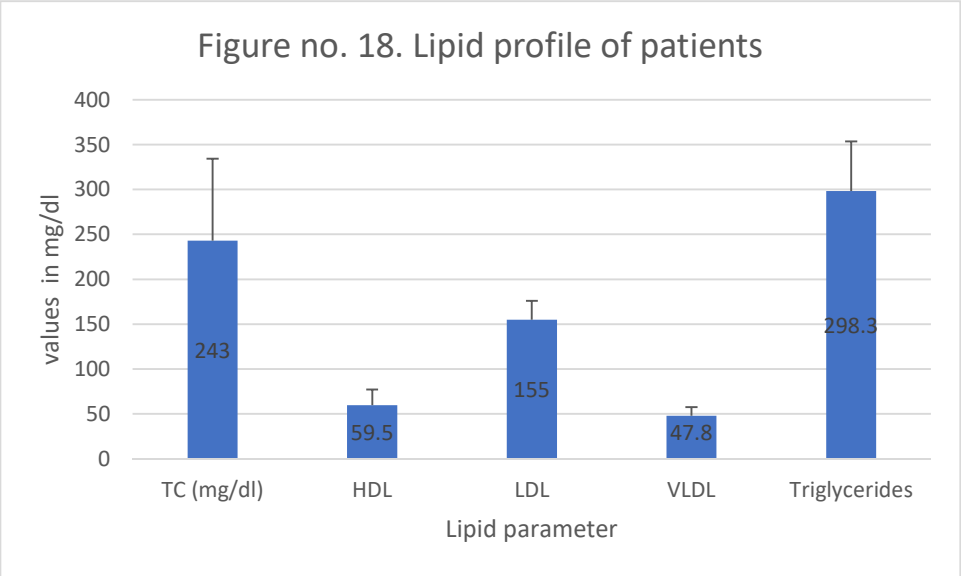
54 (36%) of the patients had Lipoprotien a levels less than 30 mg/dl, while 96 (64%) patients had Lipoprotien a levels more than 30 mg/dl.

Table no. 16. Mean Age, BMI, Blood pressure of patients		
	Mean	Std. Deviation
Age	40.4	15.1
BMI	36.7	4.9
Systolic BP	153.8	14.6
Diastolic BP	114.8	11.6



The mean Age, BMI, Systolic BP and Diastolic BP of the patients was 40.4 ± 15.1 years, 36.7± 4.9, 153.8 ± 14.6 mm of Hg and 114.8± 11.6mm of Hg, respectively.

Table no. 17. Lipid profile of patients		
	Mean	Std. Deviation
TC (mg/dl)	243.0	91.3
HDL	59.5	17.6
LDL	155.0	20.9
VLDL	47.8	9.7
Triglycerides	298.3	55.2



The mean Total Cholesterol, HDL, LDL, VLDL and Triglycerides were 243.0± 91.3, 59.5±17.6, 155.0±20.9, 47.8± 9.7 and 298.3 ±55.2 mg/dl, respectively.

Table no. 18. Fibrinogen, Homocysteine, Lp a and S. Uric acid levels of patients		
	Mean	Std. Deviation
Fibrinogen	625.9	82.1
Homocysteine mmol/L	65.0	19.7
Lp(a) mg/dl	6.7	1.4
Uric acid	10.2	2.5

The mean serum Fibrinogen, Homocysteine, Lp(a) and Uric acid levels of the patients were 625.9±82.1 mg/dl, 65.0±19.7mmol/L, 6.7±1.4mg/dl and 10.2±2.5mg/dl, respectively.

Table no 19 Distribution of patients with respect to age and Gender.				
	Gender	Mean	Std. Deviation	P value
Age	Male	42.8	15.4	0.092
	Female	38.6	14.7	

There was no statistically significant difference between the mean age of Males and female.

Table no 20 Distribution of patients with respect to BMI and Gender.				
	Gender	Mean	Std. Deviation	P value
BMI	Male	36.4	3.8	0.584
	Female	36.8	5.6	

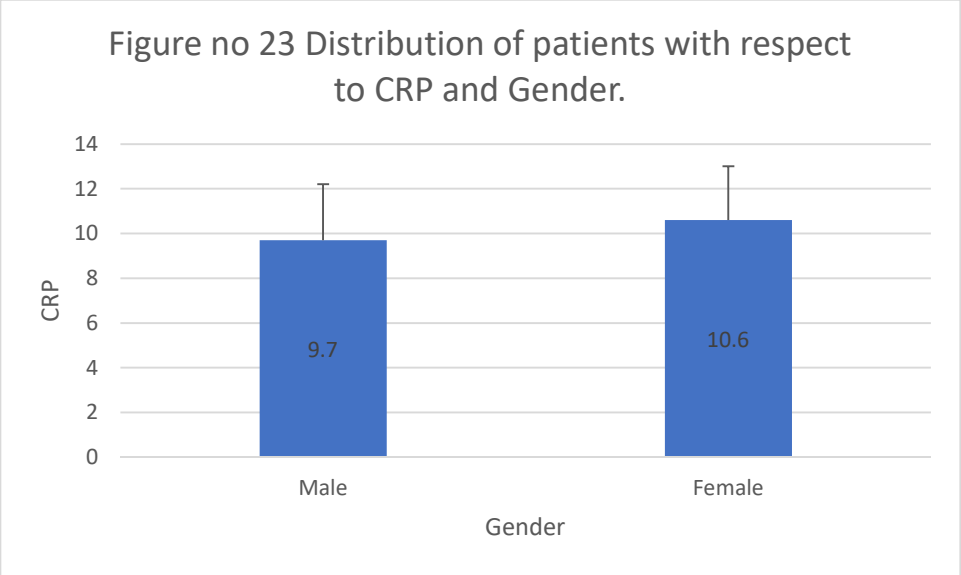
There was no statistically significant difference between the mean BMI of Males and female.

Table no 21 Distribution of patients with respect to Systolic BP and Gender.				
	Gender	Mean	Std. Deviation	P value
Systolic BP	Male	155.1	14.9	0.344
	Female	152.8	14.4	

There was no statistically significant difference between the Systolic BP of Males and female.

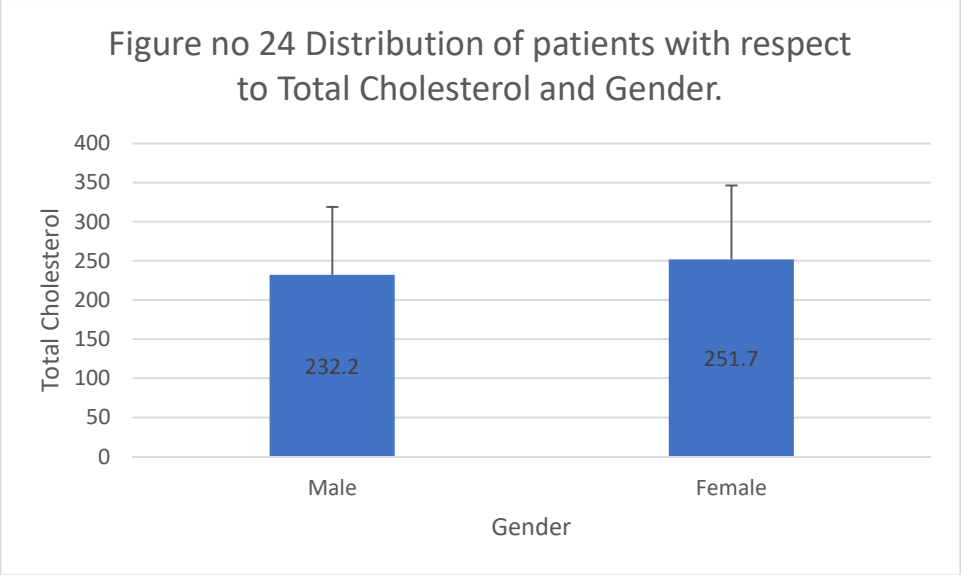
There was no statistically significant difference between the Diastolic BP of Males and female.

Table no 23 Distribution of patients with respect to CRP and Gender.				
	Gender	Mean	Std. Deviation	P value
CRP	Male	9.7	2.5	0.026
	Female	10.6	2.4	



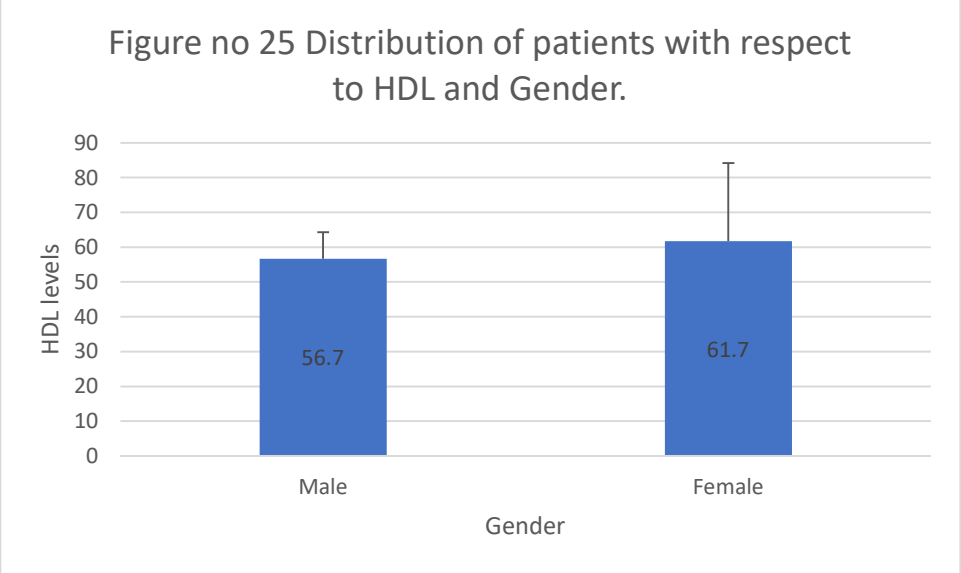
The mean CRP levels of females (10.6 ± 2.4) was statistically higher as compared that of males (9.7 ± 2.5).

Table no 24 Distribution of patients with respect to Total Cholesterol and Gender.				
	Gender	Mean	Std. Deviation	P value
Total Cholesterol	Male	232.2	86.7	0.190
	Female	251.7	94.5	



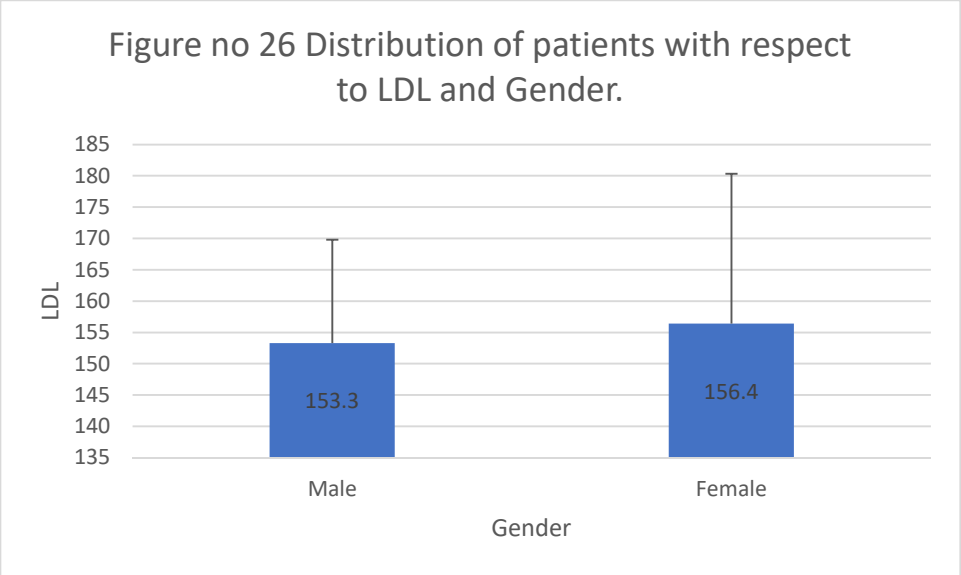
There was no statistically significant difference between the mean Total Cholesterol of Males and female.

Table no 25 Distribution of patients with respect to HDL and Gender.				
	Gender	Mean	Std. Deviation	P value
HDL	Male	56.7	7.6	0.056
	Female	61.7	22.5	



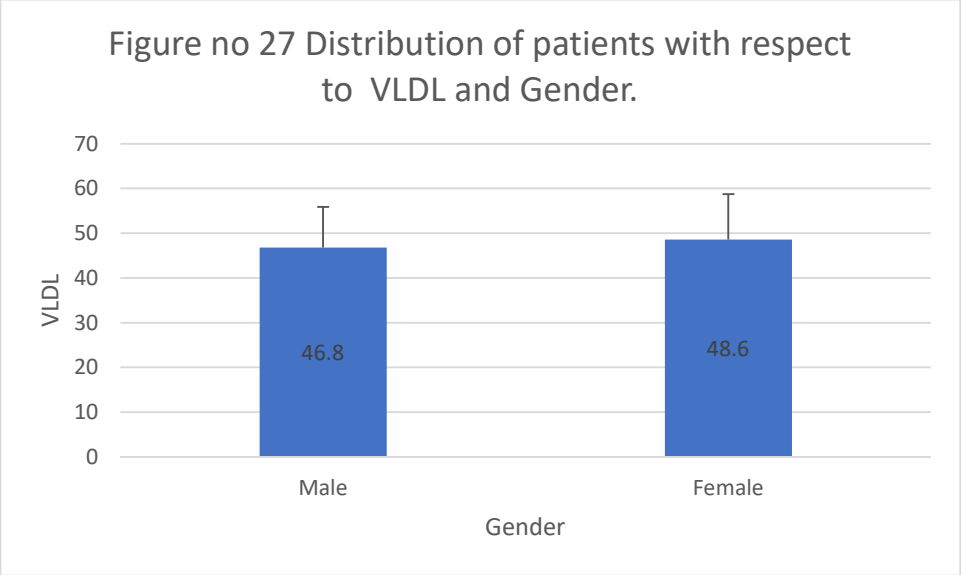
There was no statistically significant difference between the mean HDL of Males and female.

Table no 26 Distribution of patients with respect to LDL and Gender.				
	Gender	Mean	Std. Deviation	P value
LDL	Male	153.3	16.5	0.351
	Female	156.4	23.9	



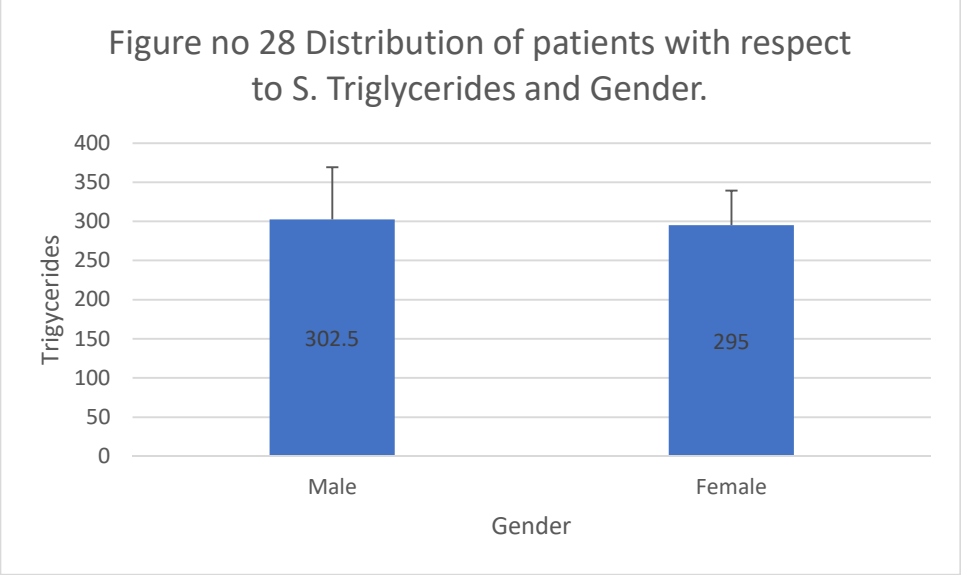
There was no statistically significant difference between the mean LDL of Males and female.

Table no 27 Distribution of patients with respect to VLDL and Gender.				
	Gender	Mean	Std. Deviation	P value
VLDL	Male	46.8	9.1	0.240
	Female	48.6	10.1	



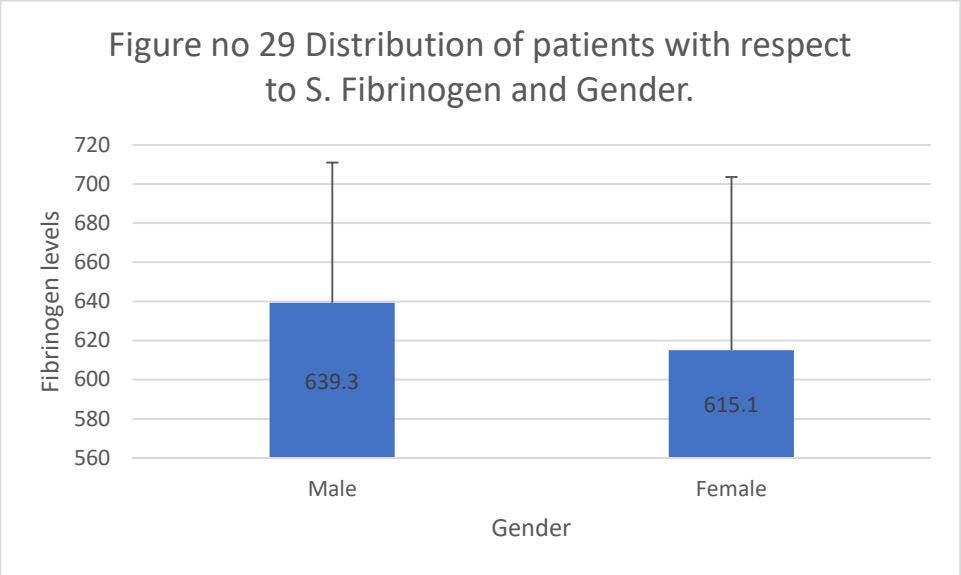
There was no statistically significant difference between the mean VLDL of Males and female.

Table no 28 Distribution of patients with respect to S. Triglycerides and Gender.				
	Gender	Mean	Std. Deviation	P value
S. Triglycerides	Male	302.5	66.6	0.428
	Female	295.0	44.1	



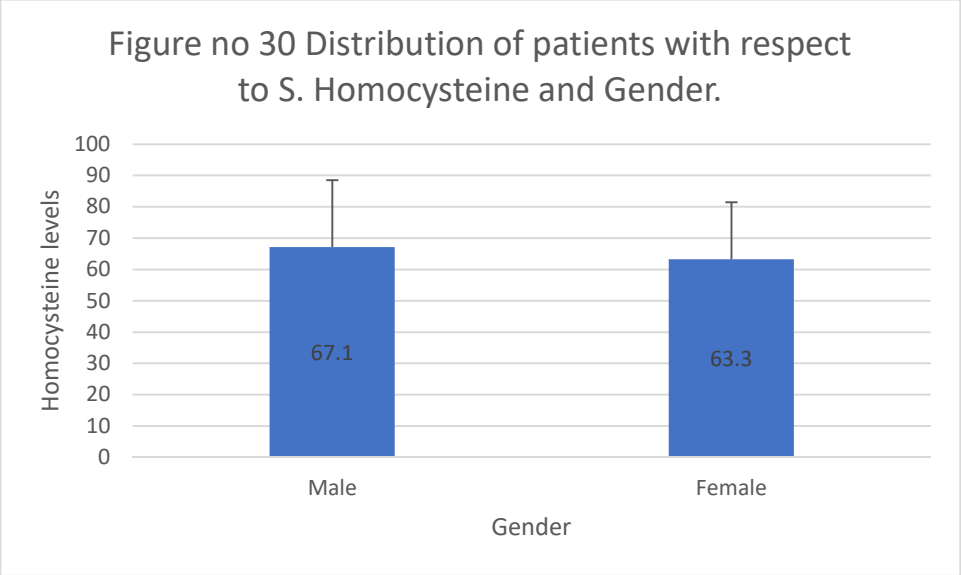
There was no statistically significant difference between the mean S. Triglycerides of Males and females.

Table no 29 Distribution of patients with respect to S. Fibrinogen and Gender.				
	Gender	Mean	Std. Deviation	P value
Fibrinogen	Male	639.3	71.7	0.067
	Female	615.1	88.5	



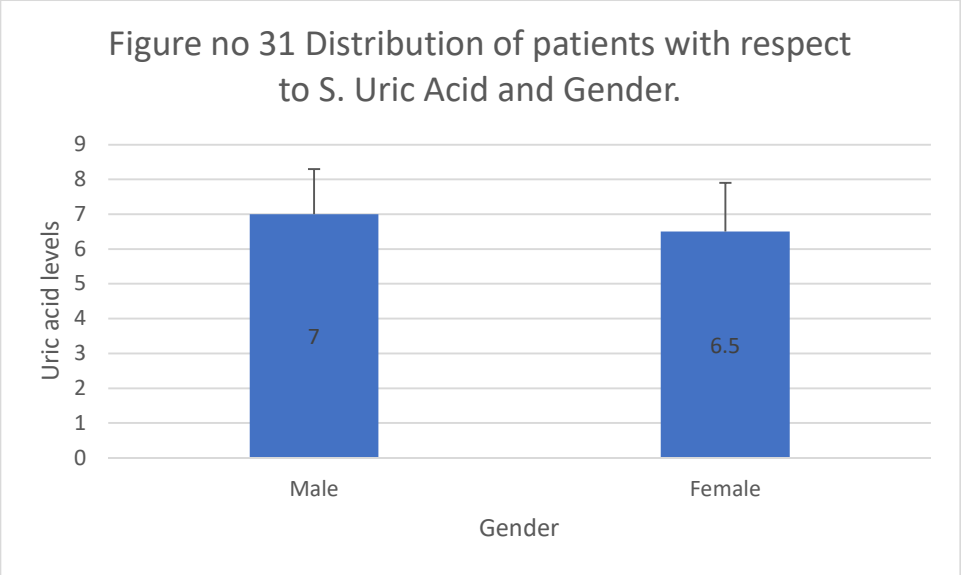
There was no statistically significant difference between the mean S. Fibrinogen of Males and females.

Table no 30 Distribution of patients with respect to S. Homocysteine and Gender.				
	Gender	Mean	Std. Deviation	P value
S. Homocysteine	Male	67.1	21.4	0.259
	Female	63.3	18.2	



There was no statistically significant difference between the mean S. Homocysteine of Males and females.

Table no 31 Distribution of patients with respect to S. Uric Acid and Gender.				
	Gender	Mean	Std. Deviation	P value
S. UricAcid	Male	7.0	1.3	0.040
	Female	6.5	1.4	



There was no statistically significant difference between the mean S. Uric acid of Males and females.

DISCUSSION

Lipoprotein(a) [Lp(a)] is identical to low-density lipoprotein(LDL) except for the addition of apolipoprotein A (apoA),which is highly glycosylated. There is a striking homologybetween the amino acid sequences of apoA and plasminogen, which is recognized to be a cardiovascular risk factor.[1]Thus, Lp(a) may play an important role in the transition fromatherosclerosis to thrombosis, because it activates monocyte adhesion and migration of macrophage foam cells intothe arterial wall.[2]Lp(a) is often considered a marker ofthrombosis.[3]Cardiovascular disease (CVD) is a major cause of deathin patients with peripheral arterial disease (PAD Lp(a) was also associated with increased cardiovascular event (CVE) risk in patients with established CVD and remains predictive for CVE risk at LDL cholesterol (LDL-C) levels ,1.8 mmol/L[9].Lp(a) may be a predictor of peripheral and centralCVD in younger men and women with dyslipidemia.Several observations suggest that targeting Lp(a) coulddecrease total residual cardiovascular risk, as increased plasma Lp(a) concentrations are significantly associated with higher risk of CAD.[10]Lp(a) is a marker of particular risk for poor outcomes in terms of severity and progression of CVD. Several prospective studies have correlated Lp(a) levels with vasculardisease in general, and plasma Lp(a) >30 mg/dl with increased cardiovascular risk.[4]after approval from the ethics committee a total of 150 patients were enrolled for the study(Table No.1) Hundred and fifty patients were included in the study.(Fig. No. 1) Of these, 83 (55.3) were males, while 67 (44.7%) were females.(Fig. No. 2) The common Comorbidities of the patients were Diabetes (60, 32.8%), Hypertension (58, 31.7%), Obesity (34, 18.6%) and hypothyroidism (29, 15.8%)here our study is in concordance with the study done by Gencer B etal[2].in his study similar findings were encountered while enrolling the cases(Fig. No. 3) 30 patients (20%) were

Exsmokers.(Fig. No. 4) 101 (67.3%) patients had history of Never-smoker status.(Fig. No. 5) 20 (13.3%) were current smokers.(Fig. No. 6) 101 (67.3%) patients had history of Never drinking status.(Table No.7) 12 (8%) patients had history of Occasional drinking.(Fig. No. 7) 12 (8%) patients had history of Occasional drinking.(Fig. No. 8) 7 (4.7%) had history of Regular drinking status.(Fig. No. 9) 10 (6.7%) patients were Current Smoker.(Fig. No. 10) 4 (2.7%) patients had history of Excessive drinking.(Fig. No. 11) 9 (6%) patients were Alcoholic.

(Fig. No. 12) 6 (4%) patients had Alcohol abstinent status.(Fig. No. 13) 6 (4%) patients were Never drinkers.(Fig. No. 14) 54 (36%) of the patients had active physical status, while 96 (64%) patients were physically inactive.(Fig. No. 15) 54 (36%) of the patients had Lipoprotien a levels less than 30 mg/dl, while 96 (64%) patients had Lipoprotien a levels more than 30 mg/dl. Here our stu8dy is in accordance with the study done by Albers JJ etal his study also reveals results similar to us

(Fig. No. 17) The mean Age, BMI, Systolic BP and Diastolic BP of the patients was 40.4 ± 15.1 years, 36.7±4.9, 153.8 ± 14.6 mm of Hg and 114.8±11.6mm of Hg, respectively.(Fig. No. 18) The mean Total Cholesterol, HDL, LDL, VLDL and Triglycerides were 243.0±91.3, 59.5±17.6, 155.0 ±20.9, 47.8±9.7 and 298.3±55.2 mg/dl, respectively.(Table No.18) The mean serum Fibrinogen, Homocysteine, Lp(a) and Uric acid levels of the patients were 625.9±82.1 mg/dl, 65.0±19.7mmol/L, 6.7±1.4mg/dl and 10.2±2.5mg/dl, respectively.(Fig. No. 19) There was no statistically significant difference between the mean age of Males and female.

(Fig. No.20) There was no statistically significant difference between the mean BMI of Males and female.(Fig. No.21) There was no statistically significant difference between the Systolic BP of Males and female.(Fig. No.22) There was no statistically significant difference between the Diastolic BP of Males and female.(Fig. No.23)here again our study is in accordance with the study done by Hojo Y etal The mean CRP levels of females (10.6 ± 2.4) was statistically higher as compared that of males (9.7 ± 2.5).(Fig. No.24) There was no statistically significant difference between the mean Total Cholesterol of Males and female.(Fig. No.25) There was no statistically significant difference between the mean HDL of Males and female.(Fig. No.26) There was no statistically significant difference between the mean LDL of Males and female.(Fig. No.27) There was no statistically significant difference between the mean VLDL of Males and female.(Fig. No.28) There was no statistically significant difference between the mean S. Triglycerides of Males and females.(Fig. No.29) There was no statistically significant difference between the mean S. Fibrinogen of Males and females.(Fig. No.30) There was no statistically significant difference between the mean S. Homocysteine of Males and females.(Fig. No.31) There was no statistically significant difference between the mean S. Uric acid of Males and females.in all of the above parameters our study is in accordance with the previous studies done by Kamstrup PR Anuurad E etal[6] in all the studies lipoprotein a is is marker for various cardiovascular decease however multicentric studies with larger sample size are required to come to a conclusion

CONCLUSION:

Lp(a) is a marker of particular risk for poor outcomes in terms of severity and progression of CVD.

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