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Original Research Article

A PROSPECTIVE STUDY ON OBESE PATIENTS WITH CORONARY ARTERY DISEASES :A TERTIARY CARE HOSPITAL STUDY

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Abstract

Introduction: Coronary artery disease (CAD) is the most common type of heart disease .The disease is caused by plaque building up along the inner walls of the arteries of the heart, which narrows the arteries and reduces blood flow to the heart. While the symptoms and signs of coronary artery disease are noted in the advanced state of disease, most individuals with coronary artery disease show no evidence of disease for decades as the disease progresses before the first onset of symptoms, often a "sudden" heart attack, finally arises. Symptoms of stable ischaemic heart disease include angina (characteristic chest pain on exertion) and decreased exercise tolerance.

Materials and Methods: This Prospective study was done at Tertiary care hospital from Oct 2022 to April 2023 Dept. of cardiology, Sri Jayadeva institute of cardiology, Kalaburagi

Results: In our study out of 50 asymptomatic obese individuals maximum,18(36%) were between 41-50 years of age.12 out of 50 i.e.24% were between 51-60 years of age. female predominant. In our study out of 50 , 31(62%) were females and 19(38%) were males.

Conclusion: Obesity is more common in middle age group i.e. between 41-60 years of age. As BMI increases there is increase in cardiovascular risk factors like hypertension and dyslipidaemia in asymptomatic obese individuals.so regular screening for these risk factors is recommended in asymptomatic obese individuals.

Keywords: Coronary artery diseases, obesity, hypertension

Introduction

Coronary artery disease (CAD) is the most common type of heart disease .The disease is caused by plaque building up along the inner walls of the arteries of the heart, which narrows the arteries and reduces blood flow to the heart. While the symptoms and signs of coronary artery disease are noted in the advanced state of disease, most individuals with coronary artery disease show no evidence of disease for decades as the disease progresses before the first onset of symptoms, often a "sudden" heart attack, finally arises. Symptoms of stable ischaemic heart disease include angina (characteristic chest pain on exertion) and decreased exercise tolerance. Unstable IHD presents itself as chest pain or other symptoms at rest, or rapidly worsening angina. The risk of artery narrowing increases with age, smoking, high blood cholesterol, diabetes, high blood pressure, and is more common in men and those who have close relatives with CAD. Other causes include coronary vasospasm, a spasm of the blood vessels of the heart, it is usually called Prinzmetal's angina.[1] It was as of 2012 the most common cause of death in the world.[2] It was also major cause of hospital admissions.[3] Coronary artery disease is assuming serious dimension in developing countries. It is expected to be the single most important cause of death in India by the year 2015.[4]Diagnosis of coronary artery disease is with an electrocardiogram, blood tests (cardiac markers), cardiac stress testing or a coronary angiogram. Depending on the symptoms and risk, treatment may be with medication, percutaneous coronary intervention (angioplasty) or coronary artery bypass surgery (CABG).

Materials and Methods

This Prospective study was done at Tertiary care hospital from Oct 2022 to April 2023 Dept. of cardiology ,Sri Jayadeva institute of cardiology, Kalaburagi. Sample size-50 asymptomatic obese individuals.

Inclusion criteria

1.age>18 years.
2.Sex-Both males and females are included.
3.Individuals with body mass index more than 30 are included.
4.Patients having history of hypertension are included in the study.

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Exclusion criteria
1.Patients with known ischemic heart disease
2.Patients with known diabetes mellitus.
Detailed history of each patient was recorded on the basis of PROFORMA given below
Clinical examination was done and relevant investigations were done.

Anthropometric Profile and Measurements:
Body weight -It was determined with subjects wearing light clothes and no shoes or socks, using a weighing balance.
Height-It was determined using a wall mounted, flexible and non expansile measuring tape with subjects in standing position and feet together.
Body mass index (BMI) was calculated using the expression:
BMI = weight in kg/ height in m^2

Measurement Of Blood Pressure :
The blood pressure of the subjects was measured by conventional auscultatory method using a calibrated mercury sphygmomanometer. Blood pressure measurement was done according to the recommendations for indirect measurement of arterial blood pressure of the Joint National Council (JNC VII) after the subject had been seated for at least 5 minutes and to avoid talking for five minutes. The mean value of two measurements taken at least one minute apart was used in the analysis. Fifth phase Korotkoff sound was used for measuring diastolic blood pressure.
Biochemical Investigations
A fasting blood sample was obtained from all subjects for estimation of glucose, total cholesterol, HDL and LDL cholesterol and triglycerides.They were measured by our Institute's standard technique.
ECG- All the patients were subjected to resting 12 lead electro-cardiography.
2D Echo study was performed in all patients. Following views were used in studying the LV
1. Para-sternal long axis view.
2. Para-sternal short axis view.
3. Apical 4 chamber view/ apical 2 chamber view.
4. Subcostal view.

The following 2D Echo parameters were used in examination of the patient
1. LV internal dimensions

At the end of systole [LVESD]
At the end of Diastole [LVEDD]
2. LV ejection fraction

$$\text{LVEF [\%]} = \frac{\text{LV diastolic volume} - \text{LV systolic volume}}{\text{LV diastolic volume}}$$

3. Inter-ventricular septum thickness
4. Detection of wall motion abnormalities.

Hypokinesia
Akinesia
Dyskinesia

Treadmill test-We subjected all patients to treadmill stress test, we applied modified Bruce criteria for it.
The classic criteria for visual interpretation of positive stress test findings are, J-point (defined as the junction of the point of onset of the ST-T wave and normally at or near the isoelectric baseline of the ECG) and ST80 (defined as the point that is 80 ms from the J point) depression of 0.1 mV (1 mm) or more and/or an ST-segment slope within the range of ±1 mV/s in 3 consecutive beats.

Treadmill protocol
Report exercise capacity is estimated in metabolic equivalents (METs) of exercise. A MET refers to the resting volume oxygen consumption per minute (VO_2) for a 70-kg, 40-year-old man. One MET is equivalent to 3.5 mL/min/kg of body weight. An example is the standard Bruce protocol, which starts at 1.7 mph and 10% grade (5 METs) with larger increments between stages than other protocols, such as the Naughton, Weber, and Asymptomatic Cardiac Ischemia Pilot (ACIP) study, which start at less than 2 METs at 2 mph and increase in 1- to 1.5-MET increments between stages. The Bruce protocol has 3-minute periods to allow achievement of a steady state before workload is increased.

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Stage 1 is 1.7 mph at 10% grade (5 METs). Stage 2 is 2.5 mph at 12% grade (7 METs). Stage 3 is 3.4 mph at 14% grade (9 METs).

The modified Bruce protocol has two 3-minute warm-up stages at 1.7 mph and 0% grade and 1.7 mph and 5% grade, and it is most often used in older individuals or those whose exercise capacity is limited by cardiac disease.

Definitions
The following definitions were used.

Asymptomatic-Subjects free of cardiovascular symptoms such as chest pain,breathlessness on exertion, Swelling over both lower limbs were selected as asymptomatic subjects.
Obese - subjects having body mass index more than 30 were considered obese according to WHO definition of obesity. BMI.
World Health Orgnisation (WHO) in 1997 and published in 2000, provide the values listed below

BMI	Classification
<18	Underweight
18.5-24.9	Normal weight
25-29.9	Overweight
30-34.9	Class I Obesity
35-39.9	Class II Obesity
40 or more	Class III Obesity

Smoking-CDC definition of smoking was used to define smoking.Tobacco chewing is defined as use of tobacco in any form like zerda,Mawa or mishri.

Diagnostic Criteria used
Hypertension was diagnosed if the systolic blood pressure was ≥140mm Hg and diastolic blood pressure ≥90mm Hg on two separate occasions.

Dyslipidemia is defined as the presence of high total cholesterol [≥200 mg/dL], elevated levels of LDL cholesterol [>100mg/dL], low HDL cholesterol [≤40mg/dL] and high triglycerides [>150 mg/dL] according to the USA-ATP III guidelines.

Results

Table 1: Distribution according to age

Age (years)	No of patients	percentage
18-30	10	20%
31-40	10	20%
41-50	18	36%
51-60	12	24%

In our study out of 50 asymptomatic obese individuals maximum,18(36%) were between 41-50 years of age.12 out of 50 i.e.24% were between 51-60 years of age.

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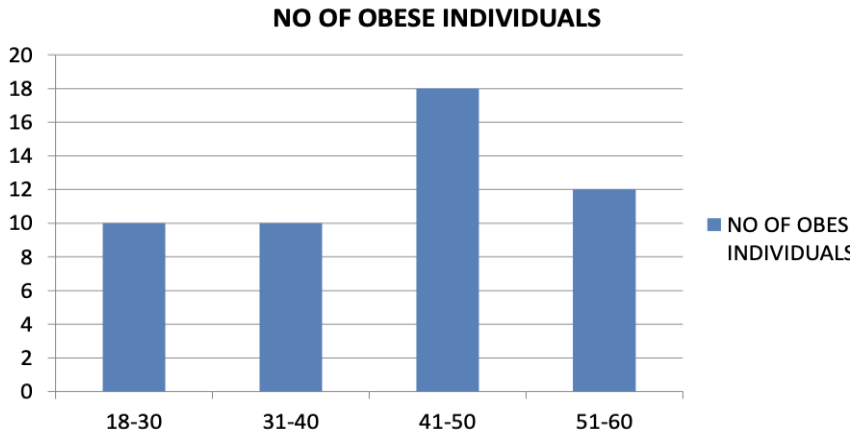
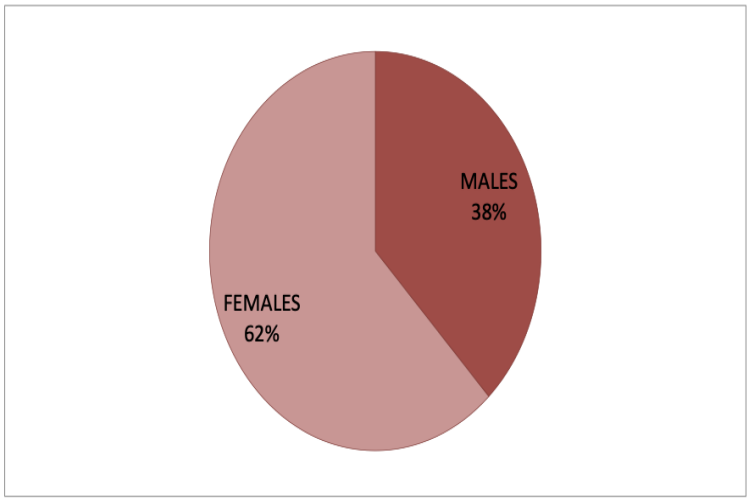


Graph 1:

Table no 2 : Distribution according to sex

Total asymptomatic obese individuals	Males	Females
50	19	31

Our study population was female predominant. In our study out of 50 , 31(62%) were females and 19(38%) were males



Graph 2:

Table 3: Distribution according to class of obesity

BMI	No of individuals	Percentage
Class I	30	60%
Class II	16	32%
Class III	4	8%

In our study out of 50 subjects maximum obese individuals 30(60%) were in Class 1 obesity, 16(32%) were in class 2 and 4(8%) were in Class 3.

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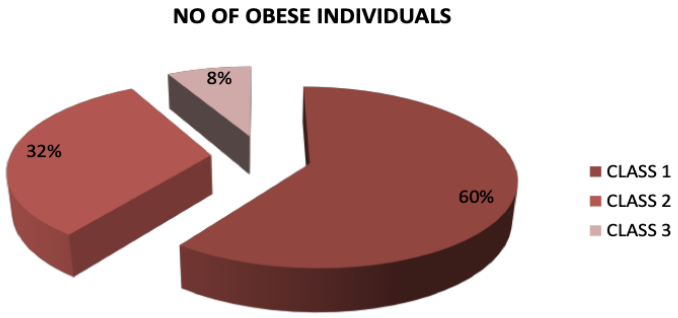
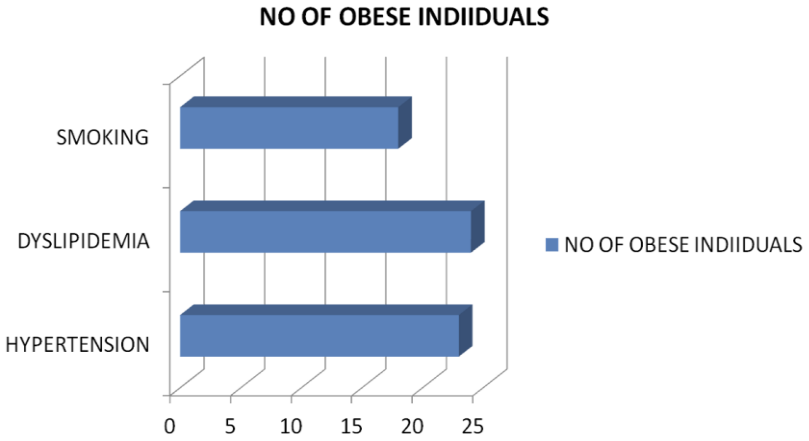


Graph: 3

Table no 4 :Distribution of risk factors among asymptomatic obese individuals

Risk factor	No of patients	percentage
Hypertension	23	46%
Dyslipidemia	24	48%
Smoking	18	36%

In present study out of 50 subjects 23(46%) had hypertension.24(48%) had dyslipidemia and 18(36%) had smoking as a risk factor for coronary artery disease.



Graph 4

Table no 5: ECG findings in obese individuals

ECG FINDING	NO OF PATIENTS	PERCENTAGE
NORMAL	18	36%
LOW VOLTAGE COMPLEXES	10	20%
LEFT VENTRICULAR HYPERTRPHY	8	16%
T WAVE INVERSION	6	12%
ST -FLATTENING	4	8%
LEFT AXIS DEVIATION	4	8%

In our study maximum patients i.e.18(36%) had normal ECG , low voltage complexes were commonest abnormal finding found in 10 i.e.20% of the subjects.Left ventricular hypertrophy was seen in 8(16%) individuals.T wave inversion was seen in 6(12%) obese individuals.ST-flattening and left axis deviation was seen in 4 individuals each i.e.8% individuals.

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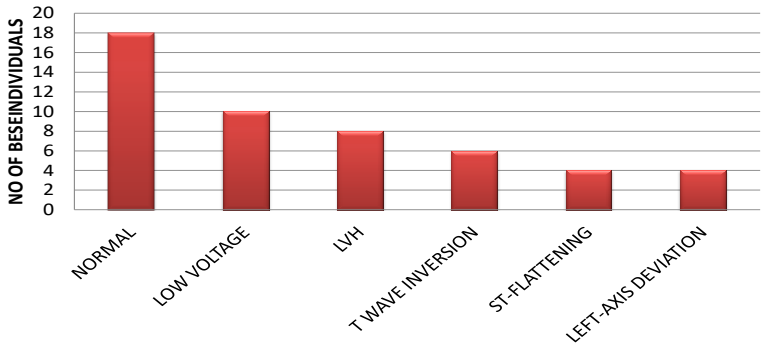
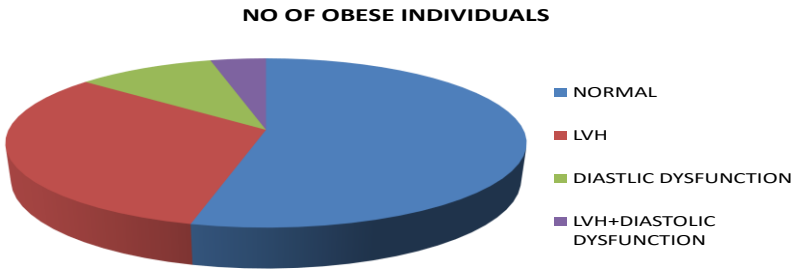


Graph 5

Table no 6 :2 D-ECHOCARDIOGRAPHIC FINDINGS IN OBESE INDIVIDUALS

2DECHO FINDINGS	NO OF OBESE INDIVIDUALS	PERCENTAGE
NORMAL	27	54%
LV HYPERTROPHY	16	32%
DIASTOLIC DYSFUNCTION	5	10%
LVH+DD	2	4%

In our study 27(54%) subjects had normal ECG. Left ventricular hypertrophy was found in 16(32%) subjects, diastolic dysfunction was found in 5(10%) subjects and Left ventricular hypertrophy+diastolic dysfunction was found in 2(4%) subjects.



Graph 6

Table no 7 :INTERPRETATION OF TREADMILL TESTS

INTERPRETATION	NO OF OBESE INDIVIDUALS	PERCENTAGE
POSITIVE TREADMILL TEST	11	22%
NEGATIVE TREADMILL TEST	39	78%

In present study treadmill test was positive in 11 i.e 22% subjects and it was negative in 39 i.e 78% subjects.

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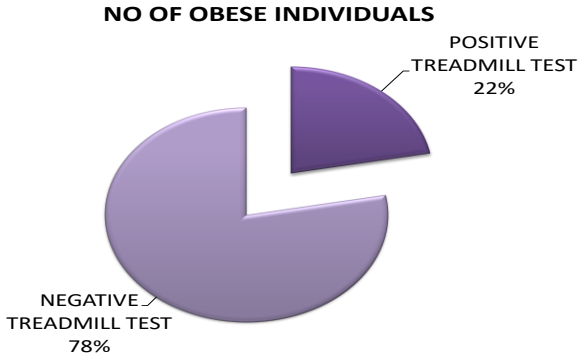
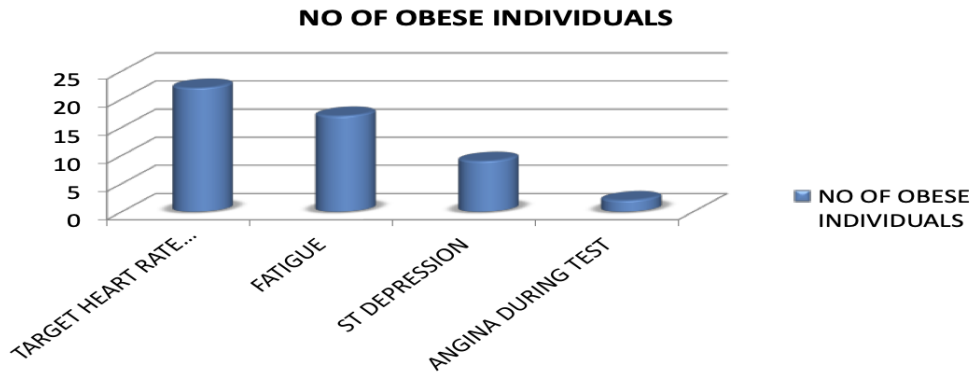


Graph 7

Table no 8 :END POINTS OF TREADMILL TEST.

Sr.No.	END POINT OF TREADMILL TEST	NO OF OBESE INDIVIDUALS	PERCENTAGE
1	TARGET HEART RATE ACHIEVEMENT	22	44%
2	TERMINATIN DUE TO FATIGUE	17	34%
3	TERMINATION DUE TO ST DEPRESSION	9	18%
4	TERMINATION DUE TO ANGINA DURING TEST	2	4%

In our study target heart rate achievement was the end point of test in 22(44%) obese individuals.in 17 individuals treadmill test was terminated due to fatigue in 17(34%) obese individuals.ST depression was the cause of termination of treadmill test in 9(18%) individuals and angina during test developed in 2(4%) individuals.so treadmill test was positive in 11(22%) asymptomatic obese individuals.



Graph 8

Table no 9 :Prevalence of hypertension with reference to BMI

BMI group	No of total subjects	Total no of hypertensives	Percentage
Class 1	30	8	26.66%
Class 2	16	12	75%
Class 3	4	3	75%

Chi square=11.29 D.F.=2 P value=0.003

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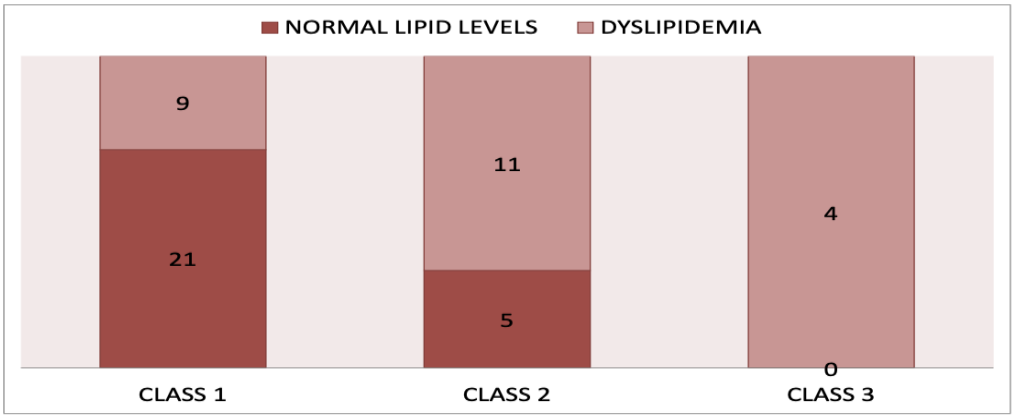
In our study, 8 out of 30 individuals in class I group,12 out of 16 in class II group and 3 out of 4 in class III group had hypertension. So prevalence of hypertension was 26.66%,75% and 75% in class I, class II and class III obesity groups respectively.

Table no 10 :Prevalence of dyslipidemia with reference to BMI

BMI group	No of total subjects	Total no of patients with dyslipidemia.	Percentage
Class 1	30	9	30%
Class 2	16	11	68.75%
Class 3	4	4	100%

Chi square=10.99 D.F.=2 p value=0.004
In our study,9 out of 30 individuals in class I obesity group,11 out of 16 in class II obesity group,and 4 out of 4 in class III obesity group had dyslipidemia.So prevalence of dyslipidemia was 30%,68.75% and 100% in class I, class II and class III groups.



Graph 9

Table no 11 :Treadmill test in different groups of BMI

BMI GROUP	NO OF TOTAL SUBJECTS	NO OF TREADMIL TEST POSITIVE SUBJECTS	PERCENTAGE
Class 1	30	3	10%
Class 2	16	6	37.5%
Class 3	4	2	50%

Chi square=6.585 D.F.=2 p value=0.03
In present study out of 30 obese individuals in class I obesity group 3 (10%) had positive treadmill test. out of 16 individuals in class II obesity group 6(37.5%) had positive treadmill test. In class III obesity group out of 4 individuals 2(50%) had positive treadmill test.

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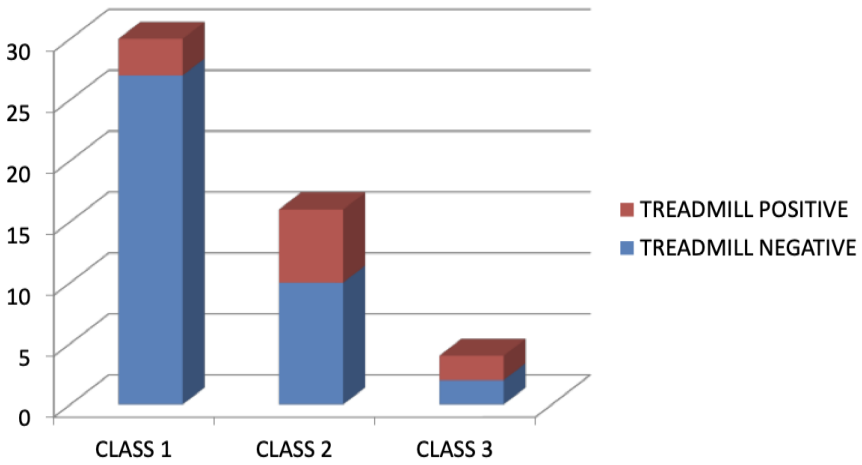
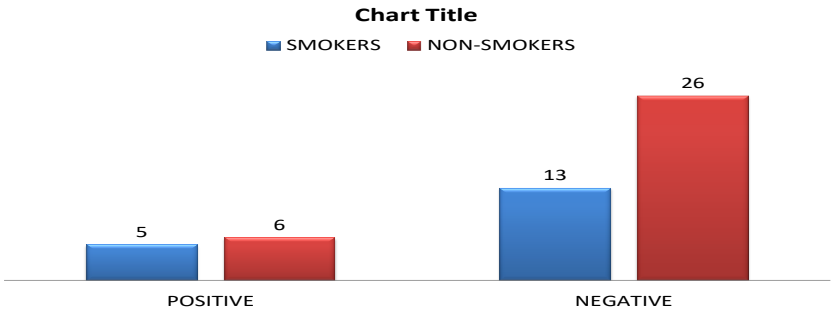


Graph 10

Table no 12 :Treadmill test with reference to smoking

Treadmill test	Smokers	Nonsmokers
Positive	5	6
Negative	13	26
Total	18	32

Chi square=0.547 D.F.=2 p value=0.457
In present study out of 18 smokers among asymptomatic obese 5 had positive treadmill test and 13 had negative treadmill test.Among 32 non smokers 6 had positive treadmill test and 26 had negative treadmill test.



Graph 11

Discussion

These prospective data demonstrate a strong positive association between obesity and the risk of coronary heart disease in women. Adjustment for cigarette smoking, which correlates inversely with relative weight and directly with coronary risk, increased the magnitude of the association. After adjustment for age and smoking, the risk of both nonfatal myocardial infarction and fatal coronary disease among women in the heaviest Quetelet-index category (≥29) was more than three times higher than that in the leanest group. The highest Quetelet-index category corresponds to a weight 30 percent or more above the desirable weight in the 1983 Metropolitan Life Insurance Company tables[6] and includes approximately 25 percent of the U.S. women 35 to 64 years of age.[5] A significantly increased rate of coronary heart disease was also found for mildly to moderately overweight women (Quetelet index, 25 to 28.9), among whom the rate was increased by 80 percent. This category represents an

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additional 20 percent of middle-aged U.S. women.[5] The leanest group of women (corresponding to less than 95 percent of the desirable weight) had the lowest rates of coronary disease; women of average weight had coronary risks approximately 30 percent higher than those of lean women. The prospective design of this study had the advantage of greatly reducing the likelihood of biased reporting of premorbid weight. Furthermore, since women with previously diagnosed coronary disease were excluded, weight changes were unlikely to have been motivated or induced by previous disease. The follow-up rate in this cohort was extremely high (more than 96 percent through 1984) and uniform across relative weight categories; thus, the study results were unlikely to be biased by incomplete follow-up. Although the current heights and weights were self-reported, these data were found to be highly reliable in an internal validation study, as well as in other studies.[7,8] The reported weights at the age of 18 could not be validated in our cohort because of inadequate availability of records, but weight at the age of 25 self-reported by middle-aged men has previously been found to be quite accurate.[9] Coronary end points were documented by a review of the medical records according to standardized and uniform criteria.

Conclusion

Obesity is more common in middle age group i.e.between 41-60 years of age.As BMI increases there is increase in cardiovascular risk factors like hypertension and dyslipidemia in asymptomatic obese individuals.so regular screening for these risk factors is recommended in asymptomatic obese individuals.Asymptomatic ECG changes in obese individuals like ST-flattening ,T wave inversion,low voltage complexes should not be ignored and they should be subjected to further investigations like 2DECHO and treadmill test.As BMI increases there is increase in incidence of coronary artery disease in asymptomatic obese individuals.so regular screening by using treadmill test is recommended in these individuals especially those in higher BMI groups to find out latent coronary artery disease.

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