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Research Article

**RETROSPECTIVE, OBSERVATIONAL AND ANALYTICAL  
STUDY IN THE TRAGIC TRIO OF DYSLIPIDAEMIA,  
HYPERTENSION AND DIABETES MELLITUS****Jaka Jhansi<sup>1</sup>, M. Pranav Kumar<sup>1</sup>, MD. Shadab Qaiser<sup>1</sup>, Hafsa Banu<sup>1</sup>,  
Dr. Amatul Ali Sameera<sup>2</sup>**<sup>1</sup>Student, Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, R.R, Telangana 501510.<sup>2</sup>Assistant Professor of Sree Dattha Institute of Pharmacy, Sheriguda, Ibrahimpatnam, R.R,  
Telangana 501510.**Abstract:**

**Aims and Objectives:** To identify the prevalence and the complications of dyslipidaemia, hypertension and diabetes mellitus.

**Methodology:** A retrospective, observational and analytical study which is conducted for 6 months in a multi-speciality hospital, AWARE GLENEAGLES GLOBAL HOSPITAL, L.B. NAGAR, HYDERABAD. The study was carried out in a sample size of 191 patients of age above 35yrs, who were treated in the cardiology and the endocrinology department. The present medical condition and past medical history of the patient were reviewed. All the patients' details were collected in the patient profile form which was obtained from the medical records of the patients in the departments included in the study.

**Results:** A total of 191 patients were included in the study, of which males were found to be 127 (66.4%) and females 64 (33.6%). Most of the people suffering from these conditions belonged to an age group of 60-69 years (29.84%). Among the study population, 159 patients were found to be obese (83.25%) and non-obese were found to be 32 (16.75%). The prevalence of complications in dyslipidaemia, hypertension and diabetes mellitus included cardiac diseases (45.94%), followed by kidney diseases (18.9%). The mortality rate in the study population was found to be (8.11%). In the study, smokers were found to be 60.2% and alcoholics were found to be 62.8%.

**Conclusion:** According to the study conducted, the interlink between diabetes mellitus and hypertension was found to be more when compared to the interlink between diabetes dyslipidaemia and hypertension and dyslipidaemia.

**Keywords:** Dyslipidaemia, hypertension, stroke, acute kidney injury, diabetes mellitus.

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**INTRODUCTION:**

**BLOOD PRESSURE:** Blood pressure is defined as the amount of force exerted by blood against the wall of arteries. Blood pressure is determined by measuring systolic (top number) and diastolic (bottom number) blood pressure.

The left ventricle contracts while systole, ejecting blood into arteries and causing a sharp rise in arterial BP which is known as Systolic Blood Pressure. During Diastole, the left ventricle relaxes as blood returns to the heart from the veins thus decreasing arterial BP which is called Diastolic Blood Pressure.<sup>[1]</sup>

Blood Pressure = Cardiac Output  $\times$  Total Peripheral Resistance<sup>[2]</sup>

**HYPERTENSION**

**Hypertension** is a heterogeneous disorder, defined by persistent elevation of arterial blood pressure that may result either from a specific cause (secondary HTN) or from an underlying pathophysiologic mechanism of unknown etiology (primary/essential HTN).<sup>[3]</sup>

**DIABETES MELLITUS**

Diabetes Mellitus is defined as a heterogeneous metabolic disorder and it is characterised by chronic hyperglycaemia with disturbance of carbohydrates, fats, and protein metabolism.<sup>[4]</sup>

Diabetes is the most common type of endocrine disorder. DM occurs due to reduced insulin secretion with or without insulin resistance.<sup>[5]</sup>

**DYSLIPIDAEMIA**

Lipoproteins are complexes of lipids and proteins that transport cholesterol, Triglycerides, and fat-soluble vitamins. Lipids are insoluble in blood and are carried by apoproteins, carrier proteins. Cholesterol and its esters are derived from lipoproteins.<sup>[6]</sup>

**Dyslipidaemia** is defined as a disorder of lipoprotein metabolism that results in abnormal levels of lipids in the body such as increased total cholesterol, bad low-density cholesterol, triglycerides and decreased good high-density lipoprotein.

Dyslipidaemia results from non-uniform diet, tobacco/alcohol, and genetics which can cause cardiovascular complications.<sup>[7]</sup>

**THE TRAGIC TRIO**

The Tragic Trio here refers to the amount of risk that HTN, DM, and Dyslipidaemia possess if they are left untreated or undiagnosed. Each one of these conditions links with others and marks as cardiovascular complications. Treating dyslipidaemia is more crucial because of its complications such as atherosclerosis. The International Diabetes Federation

(IDF), in 2015, determined that 415 million people across the world have DM, and that may increase to 642 million by 2040.<sup>[8]</sup>

**METHODOLOGY:**

**Study site:** The study has conducted in the Aware Gleneagles Global hospital, L.B. Nagar. The data in this study was collected from the cardiology and endocrinology departments. The data is collected as dyslipidaemia, hypertension, and diabetes cases either alone or together.

**Study design:** Retrospective, observational and analytical study.

A retrospective study is a study in which a search is made for a relationship between one phenomenon (usually present) and another that occurred in past. The advantages of retrospective study are its small scale, usually short time for achievement and its application to rare diseases. Its drawbacks are certain important statistics cannot be deliberate and large biases may be introduced in the recall of past exposure to risk factors.

**Study period:** 6 months

**Study criteria****Inclusion criteria:**

- Patients who have been diagnosed with dyslipidaemia, hypertension, and diabetes mellitus.
- Patients who have complications of DHD
- Age above 35 years

**Exclusion criteria:**

- Pregnancy
- Lactation
- Age below 34 years

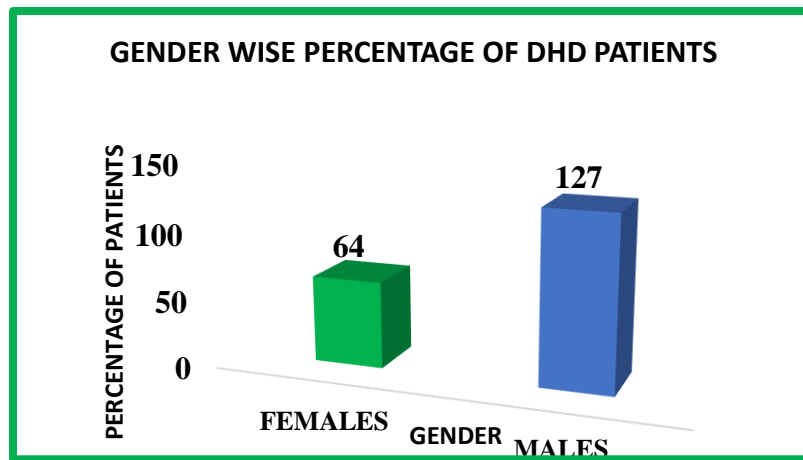
**Study procedure:**

- During the study period, the data is collected on the daily basis, as dyslipidaemia, diabetes and hypertension was diagnosed at the hospital and follow-up visits as well.
- The collected data were entered in data collection forms designed for the recording of only those parameters essential to establish the objectives of the study
- The data collection form used for the study was designed in Microsoft word, after which it was entered month-wise in excel.
- The results were then obtained after filtering the required data, figures and percentages.

**Sources of data:** All the necessary and relevant information was collected from the cardiology and endocrinology department in tertiary care hospital.

**RESULTS:****Table 1: Gender-wise distribution of the patients**

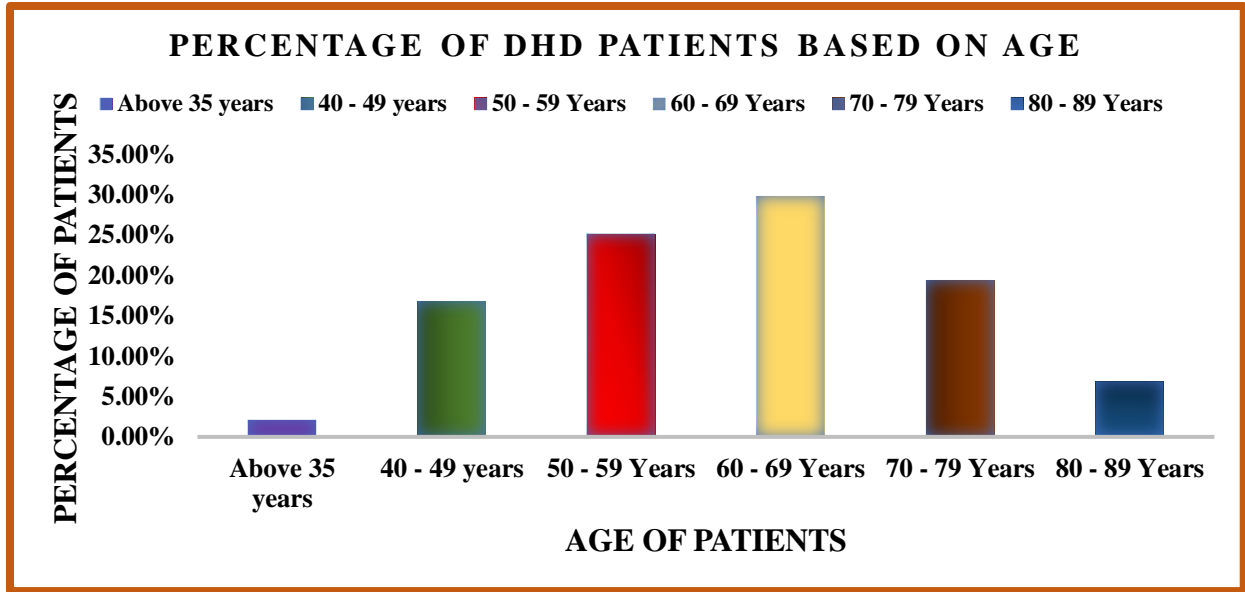
GENDER	NO. OF PATIENTS
TOTAL	191
FEMALES	64 (33.6%)
MALES	127 (66.4%)

**Fig 1: Bar graph presentation of the percentage of DHD patients according to gender**

A total of 191 patients are included in this study with diagnosis of hypertension, diabetes and dyslipidaemia separately or all of them in which males accounting for 127 (66.4%) higher than females accounting for remaining 64 (33.6%).

**Table 2: Percentage of DHD subjects according to age**

S.NO	AGE	PERCENTAGE
1.	ABOVE 35YRS	4 (2.1%)
2.	40 – 49 YRS	32 (16.75%)
3.	50 – 59 YRS	48 (25.13%)
4.	60 – 69 YRS	57 (29.84%)
5.	70 – 79 YRS	37 (19.37%)
6.	80 – 89 YRS	13 (6.81%)

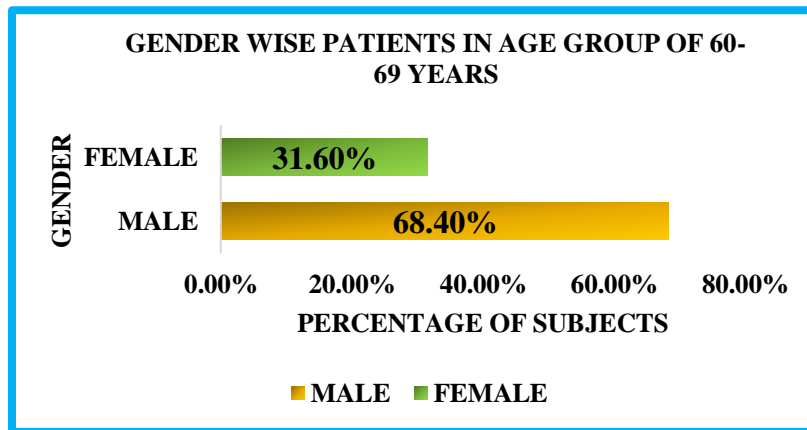


**Fig 2: Graphical representation of DHD subjects according to age**

In this study, less than 35 yrs of age are excluded, and the age range among the subjects as follows, 4 subjects between 35-39 yrs are accounted and 32 subjects between 40-49 yrs, 48 subjects between 50-59 yrs, 57 subjects between 60-69 yrs, 37 subjects between 70-79 yrs and 13 subjects between 80-89 yrs are presented. The higher age rate of DHD subjects was noted between 60-69 yrs.

**Table 3: Percentage of gender-wise DHD patients in age group of 60-69 years**

S.NO	GENDER	PERCENTAGE
1.	TOTAL AGE GROUP BETWEEN 60-69 YRS	57
2.	MALE	39 (68.4%)
3.	FEMALE	18 (31.6%)

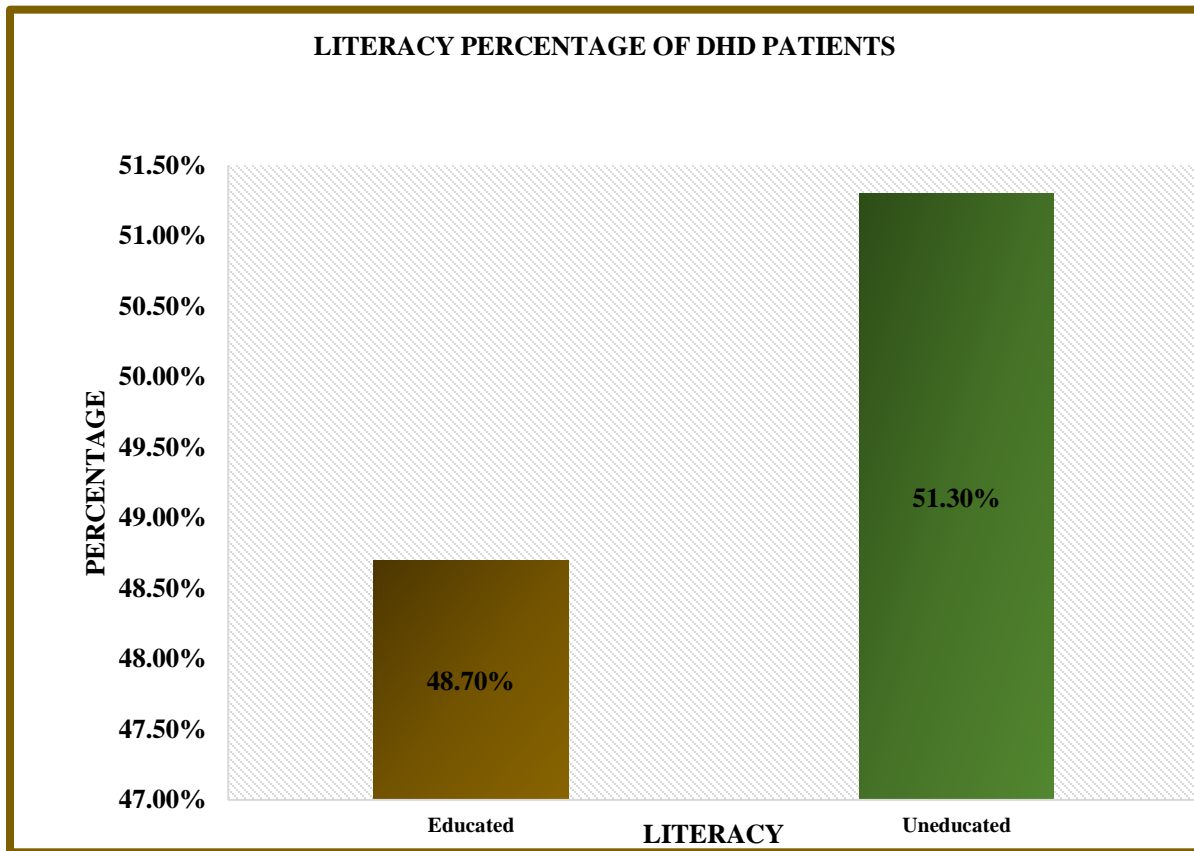


**Fig. 3: Graphical presentation of DHD patients in the age group of 60-69 years**

In this study, the higher age rate has been reported between 60-69 yrs. In this age group, males are accompanied higher i.e., 39 subjects (68.40%) than female subjects i.e., 18 (31.60%).

**Table 4: Percentage of literacy of DHD patients**

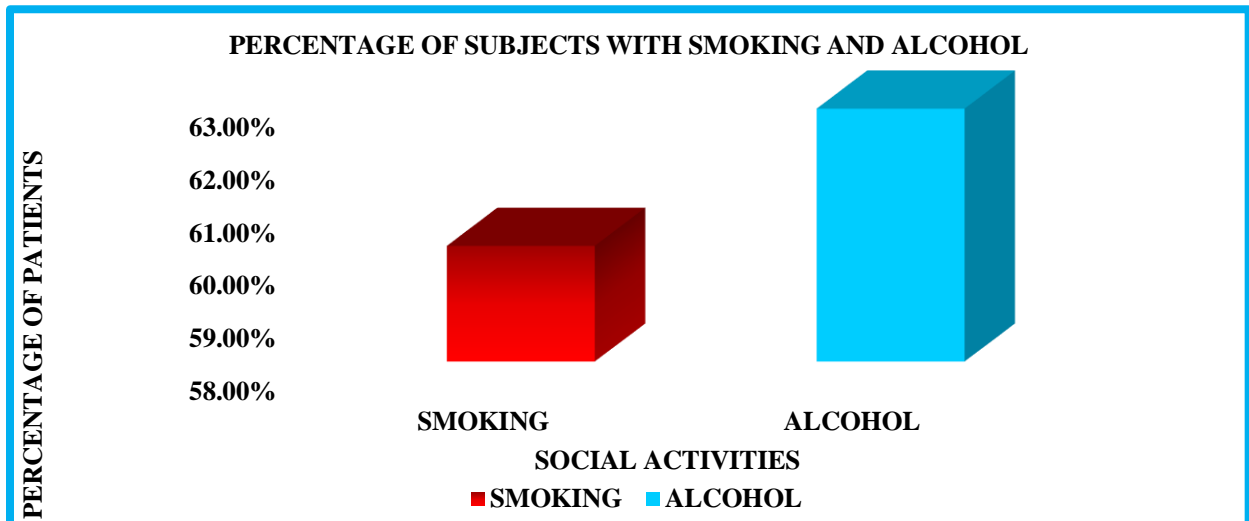
S.NO	LITERACY	PERCENTAGE
1	EDUCATED	93(48.7%)
2	UNEDUCATED	98(51.3%)

**Fig 4: Graphical representation of literacy percentage of DHD patients**

In this study, the 191 subjects here are divided as educated and uneducated because of disease progression in absence of knowledge or carelessness. Here 98(51.3%) subjects are noted as uneducated higher than educated i.e., 93(48.7%).

**Table 5: Percentage of DHD subjects based on social habits**

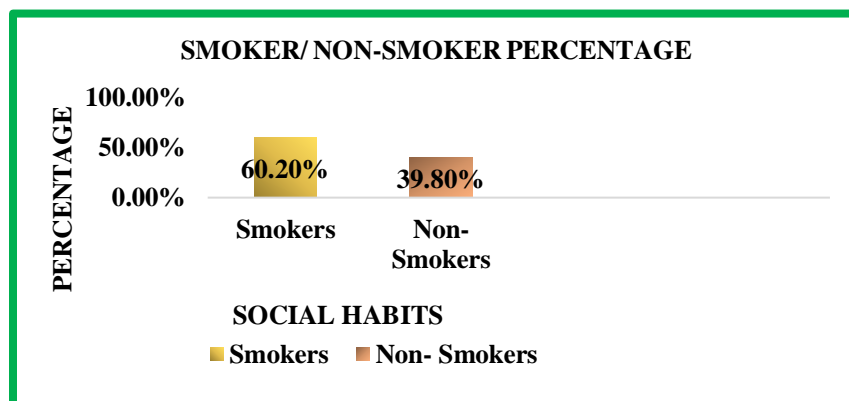
S.NO	TYPE OF HABIT	PERCENTAGE
1.	SMOKING	115 (60.2%)
2.	ALCOHOL	120 (62.8%)

**Fig 5: Graphical representation of DHD subjects based on social habits**

In this study, individuals with social habits are enlisted as follows; Alcoholics and Smokers are found approximately equal with alcoholics at 62.8% slightly more than smokers at 60.2%.

**Table 6: Percentage of smokers and non-smokers in DHD patients**

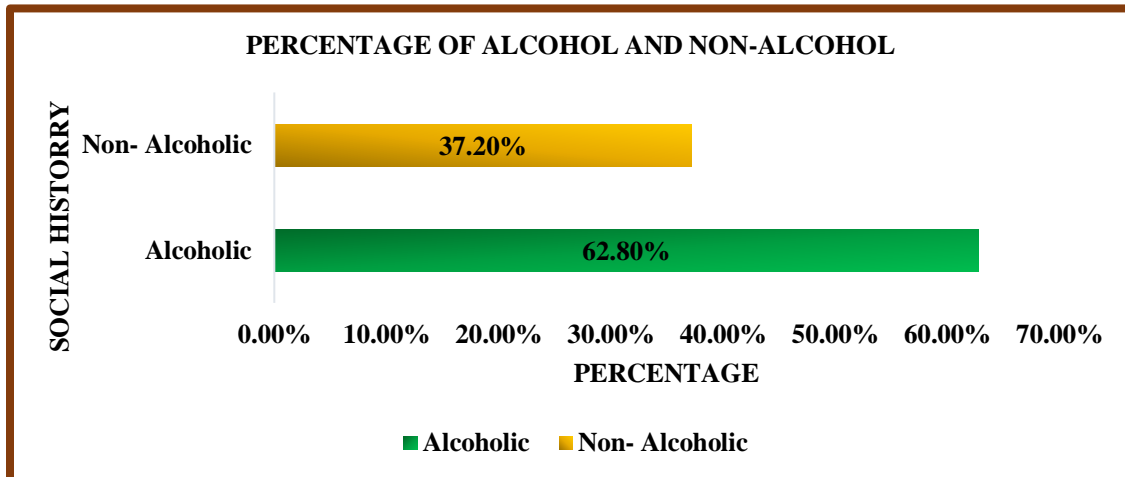
S.NO	SOCIAL HABITS	PERCENTAGE
1	SMOKERS	115(60.2%)
2	NON - SMOKERS	76(39.8%)

**Fig 6: Graphical representation of smokers/non-smokers in DHD patients**

This study contains 191 subjects divided based on social habits and enlisted as smokers and non-smokers. Here smokers are higher 115 (60.20%) subjects than non-smokers 76 (39.80%).

**Table 7: Percentage of alcohol consumption of DHD patients**

S.NO	SOCIAL HABIT	PERCENTAGE
1	Alcoholic	120(62.8%)
2	Non - Alcoholic	71(37.2%)

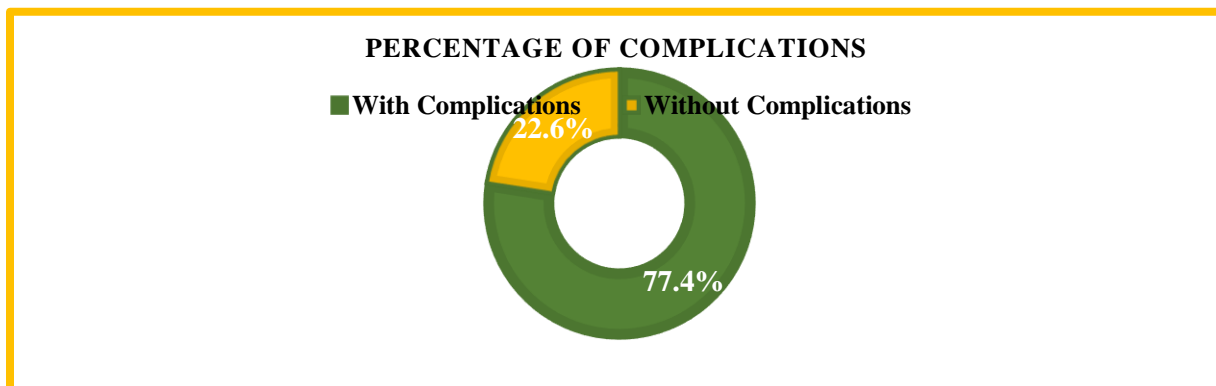


**Fig 7: Graphical representation of alcoholic and non-alcoholic of DHD patients**

This study contains 191 subjects divided based on social habits and enlisted as alcoholics and non-alcoholics. Here subjects with alcohol are higher 120(62.8%) than non-alcoholics 71(37.2%).

**Table 8: Percentage of subjects with and without complications**

S.NO	TYPES	PERCENTAGE
1.	WITH COMPLICATIONS	148 (77.4%)
2.	WITHOUT COMPLICATIONS	43 (22.6%)

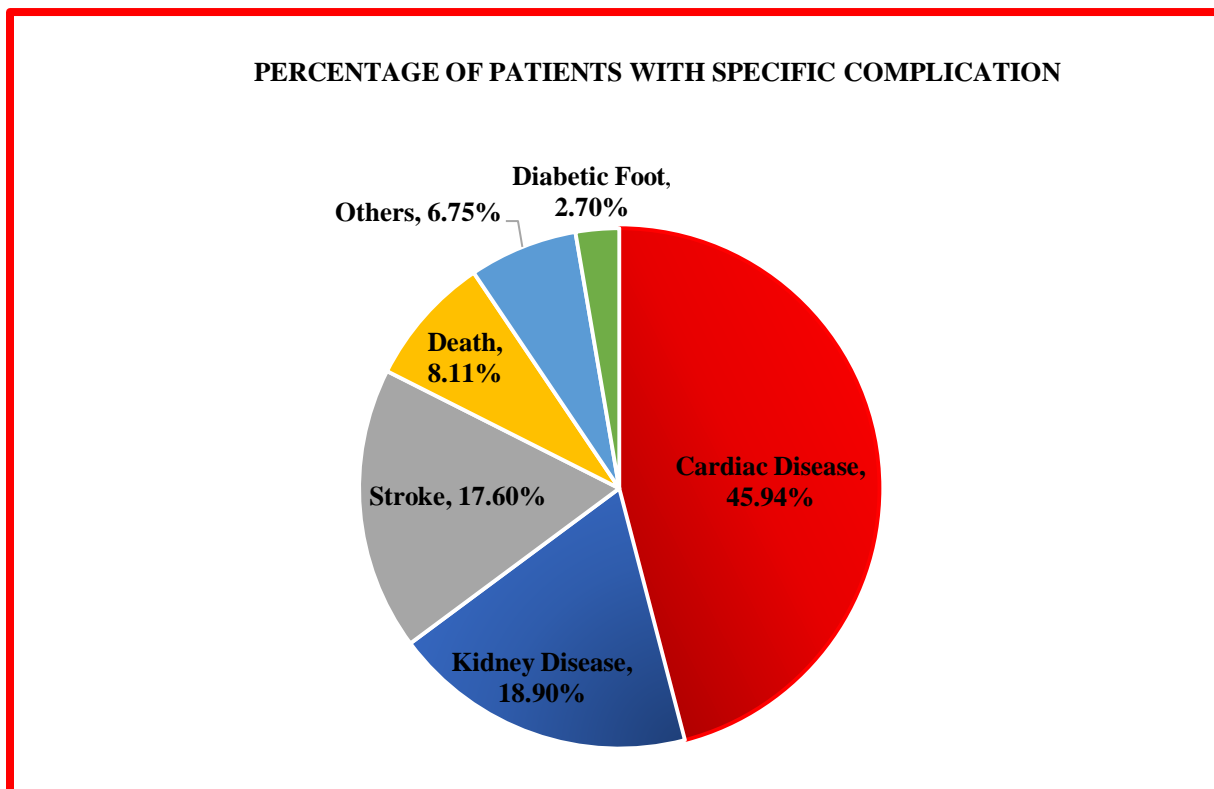


**Fig 8: Pie chart presentation of percentage of DHD patients according to complications**

The subjects in this study are also categorised according to complications because of diabetes, hypertension and dyslipidaemia as follows; 148 (77.4%) subjects are diagnosed with any of the complications of DHD and only 43 (22.6%) subjects are presented with free of complications.

**Table 9: Percentage of patients with specific complications**

DISEASE CONDITION	PERCENTAGE (%)
STROKE	17.6%
DIABETIC FOOT	2.7%
KIDNEY DISEASES	18.9%
CARDIOVASCULAR DISEASES	45.94%
DEATH	8.11%
OTHERS	6.75%



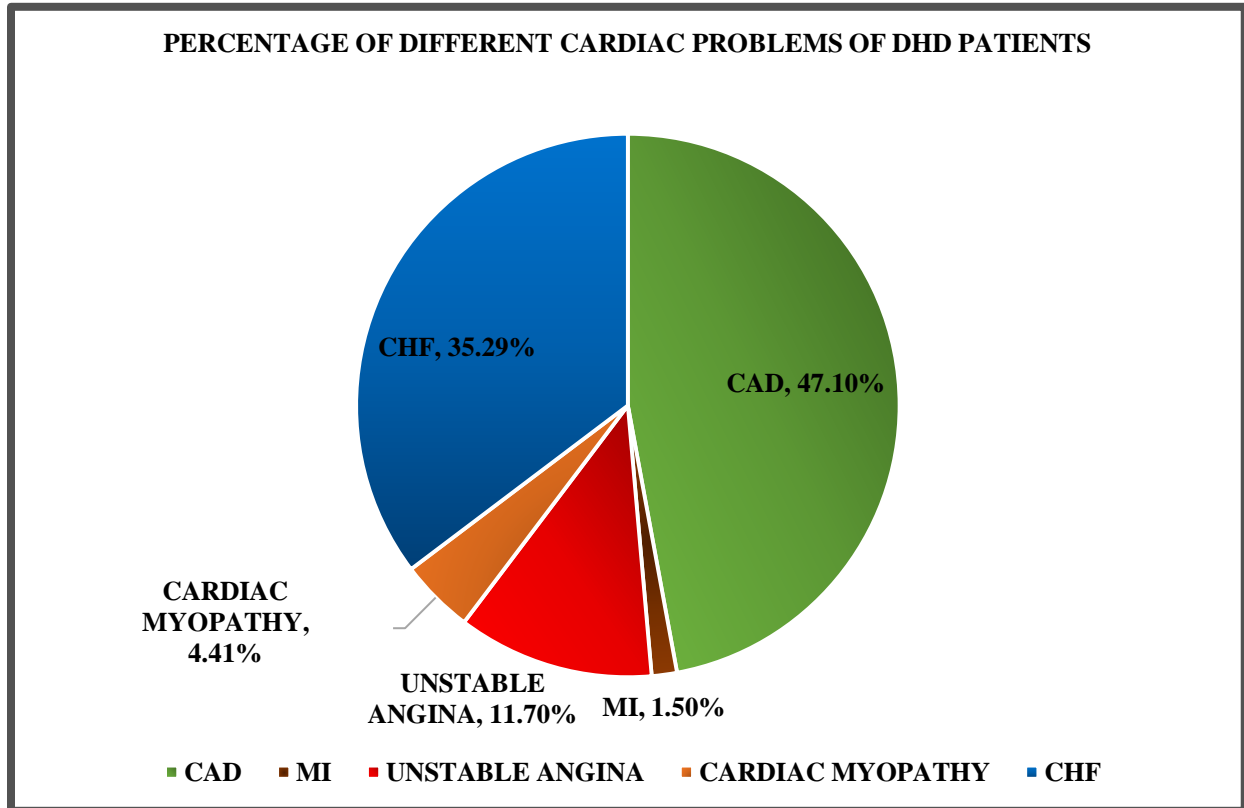
**Fig 9: Pie chart presentation of percentage of subjects with specific complications**

In this study, specific complications are enlisted in a particular manner, the most common complications include cardiovascular diseases 45.94% in addition to kidney disease 18.90%, stroke 17.60%, others 6.75% and diabetic foot 2.7%. The mortality rate was found to be 8.11%.



**Table 10: Percentage of different cardiac problems of DHD patients**

S.NO.	CARDIAC PROBLEMS	PERCENTAGE
1.	CAD	32 (47.1%)
2.	MI	1 (1.5%)
3.	UNSTABLE ANGINA	8 (11.7%)
4.	CARDIAC MYOPATHY	3 (4.41%)
5.	CHF	24 (35.29%)

**Fig 10: Pie chart representation of different cardiac diseases of DHD patients**

In this study, Cardiovascular complications are enlisted as follows; CAD was seen as the most resulting complication with the highest percentage of 47%, in addition to CHF at 35.29%, Unstable angina at 11.70%, Cardiac myopathy at 4.41%, and MI at 1.5%.

Table 11: Percentage of stroke in DHD patients

S.NO	TYPE OF STROKE	PERCENTAGE
1	ISCHAEMIC	10(38.5%)
2	HAEMORRHAGIC	16(61.5%)

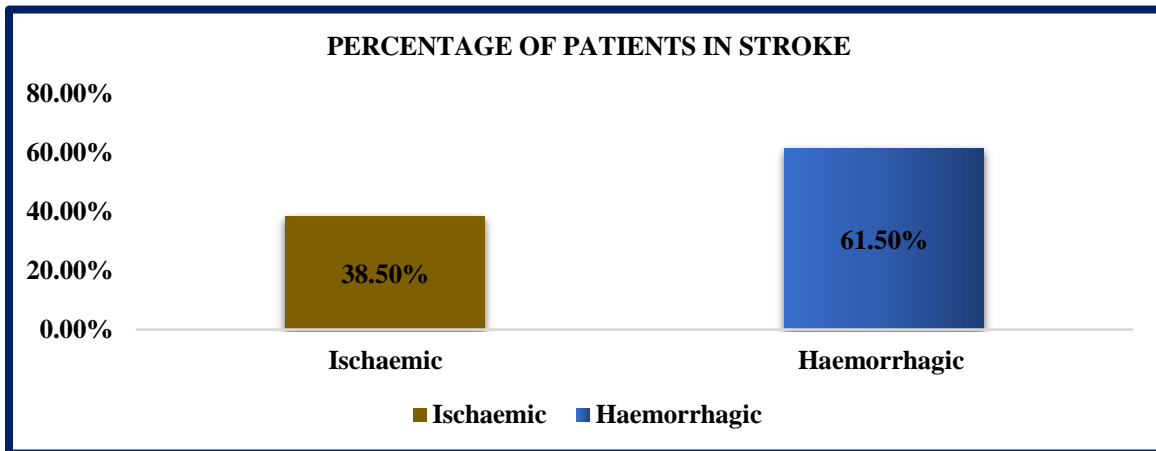


Fig 11: Graphical representation of DHD patients with stroke

In this study, occurrence of stroke categorised separately as it is one of the leading complication for DHD. Haemorrhagic stroke was found as most common with 61.50% and followed by ischaemic 38.50%.

Table 12: Percentage of reasons for death

S. NO.	REASONS FOR DEATH	PERCENTAGE
1.	CARDIAC ARREST	6 (50%)
2.	STROKE	2 (16.7%)
3.	HYPOGLYCEMIA	1 (8.3%)
4.	MODS	3 (25%)

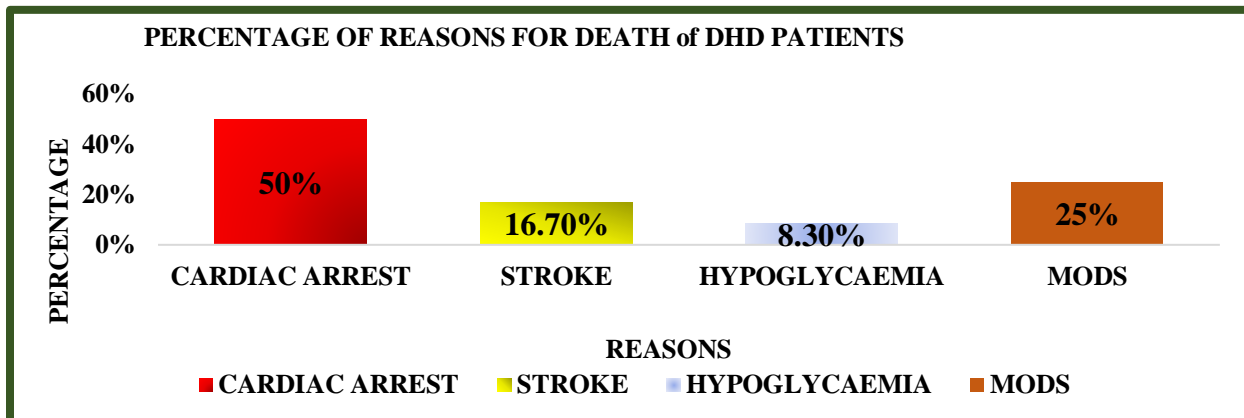
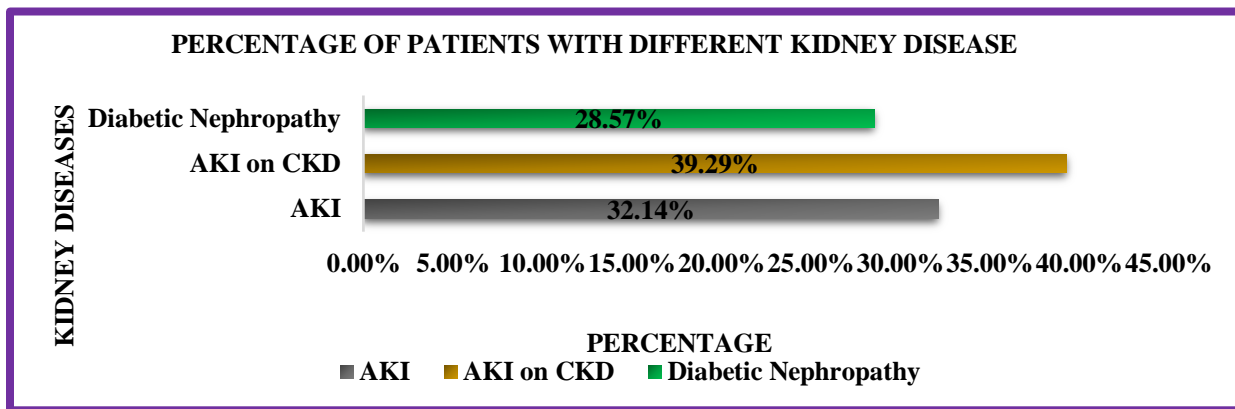


Fig 12: Graphical representation of the percentage of reasons for death in DHD patients

In this retrospective study, the mortality rate was observed for 12 subjects and the most common complication included cardiac arrest 50%, in addition to multi-organ dysfunction syndrome 25%, stroke 16.70% and lastly hypoglycaemia 8.30%.

**Table 13: Percentage of DHD patients with different kidney diseases**

S.NO	TYPES OF KIDNEY DISEASES	PERCENTAGE
1	AKI	9(32.14%)
2	AKI ON CKD	11(39.29%)
3	DIABETIC NEPHROPATHY	8(28.57%)

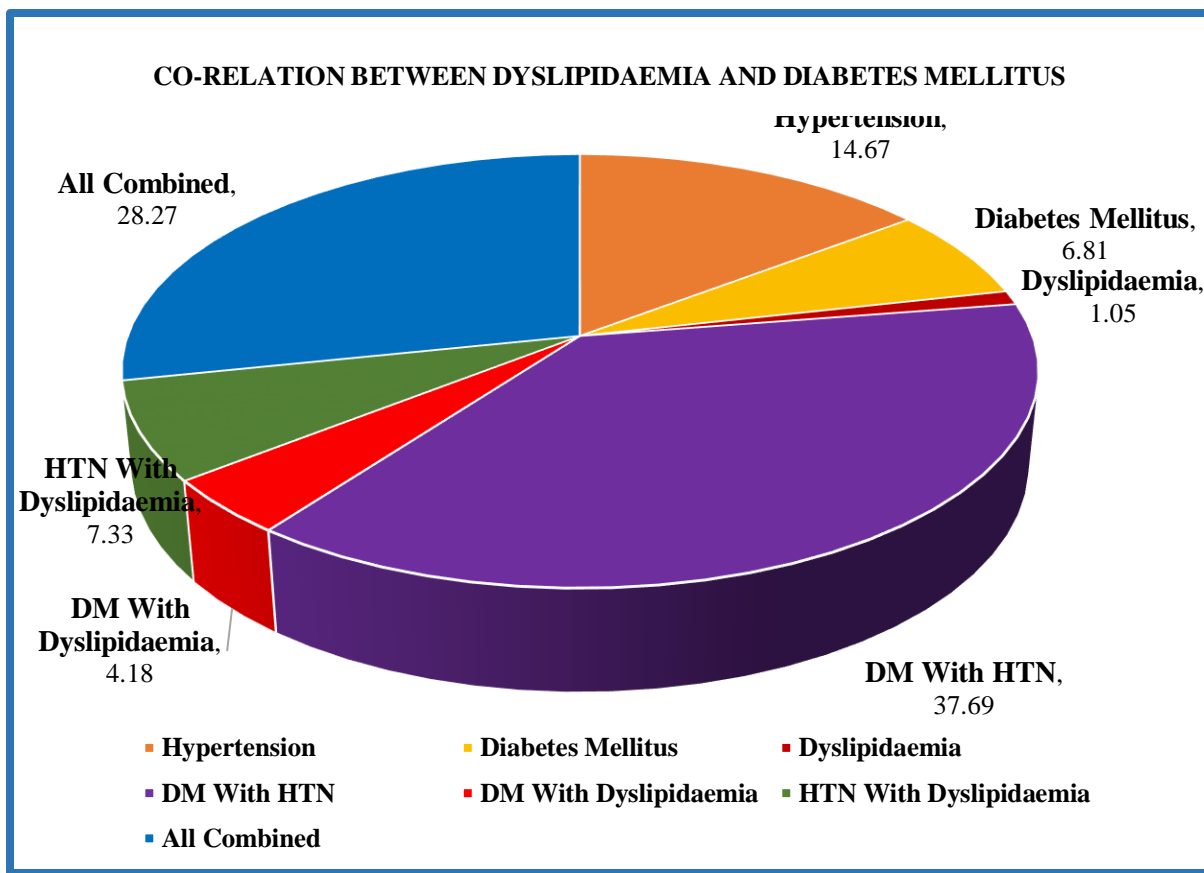


**Fig 13: Graphical representation of DHD patients with different kidney diseases**

In this study, we categorised kidney diseases for a better understanding of the complications of DHD. The most common include AKI on CKD 39.29%, followed by AKI 32.14%, and diabetic nephropathy 28.57%.

**Table 14: Percentage of co-relation between dyslipidaemia, hypertension and diabetes mellitus**

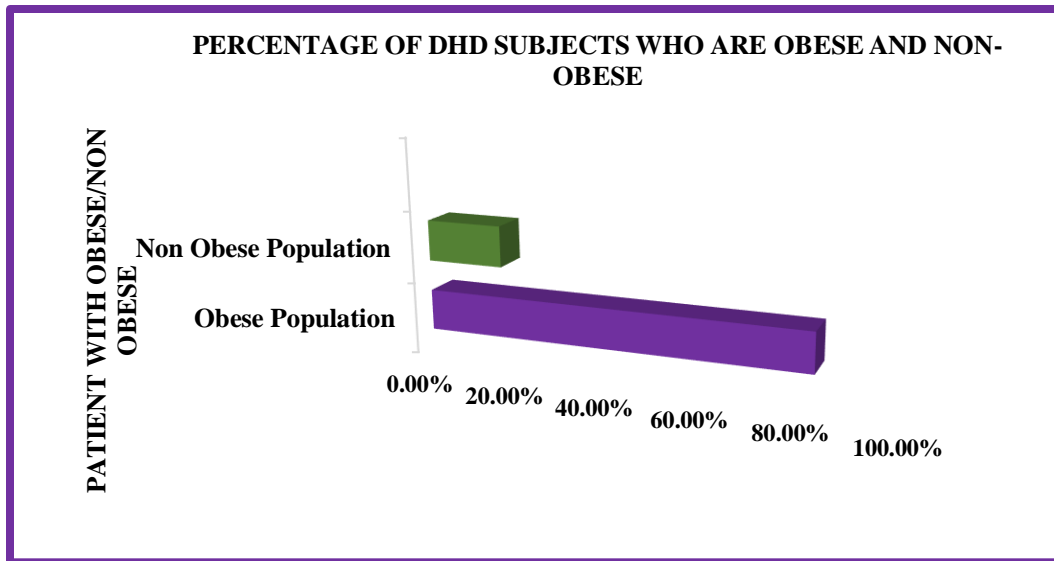
S. NO.	INTERLINKAGE	PERCENTAGE
1.	HYPERTENSION	14.67%
2.	DIABETES MELLITUS	6.81%
3.	DYSLIPIDAEMIA	1.05%
4.	DM WITH HTN	37.69%
5.	DM WITH DYSLIPIDAEMIA	4.18%
6.	HTN WITH DYSLIPIDAEMIA	7.33%
7.	ALL COMBINED	28.27%



**Fig 14: Pie chart of the percentage of co-relation between dyslipidaemia, and diabetes mellitus**  
 In this retrospective study, 14.67% of subjects presented with hypertension, 6.81% with diabetes, and 1.05% with dyslipidaemia. The combination of hypertension and diabetes was seen mostly with 37.69%, followed by hypertension with dyslipidaemia 7.33%, and lastly diabetes with dyslipidaemia seen 4.18%. The tragic trio i.e., all combined seen in 28.27% of subjects.

**Table 15: Percentage of DHD subjects who are obese and non-obese**

S. NO.	TYPES	PERCENTAGE
1.	OBESE POPULATION	159 (83.25%)
2.	NON-OBESE POPULATION	32 (16.75%)

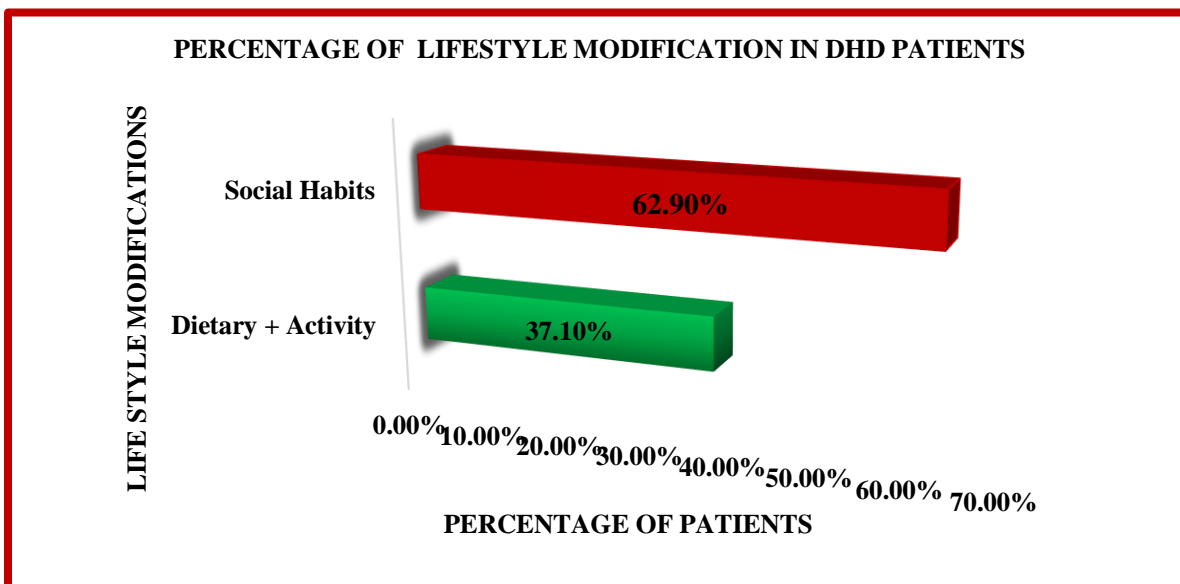


**Fig 15: Graphical representation of DHD subjects based on obese and non-obese**

In this study, the obese population was seen mostly than the non-obese population. The obese subject's percentage was found to be 83.25% and non-obese was found to be 17.75%.

**Table 16: Percentage of DHD subjects based on lifestyle modifications**

S.NO.	TYPES OF CHANGES	PERCENTAGE
1.	DIETARY + PHYSICAL ACTIVITIES	71 (37.1%)
2.	SOCIAL HABITS	120 (62.9%)



**Fig 16: Bar representation of DHD subjects based on lifestyle modifications**

In this study, subjects are recommended to follow some lifestyle modifications. Approximately 62.9% of subjects needed to change their social habits and 37.1% needed to change their diet approach and add physical activities.

**DISCUSSION:**

In the previous study conducted the sample size was found to be 14215 which was specifically carried out in the male population and in the current study, it was observed that out of a total sample size of 191 patients, males were found to be 127 (66.4%).

In the present research work carried out, which is a retrospective, observational and analytical study in the tragic trio of dyslipidaemia, hypertension and diabetes mellitus, the prevalence of the trio diseases was found to be between the age group of 60-69 years and in the older study that was carried out, the age groups between 40-65 were more prone to develop the trio diseases.

As per the previous study conducted, the mortality rate was found to be 9% and in the present study, the death rate was supposed to 8.11%.

In the present study conducted it was concluded that obesity has been imparting an important role as a risk factor for the development and progression of hypertension, type 2 diabetes mellitus and dyslipidaemia. A total of 83.25% of patients were found to be obese. Whereas in previous studies it was also observed that obesity has been a main health risk factor for causing diseases such as hypertension, diabetes mellitus as well as many different types of cancers and in this study work 13% of the patients were obese.

According to the older study conducted with a sample size of 11036 patients, about 8.3% suffered from dyslipidaemia, 18.5% had hypertension and 6.8% had diabetes mellitus, whereas in the present study carried out 1.05% of patients were accounted to have dyslipidaemias, 14.67% had hypertension and 6.8% had diabetes mellitus.

According to the present study, the percentage of patients who were alcoholics include 62.8% and the percentage of smokers was found to be 60.2%, whereas in the previous study conducted it was observed that 22.8% of patients were smokers and 33.4% were alcoholics.

The majority of the patients in the study had comorbid conditions that is 77.4% out of which cardiovascular complications accounted for the highest percentage 45.94%, whereas in the previous study carried out it was observed that cardiovascular complications were most common 43%.

**CONCLUSION:**

The term Tragic Trio is taken into consideration, as Dyslipidaemia, Diabetes, and Hypertension can combinedly cause potential risk to the patient which can ultimately lead to death.

The beginning of one condition in any of the 3 diseases (DHD), can involve the occurrence of the other two conditions and can accelerate the process of developing life-threatening complications.

Our current study is a retrospective, observational and analytical study, which is carried out in a multi-speciality hospital, Aware Gleneagles Global Hospital, L.B. Nagar, Hyderabad. This study was conducted over a time period of 6 months.

The main concept to conduct this study was to identify the interlink between dyslipidaemia, hypertension and diabetes mellitus and to summarize the required measures to be taken for its prevention and treatment. This study is conducted on a total number of 191 patients who are affected with dyslipidaemia, hypertension and diabetes either individually or together.

In our study, we found that most of the affected population are males (127) when compared to females (64).

From the results of our study, we observed that the age group of 60-69 years are more in number than the other age groups.

In our study, most of the cases are developed because of the sedentary lifestyle and improper/unbalanced diet followed by the patient. So, more than 75% of the patients are advised to change their diet, food timings, workout time, and resting time, and to avoid unnecessary stress.

Most of the patients with dyslipidaemia are prescribed and treated with statins, a diabetic diet, and hypertensive and diabetic medications depending on the patient variability.

Intake of alcohol plays an important role in increasing the levels of LDL in the body. This can lead to dyslipidaemia which is a major risk factor for cardiovascular complications.

Smoking is a potential risk factor for developing hypertension and it may also cause diabetes and

dyslipidaemia which can further progress into cardiovascular complications.

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