A Prospective Study on Prevalence, Risk Factors, Biochemical Parameters, Comorbidities and Prescription Pattern in Coronary Artery Disease

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ABSTRACT

The main aim of the study was to assess the prevalence, risk factors, biochemical parameters, co-morbidities and prescription pattern in coronary artery disease. The study was designed as a hospital-based Prospective study in two Private hospitals at Palakkad. A predesigned data entry form was used to obtain and evaluate the data. A total of 256 cases were included in the study. About 35.93% CAD patients was in the age group 60-70 years and males were more prone to CAD's. The most common risk factor for CAD was found to be Hypertension (33.59%) followed by Diabetes Mellitus. The majority patients were administered with Antiplatelet drugs, Hypolipidemic drugs and antihypertensives to manage the CAD. Troponin was found to be the most altered abnormal laboratory value in CAD patients. The comorbidities which occurred in majority of the patients was Hypertension and Diabetes Mellitus which was followed by IHD and MI. The rationality in prescription pattern of CAD patients was monitored by checking Drug Interactions and Adverse Drug Reactions. 94.53% prescriptions had drug interactions in which 46.87% was moderate interactions and 100% prescriptions had ADR. The study concludes that the incidence of the disease can be reduced by proper lifestyle modifications and by proper control on the lifestyle diseases like Hypertension, Diabetes Mellitus etc. Since our study was conducted in a small population results may not be appropriate, so more researches should be carried out for accurate results.

INTRODUCTION

Coronary artery disease is one of the most common causes of mortality and morbidity in both developed and developing countries. It is a leading cause of death in India, and its contribution to mortality is rising. Impedance or blockage of one or more arteries that supply blood to heart which typically damages the blood vessels usually due to atherosclerosis. The increase in heart disease deaths was due to an increase in the prevalence of coronary atherosclerosis with resultant coronary artery disease. This increase was associated with an increase in smoking and dietary changes leading to an increase in serum cholesterol levels. CAD appears a decade earlier compared with the age incidence in developed countries, peak being between 51 and 60 years. Co-morbidity is a cause of increased mortality, decreased quality of life and increased use of health care services. Cardiovascular diseases are the most common cause of death from non-communicable diseases worldwide and are characterized by a high level of co-morbidities. According to reports from the National Commission on Macroeconomics and Health, 62 million people in India will have CAD for the future years with 23 million of these below 40 years of age. This study aims to assess the prevalence, risk factors, biochemical parameters, co-morbidities and prescription pattern in coronary artery disease. The main objectives of the study include the evaluation of management and therapeutic outcome in Coronary Artery Disease and to check the irrationalities in prescription pattern among CAD patients.

MATERIALS AND METHODS

The study was designed as a hospital-based Prospective study in two Private hospitals at Palakkad. A predesigned data entry form was used to obtain and evaluate the data. 256 cases were included in the study. *Inclusion Criteria:* All inpatients having cardiovascular diseases were included in the study. *Exclusion Criteria:* Cases which does not contain relevant information and Cases which are referred to higher centres for treatment were excluded in the study. The data collection was carried out for a period of 4 months (October 2018 to January 2019). The information related with patients were available in the case sheets (from the date of admission till date of discharge). The data needed for the study was recorded in the data entry form. Pharmacist intervention was done after the data collection. Adverse Drug Reactions and Drug Interactions was checked from CIMS, Drug Interaction Checker software etc.

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RESULTS AND DISCUSSION

A total of 267 cases were collected, from which 256 cases were included and used for the study based on the inclusion and exclusion criteria.

Table 1: Distribution according to age

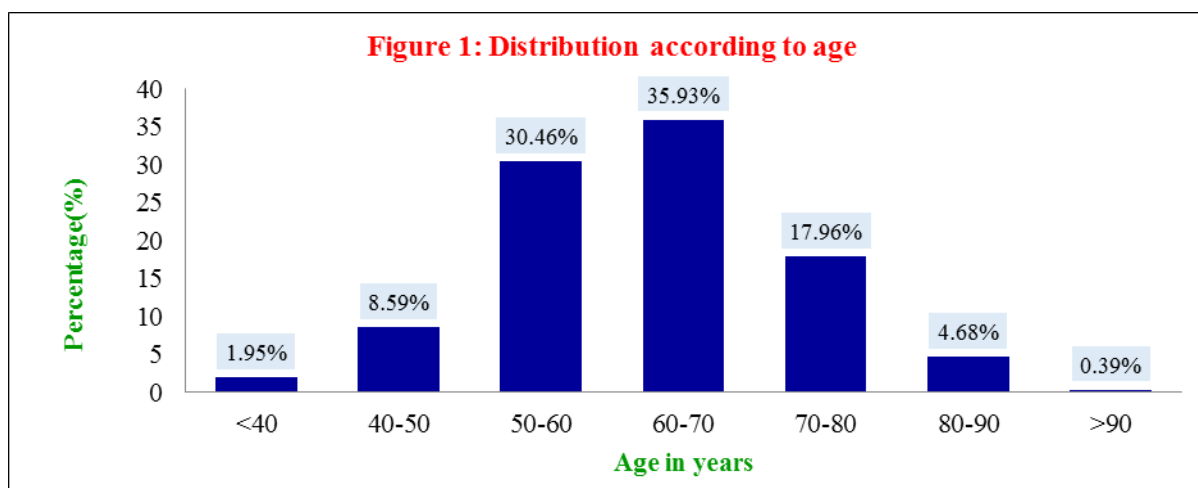| Sl. No.	Age (Years)	Number of patients (n=256)	Percentage (%)
1	<40	5	1.95
2	40-50	22	8.591
3	50-60	78	30.46
4	60-70	92	35.93
5	70-80	46	17.96
6	80-90	12	4.68
7	>90	1	0.39

Figure 1: Distribution according to age

Table 1 and Figure 1 represent the age wise distribution of patient with CAD in which 35.93% patients were in the age group of 60-70 years. 30.46% and 8.51% corresponds to the age groups of 50-60 years, whereas 8.51% were included in the age group of 40-50 years and 17.96% were included in the age group of 70-80 years. In the studies conducted by S.Dinkar et al and Ajay.D.Shanbhag et al CAD was most prevalent in the age group 50-60 years.

Table 2: Distribution according to gender

Sl.No.	Gender	Number of patients (n=256)	Percentage (%)
1	Male	165	64.45
2	Female	91	35.54

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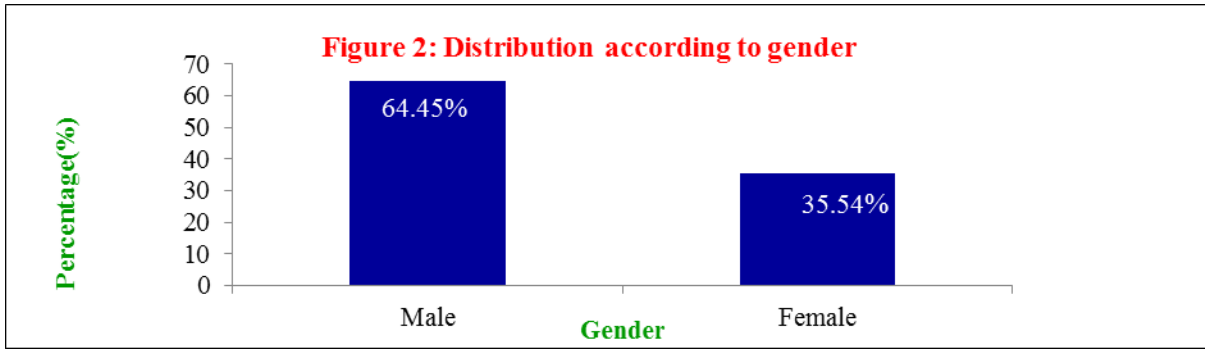
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Figure 2: Distribution according to gender

Table 2 and Figure 2 represent the distribution of patients according to gender, in which 64.45% patients were male and 35.54% patients were females, it represents that the risk of incidence of CAD is high in males is higher than that of females. These datas are in concordance with the studies done by S.Dinkar et al and Ajay.D.Shanbhag et al.

Table 3: Distribution according to social habits

Sl. No.	Social habits	Number of patients (n=256)	Percentage (%)
1	Smoking	37	14.45
2	Alcoholism	45	17.57
3	Mixed diet	154	60.15
4	Not available	20	7.81

Figure 3: Distribution according to social habits
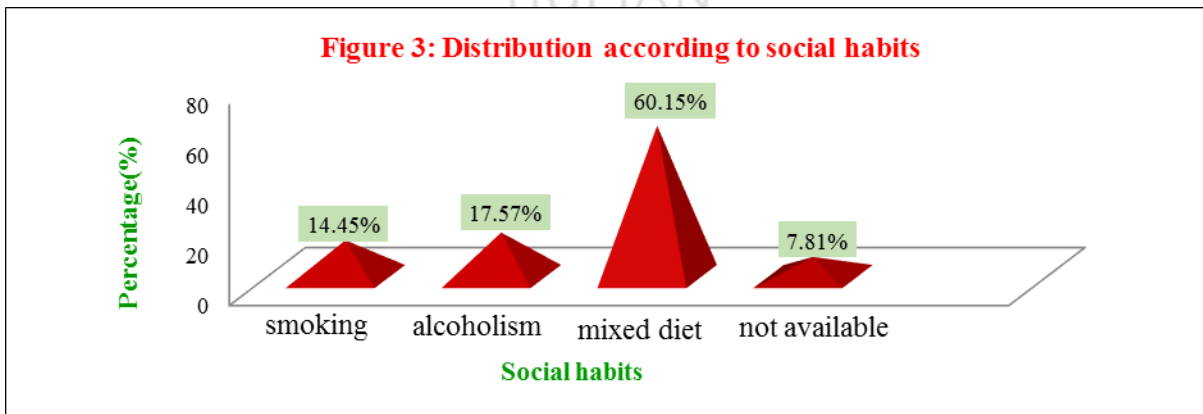
Table 3 and Figure 3 represent the distribution of patients according to social habits, in which 60.15% patients were with mixed diet and 17.57% patients were with alcoholism. M.N.Krishnan et al studied about the risk factors of CAD in Kerala and concluded that social habits like smoking and diet encounters a major percentage of coronary artery disease patients.

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Table 4: Distribution according to past medical history

Sl. No.	Past medical history	Number of patients (n=256)*	Percentage (%)
1	Diabetes mellitus	84	32.81
2	Hypertension	82	32.05
3	Ischemic heart disease	32	12.5
4	CAD	23	8.98
5	Pulmonary heart disease	13	5.07
6	Chronic heart disease	5	1.95
7	Dyslipidemia	10	3.90
8	Anemia	4	1.562
9	Thyroid disorder	13	5.07
10	Not available	23	8.98

n=256 total will not correspond to100% because of multiple diseases

Figure 4: Distribution according to Past Medical History
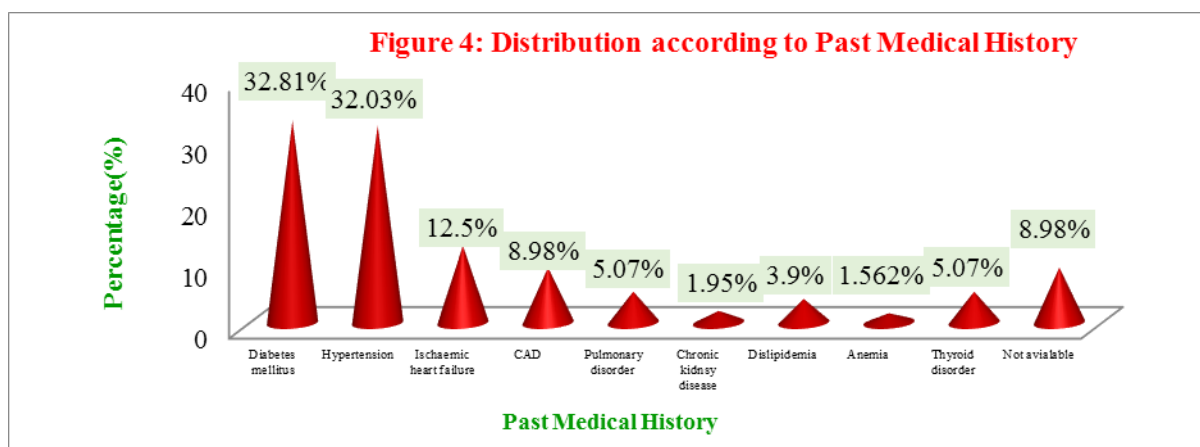
Table 4 and Figure 4 shows the distribution according to past medical history in which patients having past medical history of diabetes mellitus was found to be 32.81%, 32.03% had hypertension and 12.5% had ischemic heart disease and 8.98% had CAD. L.Katherine Morrison et al conducted a study and finds that patients with a past medical history of hypertension was known to be the main risk factor of CAD.

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Table 5: Distribution according to blood pressure

| Sl. No.	Blood pressure	Types	Number of patients (n=256)*	Percentage (%)
1	Systolic blood pressure on date of admission	i)Pre-hypertension	103	40.23
		ii)Normal hypertension	58	22.65
		iii)Stage I hypertension	49	14.14
		iv)Stage II hypertension	49	14.14
2	Diastolic blood pressure on date of admission	i)Pre-hypertension	97	37.89
		ii)Normal hypertension	72	28.12
		iii)Stage I hypertension	55	21.48
		iv)Stage II hypertension	32	12.5
3	Systolic blood pressure on date of discharge	i)Pre-hypertension	137	53.51
		ii)Normal hypertension	70	27.34
		iii)Stage I hypertension	34	13.28
		iv)Stage II hypertension	15	5.85
4	Diastolic blood pressure on date of discharge	i)Pre-hypertension	125	48.82
		ii)Normal hypertension	46	17.96
		iii)Stage I hypertension	57	22.26
		iv)Stage II hypertension	28	10.93

Table 5 represents the distribution of patients according to blood pressure. According to this study, the patients with elevated BP on the date of admission was decreased to normal levels during the date of discharge. In another study conducted by Clive Rosendorff et al concluded that in patients with BP variations should be treated with appropriate drug therapy.

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Table 6: Distribution according to co morbidities

Sl. No.	Co morbidities	Number of patients (n=256)*	Percentage (%)
1	Hypertension	86	33.59
2	Myocardial infarction	23	8.98
3	Hypothyroidism	7	2.73
4	Ischemic heart disease	56	21.87
5	Renal artery disease	1	0.39
6	Anemia	1	0.39
7	Diabetes mellitus	77	30.07
8	Angina	9	3.51
9	CAD	74	28.90
10	Atherosclerosis	8	3.12
11	Hyperlipidemia	5	1.95
12	Others	62	24.21

Figure 5: Distribution according to co-morbidities
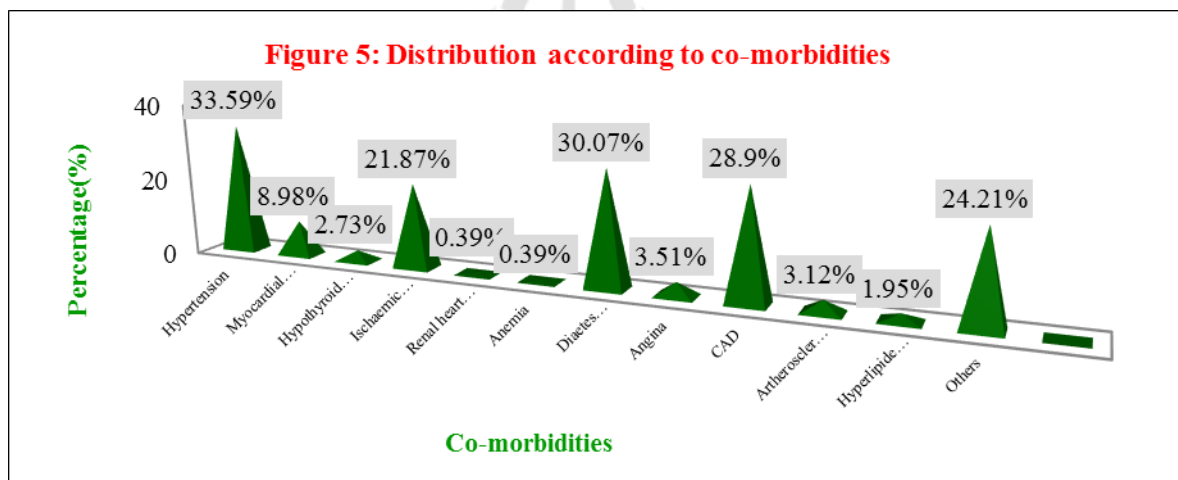
n=256 total will not correspond to100% because of multiple comorbidities

Table 6 and Figure 5 shows the distribution of patients according to the co-morbidities in which 33.59% patients had hypertension, 30.07% patients had DM, 28.90% patient had CAD, 21.87% patient having ischemic heart disease, 8.98% patient having MI, and 3.51%, 3.12%, 2.73%, 1.95% patients corresponds to angina, atherosclerosis, hypothyroidism and hyperlipidemia. Candan Kendir et al conducted a study and arrives at a conclusion that cardiovascular disease patients have higher risk for comorbidities. Also in another study

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conducted by Ksenija Tusek Bunc et al, the conclusion was comorbidities was found to be an important risk factor in CAD patients.

Tables 7: Distribution of drugs during hospitalization

Table 7.1: Distribution according to category of drugs

Sl. No.	Category of drugs		Number of patients (n=256)*	Percentage (%)
1	Antihypertensive drugs	a)Diuretics	31	12.1
		b)ACE Inhibitors	15	5.85
		c)AT1 Antagonist	27	10.5
		d)Calcium channel blocker	12	4.68
		e)Beta- adrenergic blocker	67	26.17
		f)Beta+Alpha adrenergic blocker	2	0.78
		g)Uro selective alpha 1 blocker, Sympatholytic	3	1.17
2	Hypoglycemic agents	a) Biguanides	15	5.85
		b) Sulfonylureas	17	6.64
3	Bronchodilators	a) Methylxanthines	3	1.17
		b) Corticosteroids	18	7.0
		c) Leukotriene antagonist	7	2.73
		d)Beta2 sympathomemitics	18	7.0
4	Antihistaminic drugs	a)Moderately selective	13	5.0
		b)Second generation anti histamins	2	0.78
5	Anticoagulant drugs	a)Parentral anti-coagulants	21	8.2
		b)Oral anti-coagulants	1	0.39
6	Antiplatelet drugs	a)Aspirin	153	59.7
		b)P2Y12 Receptor blocker	242	94.5
		c)GPIb Antagonist	17	6.64
7	Hypolipidemic drugs	Statins	144	56.25
8	Gastrointestinal	a)H2 Antihistamines	16	6.25

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	drugs	b)Protein pump inhibitors	162	63.28
9	Antibiotics	Cephalosporin	75	29.29
10	Antipyretics & Analgesics	a)Parentral cox-2 inhibitors	2	0.78
		b)Poor anti-inflammatory actions	28	10.93
11	Corticosteroids	a)Natural gluco-corticosteroids	12	4.68
		b)Synthetic glucocorticoids	15	5.85
12	Antiemetic drugs	a)Neuroleptics(D2 blockers)	7	2.73
		b)5-HT3 antagonist	1	0.39
13	Antiepileptic drugs	a)Hydantoin	5	1.95
		b)Barbiturates	1	0.39
14	Antiarrhythmic drugs	Agent widening action potential	5	1.95
15	Antianginal drugs	a)Nitrates	7	2.73
		b)others	2	0.78
16	Antigout drugs	Synthesis inhibitors	1	0.39
17	Anti-microbial drugs	Fluoroquinolones	13	5.07

*n=256 total will not corresponds to100% because of multiple drug administered

Table 7.1 indicates the distribution according to category of drugs. This study consolidates the datas that Beta Blockers was the commonly prescribed Antihypertensive drug which was followed by Diuretics. Antiplatelet drugs, statins were given to majority of the CAD patients. Sundeep Mishra et al conducted a study on the management standards for CAD and the drug therapies to be given are discussed in detail.

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Table 7.2: Distribution of prescribed drugs according to number of brand names

Sl. No.	Generic name	No: of patients (n=256)*	No: of Brands prescribed
1	Aspirin	153	2
2	Ceftriaxone	74	3
3	Clopidogrel	231	3
4	Atorvastatin	144	5
5	Pantoprazole	131	5
6	Thyronorm	20	1
7	Furosemide	24	2
8	Metoprolol	48	4
9	Enoxaparin	51	2
10	Glimepiride	15	2
11	Metformin	15	2
12	Acetyl cystein	23	2
13	Rosuvastatin	11	2
14	Rabeprazole	11	4
15	Acebrophylline	9	1

n=256 total will not corresponds to100% because of multiple number of brands prescribed

Table 7.2 shows the distribution of drugs according to the number of brands prescribed. Majority of the drugs was prescribed with two brands while Atorvastatin and Pantoprazole was prescribed in five brands.

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Table 8: Distribution according to abnormal laboratory values (biochemical parameters)

Sl. No.	Laboratory values	Increased No: of patients (n=256)*	Percentage (%)	Decreased (No: of patients n=256)*	Percentage (%)
1	Hemoglobin (gm/dl)	0	0	23	8.9
2	Serum creatinine (mg/dl)	20	7.8	0	0
3	ESR(mm/hr)	20	7.8	4	1.56
4	Platelet	1	0.39	4	1.56
5	Serum Na^+ (mg/dl)	0	0	13	11.71
6	Serum k^+	3	1.17	6	2.34
7	S. Cholesterol	13	5.07	9	3.9
8	FBBS/PPBS/RBS	18	7.03	3	1.17
9	Urea	28	8.9	3	1.17
10	Uric acid	1	0.39	2	0.78
11	Troponin	4	1.56	15	5.85
12	TSH	3	1.17	1	0.39

n=256 total will not corresponds to100% because of multiple laboratory values

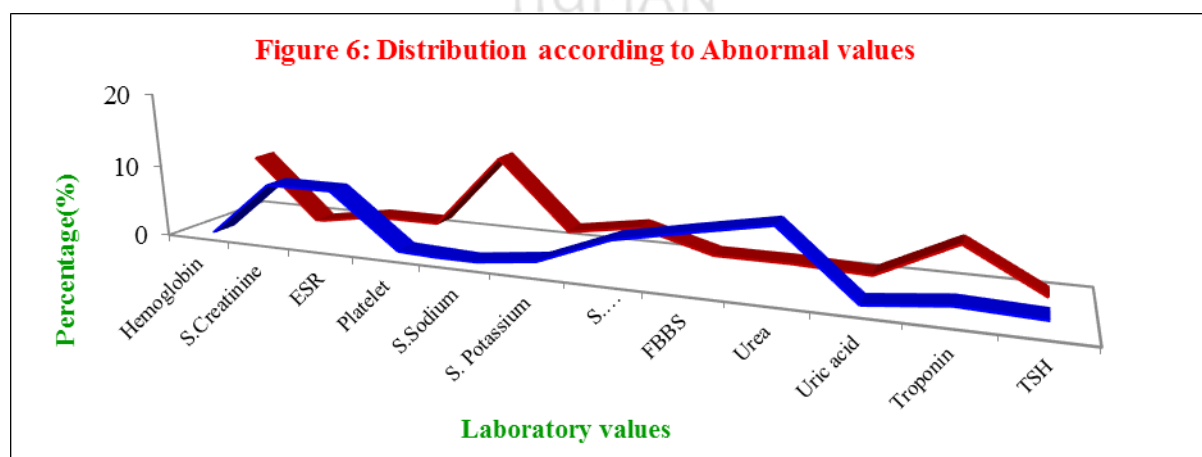Figure 6: Distribution according to Abnormal values

Table 8 and Figure 6 indicates the distribution of patients with abnormal laboratory values from which 8.9% patients shows decreased haemoglobin levels, 7.8% patients show increased serum creatinine and 1.56% patients show decreased levels of ESR and platelets with 1.56% whereas 11.71% patients shows increased S. Na^+ levels, 5.07% and 3.9% patients show increased and decreased levels of S. cholesterol and 1.56% and 5.85% patients show increased and decreased levels troponin. Tatiana I Petelina at al concluded in his study that

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Total Cholesterol and HDL are the elevated biochemical parameters in CAD patients, while in a study conducted by Donovan A McGrowder concluded that variations in lipid profiles can be clearly observe in CAD patients. Hilal Bektas Uysal et al conducted a study and suggests that Mean Platelet Volume and Neutrophil to Lymphocyte ratio are the predictors of atherosclerosis and can be used to identify CAD as earlier as possible, but in our study, these parameters were not highlighted with importance. Julia Hubbard concludes that biochemical markers for heart disease are most useful if they are specific to heart and are measurable by laboratory within timeframe sufficiently short to allow for initiation of suitable treatment.

Table 9: Distribution according to prevalence of disease

Sl. No.	Medical condition	Number of patients (n=256)*	Percentage (%)
1	Hypertension	86	33.59
2	Myocardial infarction	23	8.98
3	IHD	56	21.87
4	Renal artery disease	1	0.39
5	Hypothyroidism	7	2.73
6	Anemia	1	0.39
7	CAD	74	28.90
8	Diabetes mellitus	77	30.07

n=256 total will not corresponds to100% because of multiple diseases

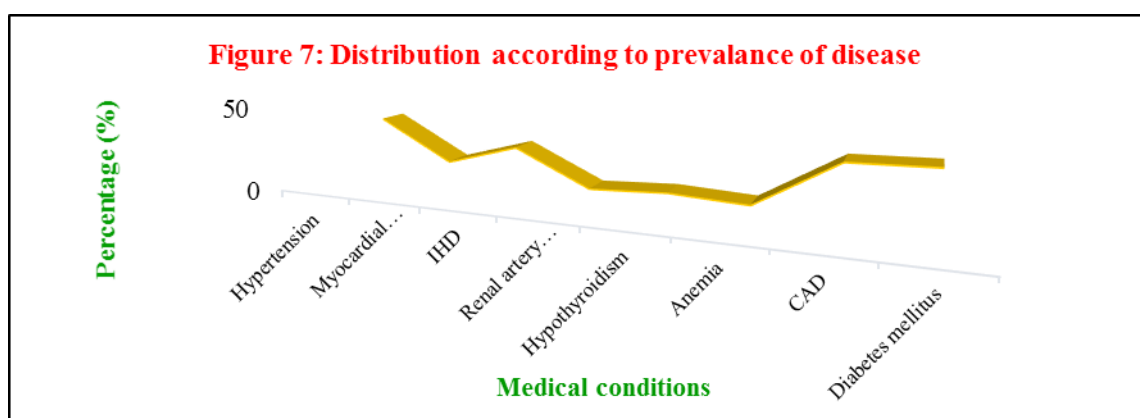Figure 7: Distribution according to prevalance of disease

Table 9 and Figure 7 show distribution according to prevalence of disease, in which 33.59% patients with hypertension, 30.07% patients with diabetes mellitus, 28.90% patients with CAD, 21.87% patients with IHD, 8.98% patients with myocardial infarction and 2.73%

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patients with hypothyroidism. But only 0.39% patients with renal artery disease and anaemia. In a study conducted by Donovan A McGrowder, hypertension was observed to be most commonly occurring risk factor in CAD patients.

Table 10: Distribution of drugs according to rationality in prescriptions

Sl. No.	ADR	Number of prescriptions(n=256)	Percentage (%)
1	With adverse drug reaction	256	100
2	Without adverse drug reaction	0	0

Table 10.1: According to drug interactions

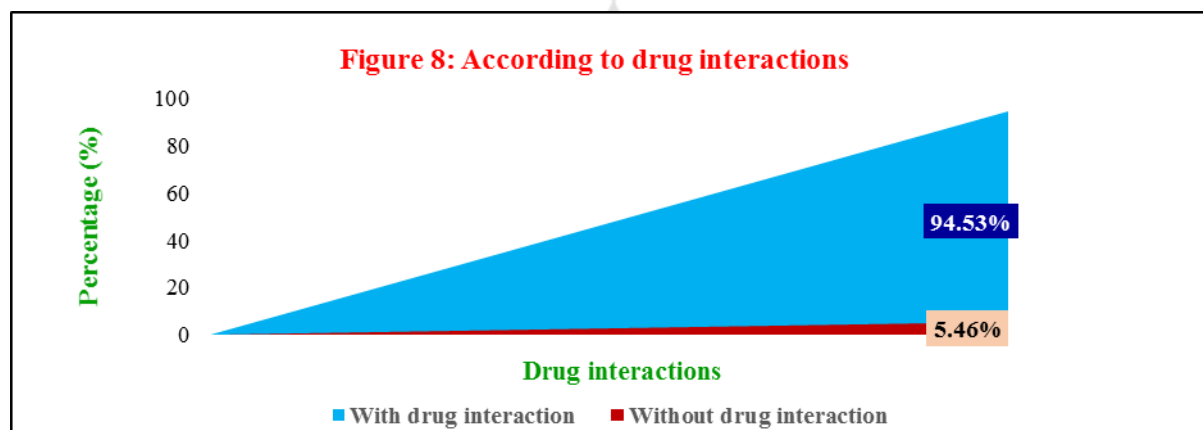| Sl. No.	Drug interactions	Number of prescriptions(n=256)	Percentage (%)
1	With drug interaction	242	94.53
2	Without drug interaction	14	5.46

Figure 8: According to drug interactions

Table 10.1 and Figure 8 indicates distribution according to rationality on the basis of drug interaction in which 94.53% patients having drug interactions and 5.46% patients have no drug interactions. Ajay. D. Shanbhag et al. studied that drug interactions are more among hospitalised cardiac patients.

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Table 10.2: Distribution according severity of drug interactions

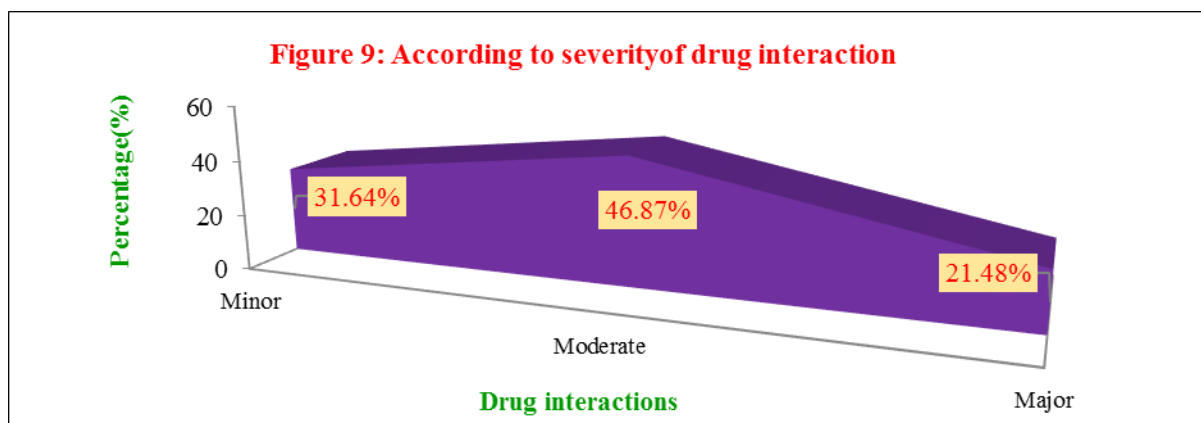Figure 9: According to severity of drug interaction

Table 10.2 and Figure 9 indicates distribution according to severity of drug interactions in which 31.64% patients having minor drug interaction, 46.87% patients having moderate drug interaction, but only 21.48% patients having major drug interaction. Ajay.D.Shanbhag et al studied and reported potential drug drug interactions in cardiac patients and suggests that usage of drug interaction databases will prevent the hazardous consequences in cardiac patients.

Table 10.3: According to ADR

Sl. No.	Severity of Drug interactions	Number of patients (n=256)	Percentage (%)
1	Minor	81	31.64
2	Moderate	120	46.87
3	Major	55	21.48

Figure 10: According to adverse drug reaction

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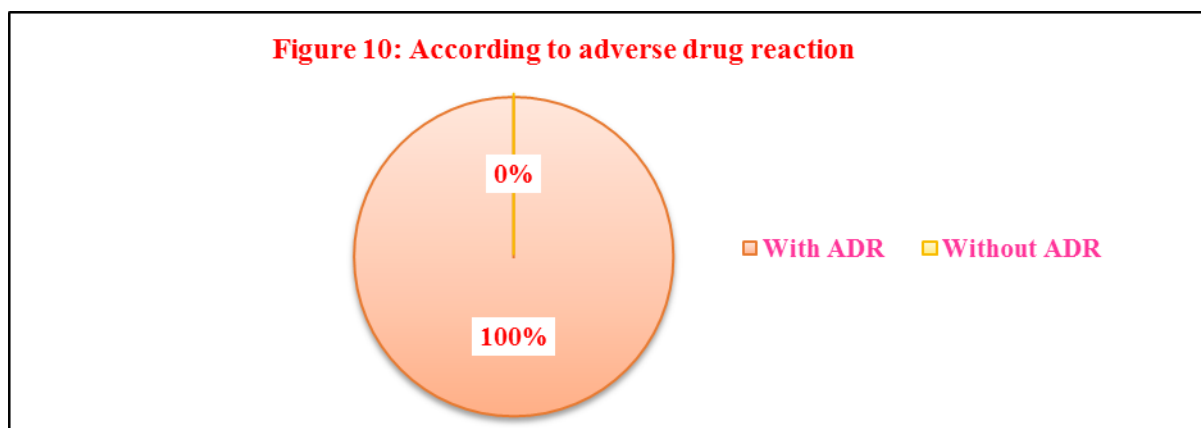
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Table 10.3 and Figure 10 shows that distribution according to adverse drug reaction, in which 100% patients had ADR. Lia Amalia et al arrives at a conclusion from their study that Cardiovascular system is the most often affected organs towards Adverse drug reactions.

CONCLUSION

The study concluded CAD was observed to be more prevalent in the age group 60-70 years. According to the study, the factors that influence CAD was found to be lifestyle modifications (mixed diet, smoking, alcoholism), HTN, DM, Atherosclerosis etc. Hypertension and Diabetes Mellitus was the comorbidities that occurred in majority of the patients and CAD was managed by Antiplatelets, Antihypertensives, statins in most of them. The rationality of the prescriptions was analysed by checking the drug interactions and adverse drug reactions and irrationalities was found out in many prescriptions. The drug interactions can be prevented to a certain extend by the usage of online drug interaction databases. Since our study was conducted in a small population results may not be appropriate, so more researches should be carried out for accurate results.

ACKNOWLEDGEMENT

REFERENCES

1. Donovan A. Mc Growder. Biochemical Parameters as Cardiovascular Risk Factors in Obese Children and Adult. J of Endocrinol Diab and Obes. 2018; 6 (1):1-11.

2. L. Katherine Morrison et al., Utility of a rapid B- Natriuretic Peptide Assay in Differentiating Congestive Heart failure from Lung Disease in Patients Presenting with Dyspnea. J of the Amer col of Cardiol. 2002; 39(2): 202-209.

3. Clive Rosendorff et al., Treatment of Hypertension in Patients with Coronary Artery Disease. A Case-Based Summary of the 2015 AHA/ACC/ASH Scientific Statement. The Amer J of Med. 2016; 129 (4), 372-378.

4. Sundeep Mishra et al., Management Standards for Stable Coronary Artery Disease in India. Ind Heart J. 2016; 68:531-549.

5. Candan Kendira et al., Cardiovascular disease patients have increased risk for comorbidity: A cross-sectional study in the Netherlands. Euro J of gen pract. 2018; 24(1), 45–50.

6. Ksenija Tusek Bunc et al., Co- Morbidities and Characteristics of Coronary Heart Disease Patients: their impact on health-related quality of life. Int J pharm heal sci. 2016;1(1) :1-31.

7. Tatiana I Petelina et al., Features of Biochemical Parameters of Blood Serum in Patients with Stable Angina and Type 2 Diabetes Mellitus. Endocrinol Metab Int J. 2018; 6(1):12-15.

8. Julia Hubbard, et al., Common biochemical markers for diagnosing heart disease. Int J of Cardiol. 2003; 99(26):24.

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9. Lia Amalia et al., Prevalence of Adverse Drug Reactions in CAD STEMI Patients Treated in the Cardiac Intensive Care Unit at the Public Hospital in Bandung, Indonesia. Sci Pharm.2016 Jan-Mar; 84(1): 167–179.

10. Hilal Bektas Uysal et al., Blood count parameters can predict the severity of coronary artery disease. Korean J Intern Med. 2016 Nov; 31(6): 1093–1100.

11. S.Dinakar et al., Coronary artery Disease: A descriptive analysis of risk factors: before and after treatment. Nat J of Comm Med. 2010; 1(2): 122-131.

12. Ajay D Shanbhag et al., Potential drug drug interactions among hospitalized cardiac patients. Int J of Bas & Cli Pharmacol. 2016 Oct; 5(5): 2251-2256.

13. M.N.Krishnan et al., Prevalance of Coronary artery disease and its Risk Factors in kerala, South India: A Community –based Cross-sectional Study. Nat J of Comm Med. 2016; 2(1): 30-62.

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