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Nutritional and Pharmacotherapeutic Consideration of Cardiovascular Disease with Co-Morbidities

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ABSTRACT: Aim: To observe nutritional and therapeutic effect on cardiovascular disease patients along with risk factors in co-morbidities in Government general hospital**. Objectives:** To conduct observational study on patients. To observe nutritional risk which increases cardiovascular events and their prevention measures, To consider some drug agents which increases risk of cardiovascular adverse events in the treatment of cardiovascular diseases with modifiable risk factors. **Methodology:** It is prospective observational epidemiological type of study. Conducted in the department of general medicine, Government medical college and Government general hospital at Srikakulam with a period of six months (March 2019 to September 2019) and the sample size was 100 subjects. **Results:** A total 100 subjects were included in the study 48 % were male and 52% were female. Average age was found to be 56- 65 years females are more prone to cardiac diseases compared to male, and its P value is 0.35516. Coronary artery diseases and congestive cardiac failure are these types of cardiovascular disease cases are more common in this period, its P value is 0.684813. Based on biochemical status there is high lipid levels are seen in subjects, its P value is 0.040497. Nutritional plays an important role in cardiovascular disease patients, based on data collection from subjects some foods which causes high risk to cardiovascular diseases are Tea, Eggs and Meat are more intake in females. Based on past and present medical history of data collected from subjects mostly Non-steroidal anti-inflammatory drugs (Nsaid's) are 35% were male and 32% were female , its P value is 0.945699. Proton pump inhibitors (PPI's) 32% were male and 34% were females, its P value is 0.326943 are used in this period of subjects. According to these drug agents causes Thrombotic events in cardiovascular disease subjects even worsen the cardiac condition and P value was found to be 0.87654. **Conclusion:** The findings in our study concluded that females are more prone to cardiovascular diseases along with co-morbidities having poor knowledge regarding nutritional and pharmacotherapeutic status thus we are providing some patient counselling measures to reduce risk towards cardiovascular diseases.

Keywords: Cardiovascular disease, Pharmacotherapeutic, Nutritional, Biochemical status, Patient counselling, Lifestyle modifications

I. INTRODUCTION

Cardiovascular disease is likely the most chronic human disease, yet it remains most common throughout the world. According WHO report, cardiovascular disease (CVD) is a condition which affecting the heart or blood vessels. It is usually associated with a build-up of fatty deposits inside the arteries (Atherosclerosis) and an increased risk of blood clots. Cardiovascular disease is also called "Heart disease ". All heart diseases are cardiovascular diseases but not all cardiovascular disease is heart disease. The role of hypertension and cholesterol of different density triglycerides in induction and progression should be different in cardiovascular diseases. CVD is not a single disease, but a cluster of diseases and injuries that affect the cardiovascular system.

Cardiovascular disease is leading cause of mortality in India. The current statistics, deaths due to cardiovascular diseases in India increased from 2.26 million in 1990 to 4.77 million in 2020, and more than half deaths caused by heart diseases were on <70 years age persons. Mostly older age (45-65 years) are affected in

ecent study. Coronary heart disease prevalence rates in India have been estimated over the past several decades and have ranged from 1.6%to 7.4% in rural population and from 1% to 13.2% in urban population. The progression of epidemic is characterized by socioeconomic gradients, tobacco use, low nutritional diet intake (fruits and vegetables) have become more prevalent causes for CVD. Sometimes due to low socioeconomic backgrounds, do not receive minimum optimal therapy for cardiovascular diseases it leads to poor health outcomes.

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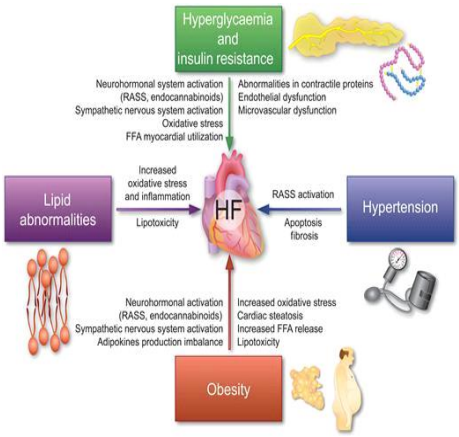

FIG1:PATHOGENESIS OF CARDIVASCULAR DISEASES

According to research study of objectives nutrition play an important role in the etiology of cardiovascular disease (CVD). This nutritional information is divided into 3 main sections: dietary patterns, individual food items, low-fat diet, Mediterranean diet, and the DASH (dietary approach to stop hypertension) diet.

NUTRITIONAL DIET EFFECT ON CVD RISK :

- Dairy products are rich in minerals (such as calcium, potassium, and magnesium), protein (casein) and vitamins (riboflavin, vitamin B-12) that can exert beneficial effects on CVD. On other hand, the presence of saturated fat in dairy products causes potential adverse cardiovascular effects.
- Eggshave high cholesterol content so it is more potential effect on CVD. Eggs is also source for protein and vitamins (folic acid, vitamin E & D, vitamin B12), selenium, choline, zinc etc., About50% of fat in the egg is monounsaturated fatty acids (MUFA).
- Dietary salt (Sodium chloride) intake rises blood pressure (hypertension) leads to increases Cardio vascular disease risk.
- Coffee is one of the most widely consumed beverage in the world. It also contains chlorogenic acid, flavonoids, melanoidins and various lipid-soluble compounds such as furans, pyrroles, anmaltol. Coffee consumption has long been suspected of being a contributing factor in the development of CVD. The effects of coffee on blood pressure, serum cholesterol and homocysteine levels, oxidation and inflammation. Caffeine overdose symptoms include agitation, delirium, seizures, cardiac arrhythmia, nausea, vomiting, and hyperglycaemia.
- Large doses of omega 3 supplements may causes minor gastrointestinal upsets, worsening of glycaemia control and rises LDL-C levels so, it may risk for CVD.
- Alcohol consumption can increases cardiovascular disease risk

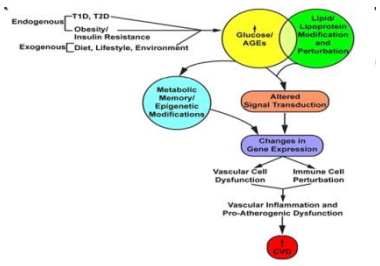

FIG 2: FLOW CHART ON NUTRITIONAL AND OTHER FACTORS CAUSES CVD RISK

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PREVENTIONS OF SOME NUTRITIONAL INTAKE TO CVD:

- Green tea can improve the health of blood vessels, thus reducing the chance of them getting narrowed. Green tea is so good for you is the presence of a compound called "catechins". Catechins are powerful anti-oxidant compounds that protect the cells in the body from harmful free radicals. It can help maintain normal blood pressure. It can lower cholesterol in the blood – particularly the LDL (bad cholesterol) and triglycerides.
- Chocolate consumption has been often hypothesized to reduce the risk of cardiovascular disease (CVD) due to chocolate's high levels of stearic acid and antioxidant flavonoids. Saturated fat has long been thought to contribute to atherosclerosis, and thus, adverse for CVD risk. However, stearic acid has been suggested to be a non-atherogenic type of dietary saturated fat.
- Garlic and onion have been used for millennia in the traditional medical practice of many cultures to treat cardiovascular and other disorders. Raw or aged garlic reliably reduces total cholesterol and Low-density Lipoprotein (LDL-C), while increasing High-density Lipoprotein (HDL-C).
- Antioxidant vitamin (A,E,C,D) is used to reduce LDL cholesterol in blood.
- Green leafy vegetables, nuts, beans and other magnesium supplements is increases HDL cholesterol and reduces LDL cholesterol for cardiovascular disease risk.
- Plant phytosterols can be considered for the reduction of LDL cholesterol in mildly hypercholesteremic individuals at intermediate to high risk of who do not use or tolerate low cholesterol medications. Phytosterols can be used in combinations with statins to increases the reduction of LDL cholesterol levels.

PHARMACOTHERAPEUTIC EFFECT ON CVD RISK:

Cardiovascular patients often require prescription of several medications to slow down the disease progression and to control different symptoms. The use of multiple drugs can be very important in the treatment of particular co-morbidities, it may increases risk of potential "drug – drug "interactions.

- **Non-potassium sparing diuretics** can cause electrolyte imbalance which was given in CVD treatment, shows hypo magnesia and hypokalaemia it may leads to frequency of malignant arrhythmias and sudden cardiac death.
- **Theophylline** directly dilates systemic blood vessels including coronary arteries which increase myocardial contractions and heart rate leads to cardiac arrhythmias.
- Injection or inhalation of **beta-adrenoreceptor agonists (salbutamol)** in therapeutic doses reduces plasma potassium concentration in healthy subjects or Cardiovascular disease subjects leads to hypokalaemia then it activates Na^+/ K^+ pump channels , myocardial contraction increases leads to cardiac arrhythmias or sudden cardiac death.
- Due to long term use of **Nsaid's**(Selective cox2 inhibitors & Non-selective cox 1 and 2 inhibitors) inhibits Prostaglandins 2 receptors which increases vascular tone and imbalance between pro-thrombotic and anti-thrombotic factors which increases thrombogenic state it leads to Atherosclerosis, Coronary artery disease (CAD).
- **Proton pump inhibitors** (PPI) may increase the risk for heart failure. In Chronic antiplatelet therapy in patients with CAD carries the risk for gastrointestinal (GI) complications, such as such GI ulcers and haemorrhage with aspirin and impaired healing of aspirin-induced gastric erosions with clopidogrel. PPIs are commonly used to prevent or treat these GI complications, but PPI use may lead to pneumonia, micronutrient deficiencies, and osteoporosis-related fractures. PPI use may inhibit the antiplatelet effect of aspirin and clopidogrel and lead to more cardiovascular events in patients with CAD.

II. MATERIALS AND METHODS

Study Design: AProspective observational epidemiological type of study

Study Area: Study conducted in the department of general medicine, Government medical college and Government General Hospital at Srikakulam.

Study Period: Six months (March 2019 to September 2019)

Sample Size: 100 subjects

Source of Data:

- Patient case sheet
- Subject included in the study
- Patient counselling

Materials:

- Patient consent form
- Patient questionnaires form
- Diet chart

Study Criteria:

- **Inclusion Criteria :**
- Patients who are willing to accept consent form and submission.

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- Patients who are co- operative for research study.
- Patients who are answering to the questionnaires
- Patients who are in age of >35 years
- Both Male & Female genders
- Nutritional status
- We are taking lab values (HDL, LDL, Total cholesterol, TG, RBS) as per hospital reports
- Diseases/ Disorders in which treatment involves drugs having CVD risk
- **Exclusion Criteria :**
- Patients who are in age <35 years
- Paediatrics
- Pregnant women & Lactating women
- Out patients
- Patients who are not willing to give consent form
- Patients who has language problem
- Unconscious patients

Study Procedure:

- **Institutional Ethics Committee:** Ethicalcommittee approval was taken before initiating thestudy under Re. No.492 / ECR / 2019. Informedwritten consent &assent obtained after explainingtherisks, benefits of thestudyfrom participants.
- **Method of Data Collection:** A Total of 100 patients are included in this study and were interviewed their details were noted in a specially designed data collection form. Among them 52 patients were male and 48 patients were female. The data collection forms contain about Socio demographic details, Questionnaires on cardiovascular history (Present & Past), risk factors, Life style modifications, Diet and Treatment chart regarding diagnosed disease/ disorder. The severity of cardiac disease observed by giving scores based on the answers given by the patients during the interviewing. The questionnaires were interpreted into local languages to those who could not understand or read English.
- **Statistical Analysis:** Descriptive statistical analysis are used in this study. Microsoft excel spread sheetwas used to record the data of recruited subjects.

Intheexcelspreadsheetwecalculatedsimplestatistics like mean, percentage standard deviationfor patient demographics (age, gender) andcomorbidities. Two-way ANOVA techniques wereused to calculate P-value.

III. FIGURES AND TABLES

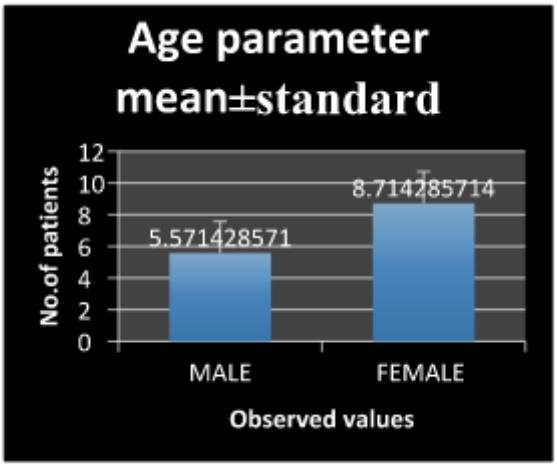

FIG 1: AGE PARAMETER MEAN± STANDARD GRAPH

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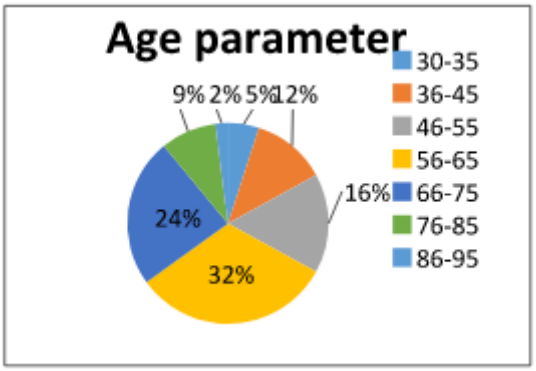

FIG 2: AGE PARAMETER FOR MALES AND FEMALES PATIENTS

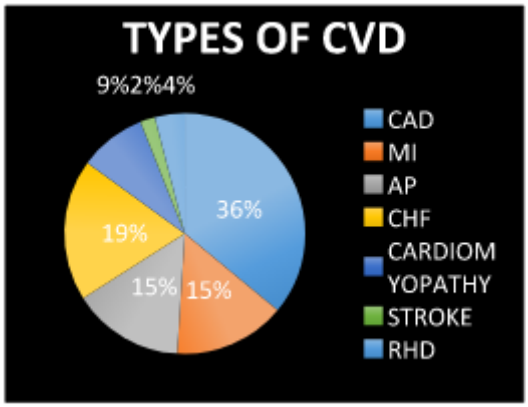

FIG 3: TYPES OF CVD'S FOR MALE AND FEMALE

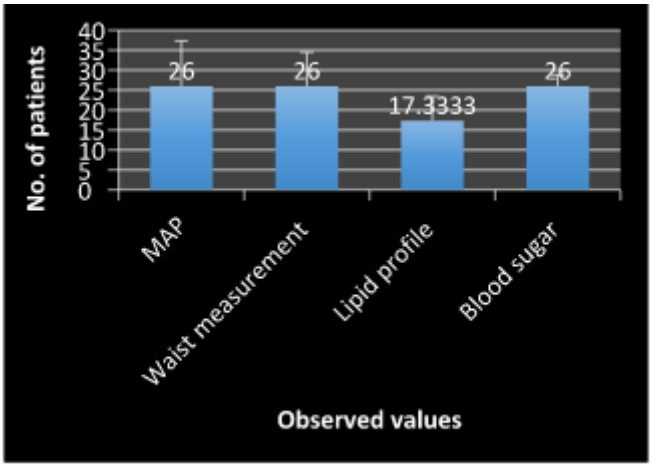

FIG 4: MALES BIOCHEMICAL STATUS OF MEAN±STANDARD

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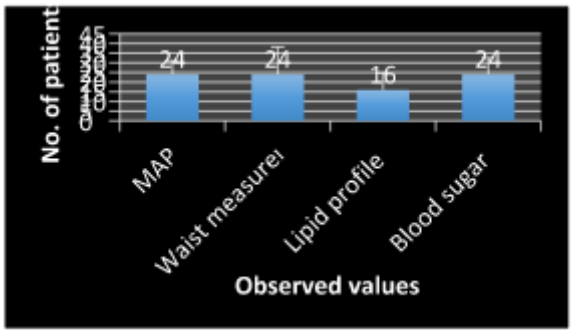

FIG 5: FEMALES BIOCHEMICAL STATUS OFMEAN±STDV

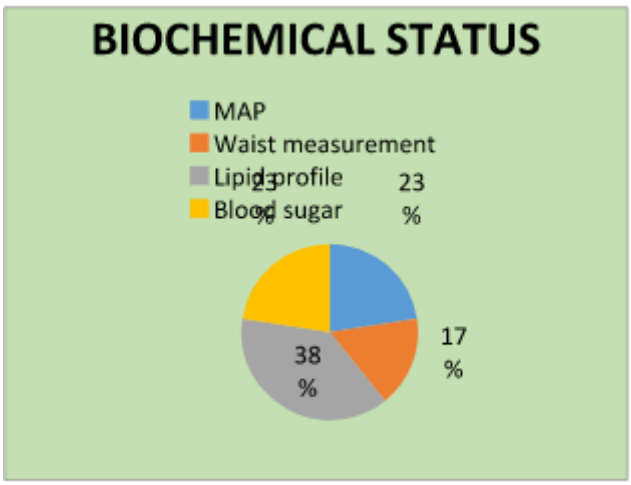

FIG 6: BIOCHEMICAL STATUS FOR BOTH MALES & FEMALES

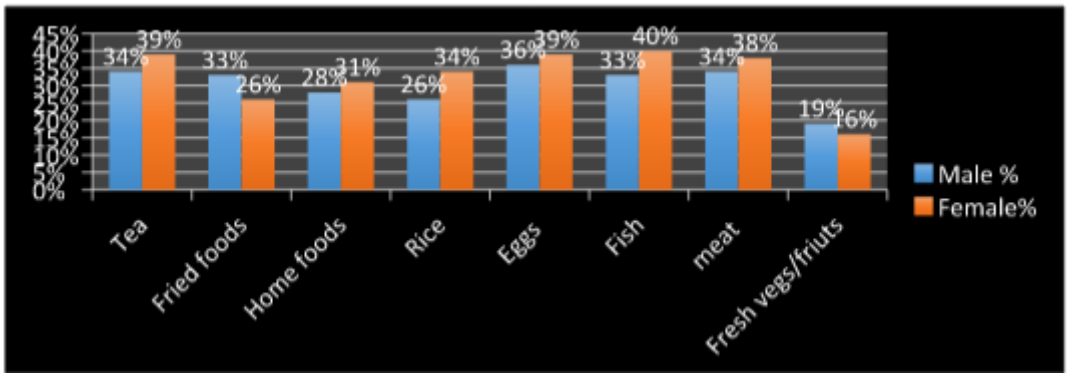

FIG 7: NUTRITIONAL STATUS FOR BOTHMALES AND FEMALES

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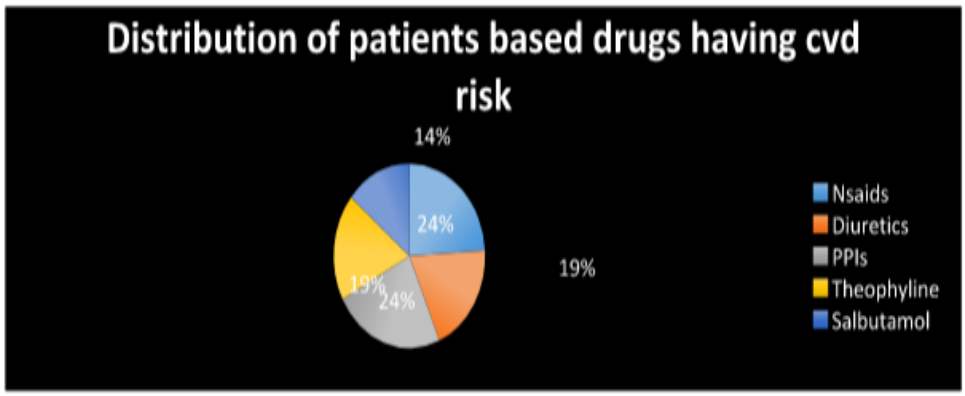

FIG 8: DISTRIBUTION OF PATIENTS BASED DRUGS HAVING CVD RISK

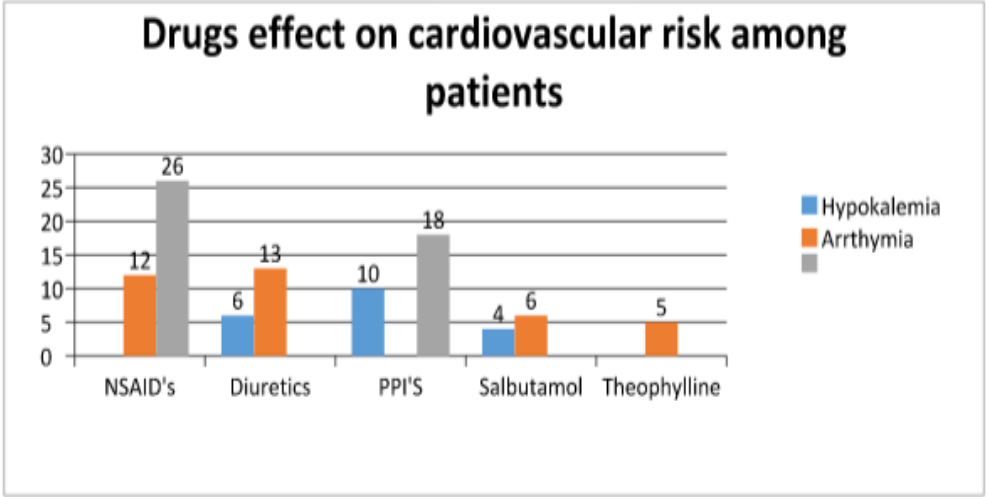

FIG 9: DRUGS EFFECT ON CARDIOVASCULAR RISK AMONG PATIENTS

TABLE 1: AGE WISE DISTRIBUTION OF MALE AND FEMALE CARDIOVASCULAR PATIENTS:

Age groups	Males	Females
30-35	1	4
36-45	7	5
46-55	5	11
56-65	14	18
66-75	7	17
80-85	5	4
86-95	0	2

TABLE 2: DISTRIBUTION OF TYPES OF CARDIOVASCULAR DISEASE'S AMONG PATIENTS:

Gender	CAD	MI	AP	CHF	Cardiomyopathy	Stroke	RHD
Male	19	8	6	7	6	1	1
Female	17	7	9	12	3	1	3

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TABLE 3: BIOCHEMICAL STATUS AMONG CVD PATIENTS:

PARAMETERS	Males	Females
Mean atrial pressure		
70-90mmHg	34	29
>90 mmHg	18	19
Waist measurement		
81-95cm	32	34
>95cm	20	14
Lipid profile		
HDL	12	10
TG	16	12
LDL	24	26
Blood sugar		
140-200mg/dl	24	30
>200 mg/dl	28	18

TABLE 4: NUTRITIONAL INTAKE AMONG PATIENTS:

FOOD VARABILES	Male %	Female %
Tea	34	39
Fried Foods	33	26
Home Foods	28	31
Rice	26	34
Eggs	36	39
Fish	33	40
Meat	34	38
Fresh vegetables/Fruits	19	16

TABLE 5: DISTRIBUTION OF PATIENTS-BASED DRUGS HAVING CVD RISK:

Drugs	Males	Females
Nsaid's		
Using	35	32
Not using	17	16
Diuretics		
Using	28	26
Not using	24	22
PPI's		
Using	32	34
Not using	20	14
Theophylline		
Using	24	28
Not using	28	20
Salbutamol		
Using	17	22
Not using	35	26

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TABLE 6: DRUGS EFFECT ON CARDIOVASCULAR RISK AMONG PATIENTS:

Drugs	Adverse events of cardiovascular diseases		
	Hypokalemia	**Arrhythmia**	**Thrombotic events**
Nsaid's	0	12	26
Diuretics	6	13	0
PPI's	10	0	18
Salbutamol	4	6	0
Theophylline	0	5	0
Totals	**20**	**36**	**44**

IV. RESULTS :

Among 100 subjects were selected in the study of which 48 are male subjects and 52 are female subjects. Table (1) shows Age wise distribution among Patients, we consider different age groups from highest age group of 85-95 years and lowest age group 30-35 years were taken. The age of 30-35 years (1 %) male, (4%) in female.The age of 36-45 – (7%) male, (5 %) female.The age of 46-55 (5%) male, (11%) female.The age of 66-75(7%) male, (17%) female.The age of 80-85(5%) male, (4%) female. In this age "56-65" years of females 18(18%) are more prone to cardiac diseases compared with males 14 (14%). The mean and standard deviation of Females was 8.714286±6.626067 than Males was 5.571429± 4.613644.According to chi-square test the P value is 0.35516 The Gender characteristic, female subjects 52 (52%) shows more cardiovascular diseases compared with male subjects 48 (48%).

Table 1, fig 1 &2

Table (2) shows Types of CVD's among Patients. In this different cardiovascular diseases are included were CAD, MI, AP, CCF, Cardiomyopathy, Stroke & RHD. In males, CAD 19(19%), MI 8 (8%), CCF 7(7%), AP & Cardiomyopathy 6 (6%), RHD & Stroke 1 (1%). In females CAD 17(17%), MI 7(7%), AP 9(9%), CCF 12(12%), Cardiomyopathy & RHD have 3(3%), stroke 1 (1%) were differenced based on gender. The mean and standard deviation of male subjects was 6.857143±6.039552 and then female subjects was 7.428571±5.711309. According to Chi - square test the P value is 0.684813. Average found to be Coronary artery disease (CAD) and Congestive cardiac failure (CCF) are commonly reported cardiovascular disease cases are filed in this specific period.

Table 2, fig 3

Table (3) shows Biochemical status among patients. In Mean atrial pressure (MAP) parameter male 70-90mmHg (34%) and >90mmHg (18%) its mean ± stdv is 26±11.31371, female 70-90mmHg (29%) and >90mmHg (19%) its mean ± stdv is 24±7.071068. In waist measurement male 81-95cm (32%) and >95cm are (20%) its mean ± stdv is 26±8.485281, female 81-95cm (34%) and >95cm (14%) its mean ± stdv is 24±14.14241. In Lipid profile male HDL (12%), TG (16%) and LDL (24%) its mean ± stdv is 17.3333±6.110101, female HDL (10%), TG (12%) and LDL (26%) its mean ± stdv is 16±8.717798. In Blood sugar male 140-200mg/dl (24%) and >200mg/dl (28%) its mean ± stdv is 26±2.828427, female 140-200mg/dl (30%) and >200mg/dl are (18%) its mean ± stdv is 24±8.485281. In this Lipid profile values shows high percentage (especially LDL, TG) its P value is 0.040497 by chi-square analysis.

Table 3, fig 4, 5, &6

Table (4) shows Nutritional intake among cardiovascular patients**,** Nutritional related data collected by interviewing the patient through diet related questionnaires. Based on the data different food, Tea (34%), Eggs (36%), Fish (33%), and Meat (34%) in males.Tea (39%), Eggs (39%), Fish (40%) and Meat (38%) in female. In this mostly Tea, Eggs, Meat are shows high percentage compared with remaining food items which are commonly in daily use. Here Females have high percentages in this items compared with males.

Table 4, fig 7

Table (5) shows Distribution of patients based drugs having CVD risk, The Nsaid's (35%) male and female (32%), Proton Pump Inhibitor's (PPI's) (32%) male and female (34%). Diuretics (28%) male and female (26%).Theophylline (24%) male and female (28%).Salbutamol (17%) male and female (22%). Mostly Nsaid's and PPI's are widely distributed based on collecting present and past medication history data from subjects. The mean ± stdv of Nsaid's in male (26±12.72792), in female (24±11.31371).The mean ± stdv of PPI's in male (26±8.485281), in female (24±14.14214). The

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P value of Nsaid's (0.945699) and P value of PPI's (0.326943) by chi-square analysis.

Table 5, fig 8

According to data collected from subjects of above table (5) there is two drug agents which are commonly used by subjects in past and present medical history. Those drug agents' causes adverse events in cardiovascular disease subject along with co-morbidities. Here table (6) shows Drugs effect on cardiovascular risk among patients graphically represents mostly thrombotic events caused by Nsaid's and PPI's drugs. These are further leads to increases cardiovascular risk like cardiovascular attack, myocardial infractions, cardiomyopathy among patients based on referred articles. Its P value (0.87654).

V. DISCUSSION:

In our study more numbers of females nutritional and pharmacotherapeutic effect seen when compared with males. The most effected age group was 56- 65 years which was similar study done by the Jennifer L.Rodgers, Siva K. Panguluriet al. where the number of patients havingcardiovascular diseaseismorein female population than in male population [5]. In our study coronary artery disease (CAD), congestive cardiac failure (CCF) are mostly reported cases in that specific period of time. In our study we evaluated biochemical status of individual subjects throughout study in this high percentage of lipid levels (TG, LDL) are seen. Presence of triglycerides (TG), low density lipid (LDL) both are bad cholesterols causes more risk to cardiovascular diseases. The results were related to Timothy J. wilt et al, directly shows high lipid levels risk for cardiovascular diseases[7]. In our study nutrition plays important role, due to poor knowledge regarding food diet among subjects there is more risk towards cardiovascular diseases along with co-morbidities. Some foods Tea, meat and eggs especially taken without knowing about that in daily use are mostly effected in which pervious study done by Raffle De caterinaet.al, their study results revealed that diet can effect on modifiable risk factors which causes vascular inflammation directly risk to cardiovascular diseases[9]. In our study pharmacotherapeutic effect of cardiovascular disease with co-morbidities, in which multiple drugs are used by subjects in which influences drug related problems such as adverse events. So the data was collected from subjects according to past and present medical history there is thrombotic adverse event mostly seen among subjects which increases risk of cardiovascular disease along with co-morbidities. Chronic use Nsaid's and PPI's which elevates risk of cardiovascular adverse effect. The results was similarly study done by Vargaet .al, John P. Cooke et.al , in which their study shows long term use of Nsaid's in elderly patients which often suffers from CHF , arterial hypertension and other cardiovascular diseases. When PPI prescribed especially in cardiovascular disease subjects there is an impairment of vascular homeostasis by NO deficiency which mediated by long term use of PPI's increases cardiac adverse events[13].

VI. CONCLUSION:

The present study concluded that female subjects are more prone to cardiovascular disease when compared to male subjects. High lipid levels can increases risk of cardiovascular diseases among subjects. The knowledge about disease among subjects was good but having poor knowledge regarding nutritional and pharmacotherapeutic status. Thus providing some patient counselling measures via diet control information, socioeconomic habitual, and less adherence towards drug agents (Proton pump inhibitors and NSAID's which causes thrombotic events). Thus it makes to help and prevent risk of cardiovascular disease with co-morbidities.

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