Research Article

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# Drug-drug interactions in myocardial infarction patients and their risk factors

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**Abstract**

**Aim:** To study drug-drug interactions in myocardial infarction patients.

**Methodology:** A prospective interventional study was done on myocardial infarction with drug interactions patients admitted in tertiary government and corporate hospital, Visakhapatnam Andhra Pradesh, India. Information regarding the gender, risk factors, type of drug interactions as major, moderate, minor were recorded in a standard questionnaire (case report form).

**Results:** A total of 100 cases were included after excluding missing data. Out of 100 cases, 62 were male and 38 were female. Myocardial infarction in patients in which we assessed risk factors among them were HTN-67%,previous history of CVD-66%,family history-60%,Hyperlipidemia-40%,Diabetes milletus-38%,smoking-64%,Drug interactions were Major, Moderate, Minor. Major interactions were 24, Moderate interactions were 318, and Minor interactions were 91.

**Conclusion:** Based on the above data risk factors mostly seen in HTN and previous history of CVD, drug interactions mostly observed were moderate drug interactions.

*Keywords:* Myocardial infarction, Drug interactions, Risk factors, effects.

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## Introduction

Myocardial infarction (MI) refers to tissue death (infarction) of the heart muscle (myocardium) caused by ischemia i.e. lack of oxygen delivery to myocardial tissue. Myocardial infarction, unlike other coronary heart diseases it implies obstruction to blood flow due to plaques in the coronary arteries or to other obstructing mechanisms (e.g. spasm of plaque). It is also known as a heart attack [1].

**Etiology**

- Ischemia.
- Hyperlipoproteinemia.
- Family history of Ischaemic Heart Disease.
- Hyperhomocysteinemia
- Platelet aggregation.
- Tobacco smoking.
- Hypertension.
- Obesity.
- Alcohol consumption.
- Diabetes.
- Non atherosclerotic causes: Vasospasm, Embolism, thrombotic diseases, trauma, coronary ostial stenosis., arteritis

**Classification [2]**

Infarcts has been classified in several ways by physicians and pathologists:

**Based on results of ECG**

- ST-segment Elevation Myocardial Infarction (STEMI).
- Non-ST-segment Elevation Myocardial Infarction (NSTEMI).
- According to the anatomic region of the left ventricle involved
- Anterior.

- ▪ Posterior (inferior).
- ▪ Lateral
- ▪ Septal.
- ▪ Circumferential.
- ▪ Combinations- Anterolateral, posterolateral, Anteroseptal.

According to the degree of thickness of the ventricular wall involved:

- ▪ Transmural (full thickness).
- ▪ Laminar (sub endocardial -reduced coronary perfusion).

According to the age of infarcts:

- ▪ Newly formed (acute, recent, fresh).
- ▪ Advanced infarcts (old, healed, organized).

## Pathophysiology

Atherosclerotic plaque is formed due to cholesterol deposition within the wall of the main artery. This plaque may rupture, it activates the clotting mechanisms so platelet aggregation and fibrin deposition that results in the formation of thrombus in a coronary artery. This occlusive thrombus completely blocks the coronary artery and interrupts the blood supply to part of the myocardium (heart muscle). Ultimately ST-segment elevates thus myocardial infarction develops.

## Drug-Drug Interaction

Today, with the increasing availability of complex therapeutic agents and widespread play pharmacy, the potential for drug interaction is enormous.

The net effect of combination may be-

- ▪ Synergism or additive effect of one or more drugs.
- ▪ Antagonism or subtractive effect of one or more drugs.
- ▪ Alteration of the effect of one or more drugs or the production of idiosyncratic effects.

## Types of Drug Interactions

Depending on the type of effect produced, drug interactions are classified as inhibiting drug interactions, potentiating drug interactions, modifying drug interactions [4].

## Inhibiting Drug Interactions

When the action of one drug is opposed by the other drug on the same physiological system is known as drug antagonism. The drug interactions that involve this type of effect are called inhibiting drug interactions. Ex: when the combined effect of two or more drugs then one drug effect is reduced by the other drug.

Examples:

1. Adrenaline and acetylcholine.
2. Aspirin and Ramipril.
3. Valsartan and Aspirin.

## Potentiating Drug Interactions

When two or more drugs are used in the combination form, their action is increased then it is known as synergism. Hence this type of interaction is known as potentiating drug interactions.

Ex: when the combined effect of two or more drugs, acting simultaneously is greater than the sum of the individual effects produced when each drug is administered alone.

Examples

- ▪ Losartan and Ramipril.
- ▪ Procaine and adrenaline.
- ▪ Atorvastatin and Ramipril.
- ▪ Promethazine and Valsartan.

## Idiosyncrasy

An extraordinary response to a drug that is different from its pharmacological action is called as idiosyncrasy effect [5].

Examples:

- ▪ A small quantity of aspirin may cause gastric haemorrhage and a small dose of quinine may produce ringing in the ears.
- ▪ Some persons are sensitive to penicillin and sulphonamides because they produce toxic effects.

## Drug Interactions Effects

1. Major: Life-threatening or permanent damage.
2. Moderate: Deterioration of patient status, treatment is required.
3. Minor: Little effect.

## Scope of Drug Interactions Evaluation

Studies on drug interactions in myocardial infarction patients should focus on their prescribing, dosage form, dose, and administration of the drug. It deals with the effects or type of drug interactions in patients as well as the complications in the body. This problem is mainly due to poor knowledge about the effect of drugs on the body [6]. Drug interaction evaluation or drug-drug interactions studies is an ongoing, authorized, and systemic quality improvement process, which is designed to:

Review the drug before prescribing it to patients.

To provide the feedback results to prescribers/clinicians.

To develop criteria and standards which prescribe optimal drug use.

To promote appropriate drug use through education and environment about their interactions and its effects.

To observe the patterns of drug use with current recommendations or guidelines for the treatment of a certain disease [7].

It relates the number of cases of drug interactions to the number of patients exposed. It is possible to detect that the reaction is more common in a certain age group, in certain conditions, or at a special dose level, then information on the proper use of the drugs can be improved such as indications, contraindications, appropriate dose, etc.

The principal aim of drug interaction study is to facilitate correct recommendation drugs (according to WHO guidelines) to be given to the patients by the prescriber to avoid the adverse drug reactions among the drugs prescribed [8].

## Materials and Methodology

### Study Site

The study was conducted inpatient department of Maharaja Institute of medical sciences, Nellimarla, Vizianagaram.

### Study Period

The study was conducted for a period of 3 months from October 2020 to December 2020.

### Study Design

Prospective interventional analytical study.

### Sample Size

A total of 100 cases will be included in the study.

### Study Criteria

### Inclusion Criteria

1. Male and female aged 18-70 years.
2. Patients who are willing to sign on the consent form.

### Exclusion Criteria

1. Male and female aged above 70 years.
2. Pregnant women.
3. Male and female aged below 18 years.
4. Patients who are not willing to sign on the consent form.

### STUDY PROCEDURE:

The initial sample size collected is 120

↓

After elimination of all the missing data the final sample size of 100

(The missing data is due to sudden discharge or incomplete data)

↓

Preparation of standard questionnaire form

↓

Filling the data through direct patient interaction.

## Results

### Analysis of Risk Factors

**Table 01: Analysis of Risk Factors**

| Risk Factors | % Of Risk |
|---|---|
| HTN | 67% |
| Previous h/o CVD | 66% |
| Family history | 60% |
| Hyperlipidaemia | 40% |
| Diabetes millets | 38% |
| Smoking | 64% |



**%OF RISK**

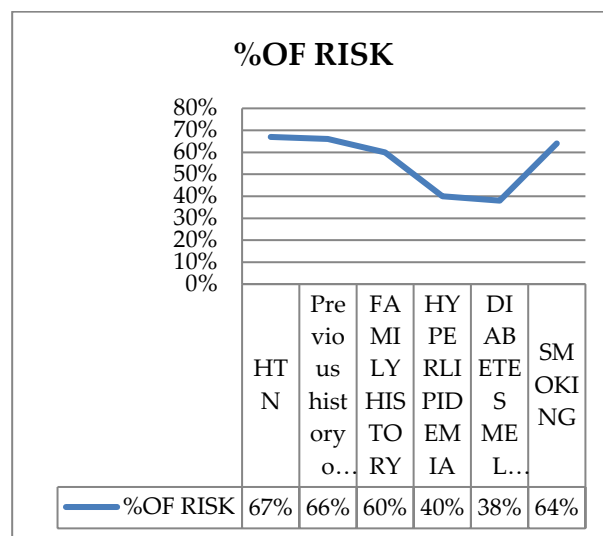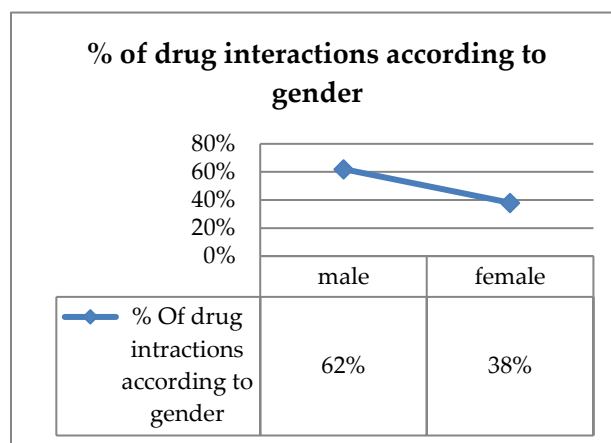| | HTN | Previous history o… | FAMILY HISTORY | HYPERLIPIDEMIA | DIABETES MEL… | SMOKING |
|---|---|---|---|---|---|---|
| %OF RISK | 67% | 66% | 60% | 40% | 38% | 64% |

**Fig 01: Distribution of Risk Factors**

### Gender Analysis

Like in most of the studies on MI, male subjects in our study were significantly higher than female subjects. Male -62 and Female-38

The total number of subjects is -100.

**Table 02: Gender Analysis of**

| Gender | %of Cases |
|---|---|
| Male | 62% |
| Female | 38% |



**% of drug interactions according to gender**

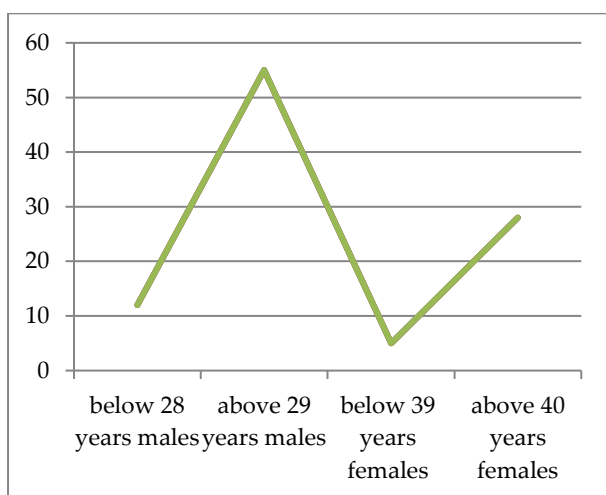| | male | female |
|---|---|---|
| % Of drug intractions according to gender | 62% | 38% |

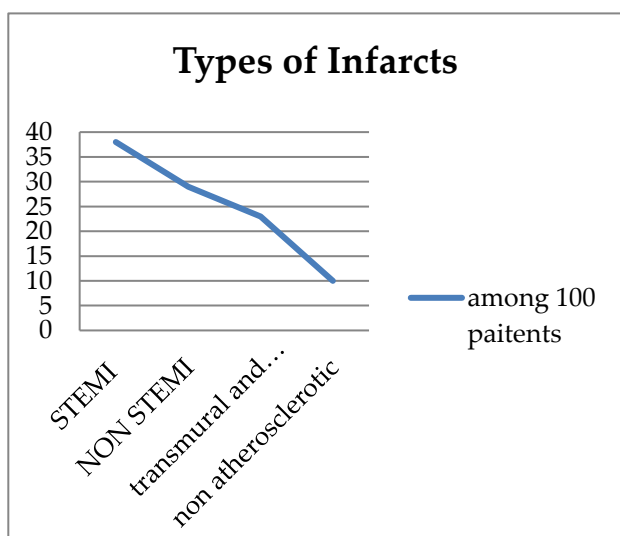**Fig 02: drug interactions according to gender**

**Age**

**Table 03: Analysis of Age**

| Age | Below 28yrs males | Above 29 yrs. males | Below 39 yrs. females | Above 40 yrs. females |
|---|---|---|---|---|
| Number of cases | 12 | 55 | 5 | 28 |



**Fig 03: Age Distribution in study population**

**Types of Infarcts**

**Table 04: Analysis of Infarcts**

| Type of Infarct | No. of Cases |
|---|---|
| STEMI | 38 |
| NSTEMI | 29 |
| Transmural and sub endocardial | 23 |
| Non-atherosclerotic | 10 |



**Fig 04: Distribution of Infarcts in study population**

## Discussion

### Age Distribution

In our study, we frequently found the patients with age groups below 28 years (N=12) more than 29 years (N=55) in male patients, below 39 years (N=5), females, more than 40 years (N=28).

### Gender Distribution

Among 100 patients studied we saw males(N=62) were predominant than females (38) in contrast with the study conducted, which showed males were more frequently attacked with myocardial infarction when compared with females.

### Risk Factors in Myocardial Infarction Patients

There are so many risk factors seen in myocardial infarction in which a patient's history of CVD is a major risk factor for MI and hypertension is also a risk factor for MI. Similarly family history and hyperlipidemia are most commonly seen in recent times as risk factors of MI.

### Drug-Drug Interactions

Among 100 patients we found that moderate interactions were mostly seen in myocardial patients and major interactions were less observed, in contrast with the study. Minor interactions were more than major interactions.

### Monotherapy VS Polytherapy

In our study, we found that polytherapy may cause more drug interactions than monotherapy due to more than one complication in them. But polytherapy is most seen in drug interaction patients.

### Types of Infarcts

Among 100 patients, ST-elevation myocardial infarction (STEMI) was more compared to Non-ST-elevation myocardial infarction (NSTEMI). Transmural and sub endocardial infarcts were more compared with other non-atherosclerotic.

### ETIOLOGY

Among 100 patients of study, 67 patients with the cause of ischemic heart disease and coronary heart disease, 23 patients with the cause of atherosclerosis, and 10 patients with the cause of non-atherosclerotic disease.

## Conclusion

Based on the result, we concluded that, this review concludes that there are many drugs which commonly involves in drug-drug interactions. The prescribers give drugs from different classes in combination it results in drug interactions. Physicians and chemical pharmacists should make use of available interactions software (Medscape, drugs.com) to check all prescribed

medications or the presence of potentially significant or harmful interactions or they should tell the patients about effects. Early detection is very important for any diseases, symptoms like chest pain get tested with the MRI or ECG where we get to know the activity of the heart and get into treatment by pharmacological and non-pharmacological. Management of risk factors like HTN, coronary artery disease, diabetes mellitus, hyperlipidemia, atherosclerosis, etc. Life style plays an important role in increasing the risk of myocardial infarction, lifestyle modifications and maintaining a healthy lifestyle reduce the risk of MI. Males were more frequently attacked with MI when compared to females. Aspirin gets less possibility of drug-drug interaction compared to clopidogrel. Aspirin is s a mostly used drug for MI. If the patient is allergic to aspirin then clopidogrel is prescribed. The prescription analysis is to be done in patients who are taking multiple drugs. Pharmacists should counsel the patients regarding the effects of drug-drug interactions for achieving safe drug therapy.

## Conflict of Interest

Authors Declares no conflict of interest

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