



## Polypharmacy: Remedy Leads to Illness

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### Abstract:

**Background:** People often engage in polypharmacy, which is outlined as taking more drugs than is clinically required or using many prescriptions at one time.

**Objective:** The goal of this research was to provide a descriptive analysis of polypharmacy and to perform the clinical assessment of the patients as well as assess their behavioural changes.

**Methods:** A cross-sectional study was performed in tertiary care hospital over five months. A total 100 patients are included. The study population include cardiovascular and diabetic patients. Medicine card containing more than 5 medicines are included. Data collection was done by personal communication with the patients which prevents the manipulation of the information. The collected data are determined through graphical methods.

**Results:** Polypharmacy patients were experiencing excessive behavioural changes such as anxiety and frustration. Statins and Biguanides group of medicine are prescribed more. The blood pressure and heart rate of the patients were also changing continuously due to medicines and hospital restrictions. It was found that diet and oxygen saturation level is not affected by Polypharmacy as these are continuously monitored by the hospital staffs.

**Conclusion:** Polypharmacy frequently leads to an increased risk of medical related issues. Throughout this study, it was found that patients have major effect on their blood pressure and heart rate simultaneously which could be due to number of medicines prescribed or the hospital environment and restriction. Changes in the patient behaviour is also one of the major concerns which needs to be focused sincerely.

**Keywords:** Polypharmacy, Blood Pressure, Heart Rate, Behaviour, Cardiovascular, Diabetes Mellitus

### Introduction

Polypharmacy is the use of five or more medications. Polypharmacy also involves prescribing drugs that may not be necessary, using drug without a prescription, or using drugs that are not indicated. This often leads to an

enhanced risk of medical related issues. Patients with multiple co-morbidities, such as (CVD), hormonal disorders, neurological disorders are more likely to be prescribed multiple drugs, which is the exclusive way to attain the patients'

therapeutic goals. This puts the patients at risk (*Polypharmacy*, 2024).

## Methods

### Population and Sampling

A cross-sectional study was conducted. The sample size of the study will be 100 patients of the Narayana Multispeciality hospital and their responses were collected to gain specific information about the effects of polypharmacy. Furthermore, the Non-random sampling method was used.

### Inclusion and Exclusion Criteria

Patient of both the gender, more than 45 year of age, admitted in hospital, containing five or more than five medicines in their medicines card and had medical reconciliation were included in this study. Cardio vascular and cardiovascular + Diabetes Mellitus patients are included who were willingly participating in the study.

Those patients who are not willing to participate, contains less than five medicines were excluded in this study. Patients other than Cardiovascular

and cardiovascular+ Diabetes Mellitus were excluded.

### Data Collection Method

The *primary data collection* method will be taken over into consideration throughout the study. This includes personalised communication with the patients which orifice the influence of the content as the survey assists in directly reaching the diligent.

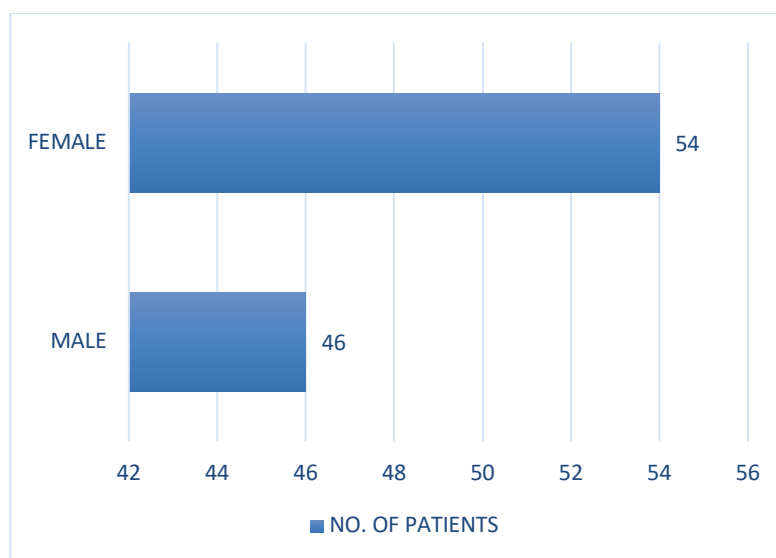
### Data Analysis

The collected data are consistently observed through a descriptive statistical analysis method that assist in addressing the study questions & resolve relevant findings to draw an effectual conclusion.

## RESULTS

A total 100 patients met the inclusion criteria and majority of them were females, was in the age group of 45-70 years.

### Gender Analysis

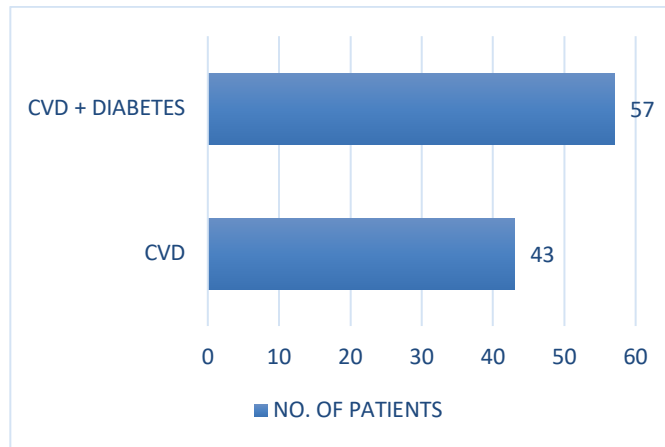


**Figure 1: Gender Analysis**

This graph shows that, the count of female patients is more than male patients. There were total 53 female patients out of 100 patients whereas 47 male patients out of 100 patients

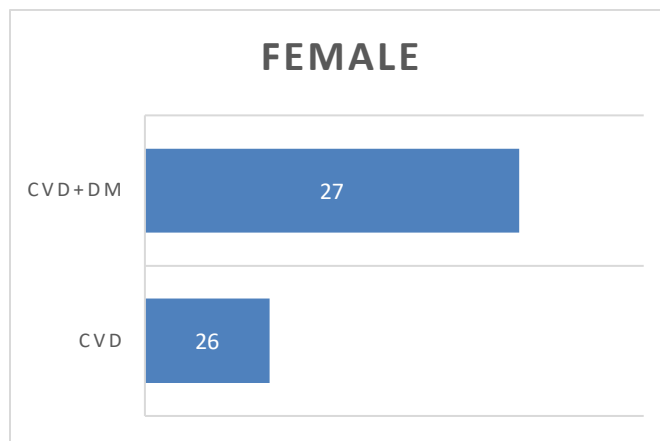
from January'2024 to May'2024 at Narayana Multispeciality Hospital Jaipur.

### Disease Analysis



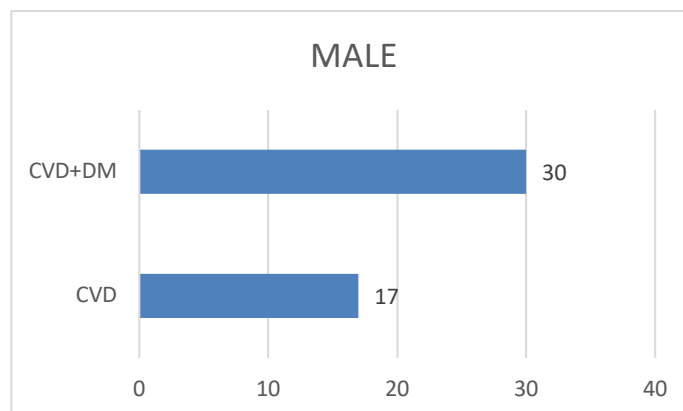
**Figure 2: Disease Analysis**

From the above graph it can be easily interpreted that, Number of cardiovascular patients is less than patients who had cardiovascular diseases along with diabetes. There are total 57 patients out of 100 with CVD+DM whereas 43 patients out of 100 with CVD from January’2024 to May’2024.



**Figure 3: Female disease analysis**

During the study, it was analysed that number of female patients with CVD and CVD+DM is almost same. There were 26 CVD female patients and 27 CVD+DM female patients. Obesity, diabetes and high cholesterol are associated with high blood pressure, and are seen more often in women.

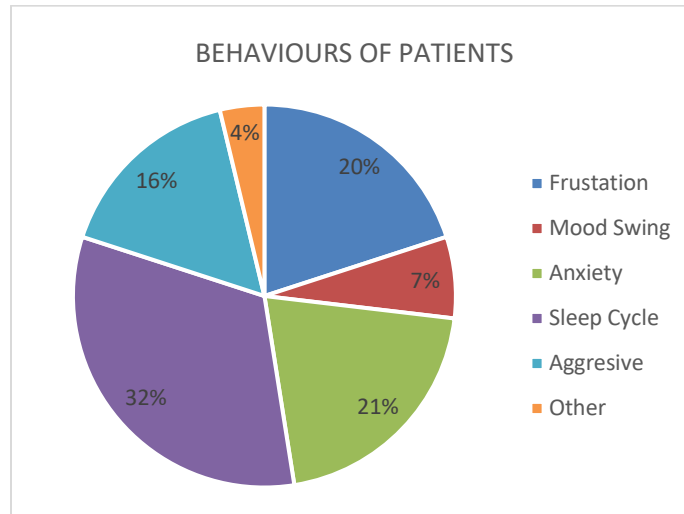


**Figure 4: Male disease analysis**

This graph depicts that, male patients with CVD+DM is more than CVD male patients. There was total 30 CVD+DM male patients and 17 CVD patients. Men are more likely than women to develop diabetes and cardiovascular illnesses. It

may be because women are partially protected by estrogen and progesterone until they go through menopause that men, tend to acquire heart disease earlier than women.

**Behaviour Analysis**

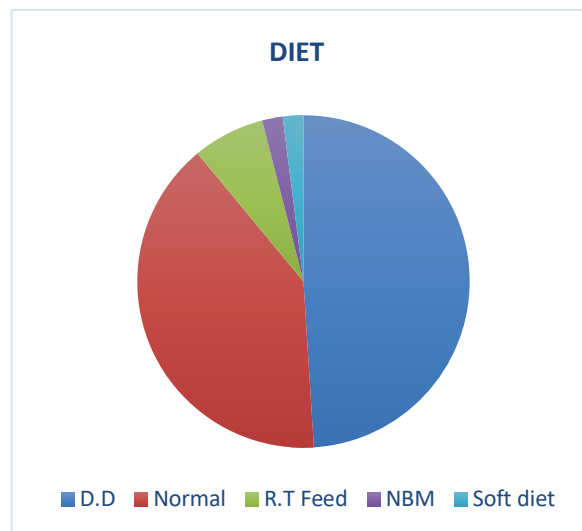


**Figure 5: Behaviour**

Initially, at the time of admission, 36% patients have disturbed sleep cycle which gets decreased to 32% after getting admitted in the hospital. 27% patients are experiencing frustration which gets reduced to 20%. Moreover, 14% and 11% patients were experiencing anxiety and aggressiveness initially which gets increased. Now, 21% and 16% patients were experiencing anxiety and aggressiveness. Initially 12%

patients have mood swings but after getting admitted in the hospital it gets reduced to 7%. In addition to all this, of 4% shown some others behavioural change such as depressed or excessive chattering or muttering between January'2024 to May'2024 at Narayana Multispeciality Hospital Jaipur.

**Diet Analysis**

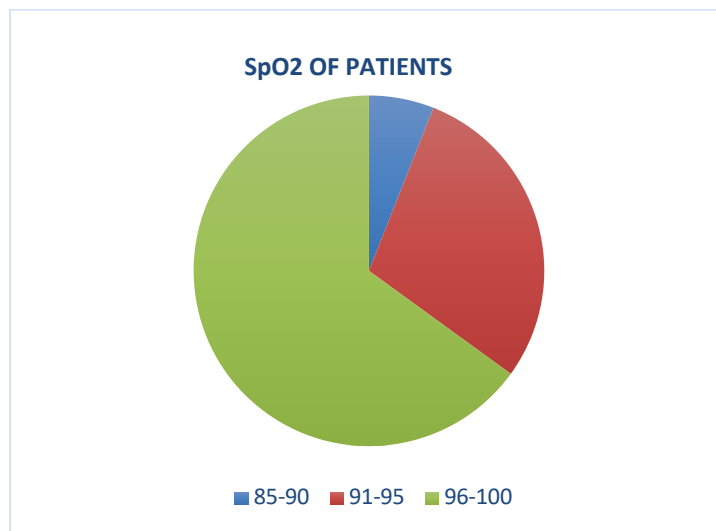


**Figure 6: Diet**

After getting admitted in the hospital, there are slightly change in the diet pattern. This graph represents that, total 40% patients are on normal diet after getting admitted in the hospital. However, the percentage of diabetic diet is 49%. In

addition to this, some different diets are also observed like 7% patients are on Ryle’s Tube feed (RT Feed), 2% patients are Nill By Mouth (NBM) and 2% patients are on soft diet.

**Spo2 Level Analysis**

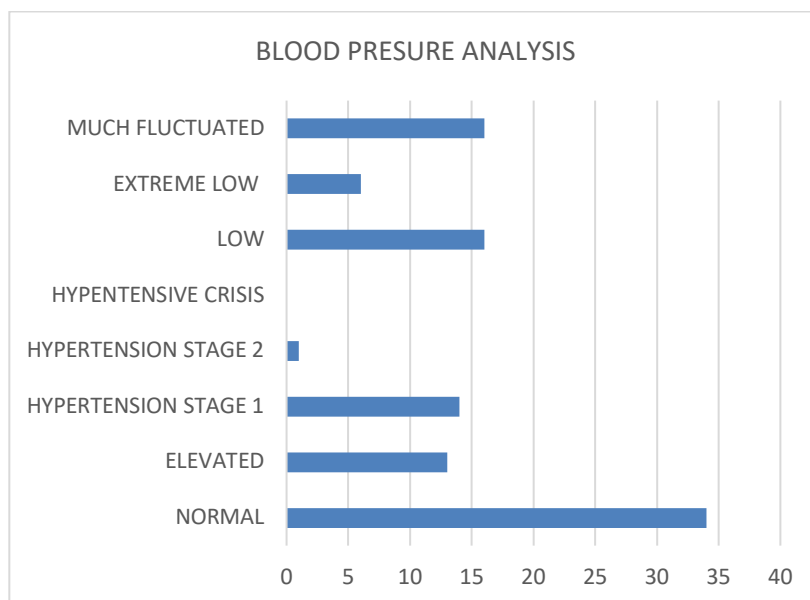


**Figure 7: SpO2**

This graph depicts that, after getting admitted inside the hospital, there is increase in the number of patients whose saturation level is between 96-100%, there are total 65% patients whose saturation level is in between 96-100%. Now, 29% patients have saturation level between 91-95%. On

the other side there are total 6% patients only who had saturation level between 85-90%. There was no major difference was seen in the level of oxygen saturation during polypharmacy. It was well monitored by the medical staffs.

**Blood Pressure Analysis**

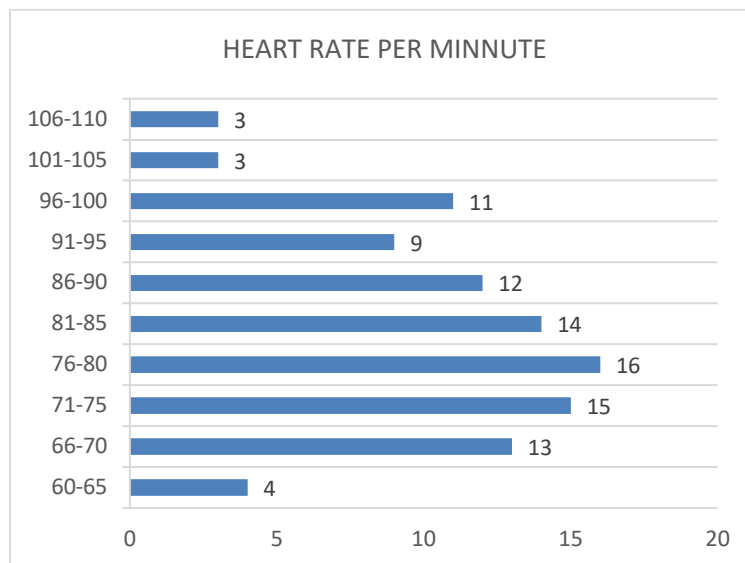


**Figure 8: Blood pressure**

This graph depicts that, at the time of admission, the blood pressure of 46% patients falls in the normal range. However, 17 % patients had elevated blood pressure and 15% have low blood pressure. On the other side, 8% patients belong

to the range of hypertension stage I and 6% reported for extremely low category. In addition to this, 8% patients have reflected blood pressure which is much fluctuated.

### Heart Rate Analysis



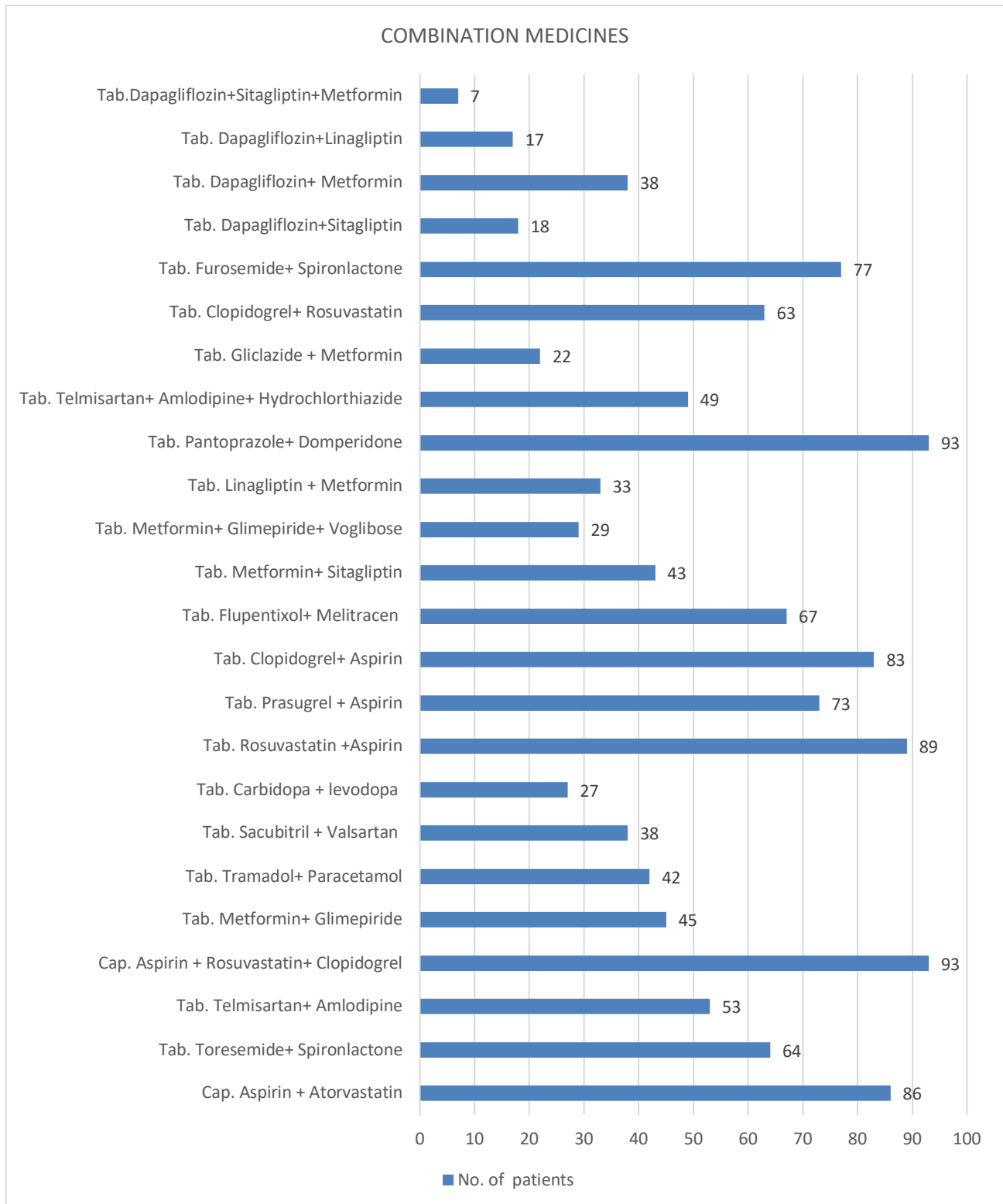
**Figure 9: Heart Rate**

Figure 9, shows that, there is very much disturbance in the heart rate of patients which are admitted in the Narayana Multispeciality hospital, Jaipur. This graph shows that out of 100 patients, only 15-20% patients fall under the normal heart rate range. Other than this, Maximum patients have elevated heart rate which could be due to many reasons such as

anxiety, fever, pain, changes in the electrolytes level inside body and sometime due to nebulization also.

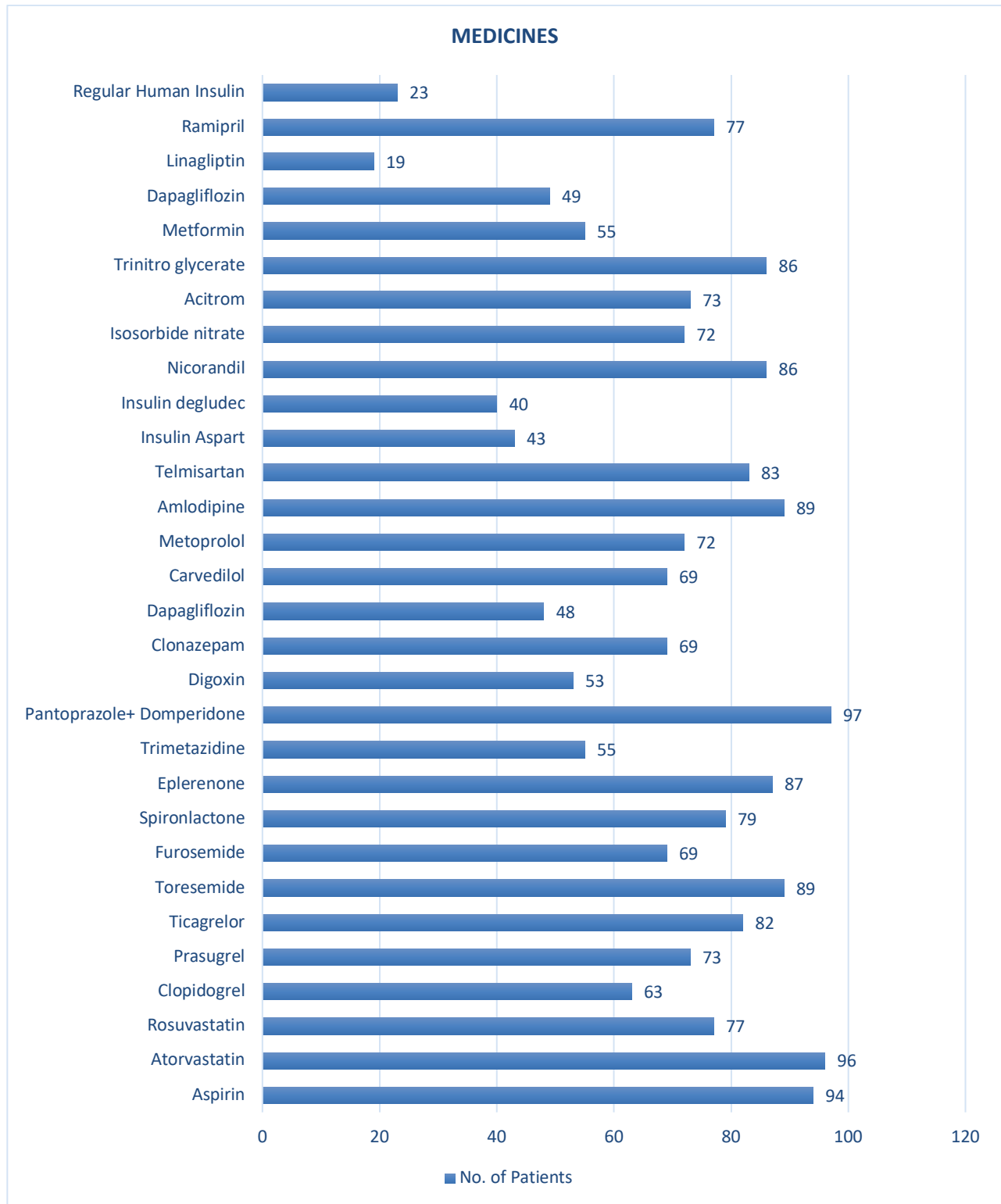
### Medicine Analysis

There are some medicines which are given to patients in combination to reduce the drug resistance as well as reduce the medicine count.



**Figure 10: Combination Medicine Prescribed**

This graph depicts that combination of statin group is much prescribed medicine such as Cap Aspirin+Rosuvastatin+clopidogrel, Cap. Aspirin+ Atorvastatin, Tab. Clopidogrel+Aspirin. For diabetic patients, Tab. Metformin+Dapagliflozin and Tab. Metformin+ Sitagliptin is prescribed more.



**Figure 11: Most medicine prescribed**

This graph depicts that statin group is much prescribed medicine such as Aspirin, Rosuvastatin, clopidogrel, Atorvastatin. Tab. NTG, Clopidogrel and Amlodipine is also much prescribed drug. For diabetic patients, Metformin, Dapagliflozin and Sitagliptin is prescribed more.



## Discussion

This study found that cardiovascular diseases along with the diabetes is significantly more prevalent in the patients than cardiovascular diseases. During the study, it was analysed that number of female patients with CVD and CVD+DM is almost same. Diabetes increases the risk of heart attacks and strokes in women, which has detrimental effects. The chance of acquiring diabetes later in life is doubled by gestational diabetes, or diabetes during pregnancy. Furthermore, high blood pressure is linked to obesity, diabetes, and high cholesterol, all of which are more common in women than in males.

Male patients with CVD+DM are more than CVD male patients. There was total 30 CVD+DM male patients and 17 CVD patients. Men are more likely than women to develop diabetes and cardiovascular illnesses. It may be because women are partially protected by oestrogen and progesterone until they go through menopause that men tend to acquire heart disease earlier than women. These hormones improve blood vessel health in addition to being primarily important for reproductive functions.

Author *Rosalinda Madonna*, 2019, The relative risk of cardiovascular disease (CVD) was shown to be 44% greater in women with diabetes than in men with the same circumstances, according to a meta-analysis comprising over 850,000 participants. Women with diabetes die from myocardial infarction at a significantly higher rate than men with the same condition. Compared to women without the condition, women with type 2 diabetes had a three times higher risk of dying from CAD (95%) (*Impact of Sex Differences and Diabetes on Coronary Atherosclerosis and Ischemic Heart Disease*, 2019)

This study observed major changes is the mental and emotional behaviour of the admitted hospital. Because of their altered mental states—which might include fear of being sick, anxiety about paying for medical bills, and changing

their lifestyle if they have a chronic condition—patient behaviour is frequently described as disruptive. And the outcomes that carers often face include impoliteness, unreasonable demands, and even violent assault. Certain drugs may also trigger these behaviours. Similar studies have shown that the use of antidepressants, antipsychotics, anxiolytics, hypnotics, and mood stabilisers can cause akathisia, agitation, mania, and emotional blunting in a large number of violent criminals. Many psychiatric drugs interact with monoamine neurotransmitters, causing disruptions in the brain's neural network that led to chemical lobotomies and dysexecutive disorders (*The prevalence, grouping, and distribution of stressors and their association with anxiety among hospitalized patients*, 2021)

It was analysed that maximum drugs which were prescribed to these patients belongs to the class of Statins (HMG-CoA reductase inhibitors), Angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptors blockers (ARBs), Calcium channel blockers (CCBs), beta blockers, nitrates, anti-platelet agents and anticoagulants.

During the analysis of diet, it was observed that, after getting admitted in the hospital, there are slightly change in the diet pattern. Throughout the analysis, diet is well maintained by the dietician and medical staff thus, diet is not affecting the health of the patient who are on polypharmacy.

While focusing over blood pressure, it was analyzed that there is fluctuation in the blood pressure. Only 34% patients fall under normal range of blood pressure. During the study, CHF patients, CKD patient and accidental patients were put of noradrenaline dose, adrenaline dose, phenylephrine or ephineprine dose to elevate the blood pressure.

The fluctuation may be because of Beta blockers such as propranolol, metoprolol, labetalol etc. Which are injected to lower the blood pressure with continuous monitoring. Furthermore, some

patients have aggressive behaviour or suffering from anxiety.

Another Observation was that after getting admitted, maximum elevated heart rate was monitored. High blood pressure is linked to elevated heart rate. Frequent, regular spikes in blood pressure can be deadly to the heart, kidneys, and blood vessels. Those who have chronic hypertension undergo health problem similar to this (*Comorbidity of Anxiety and Hypertension: Common Risk Factors and Potential Mechanisms*, 2023).

Another reason for the elevated heart rate is may be fever and excessive pain. Certain medicines and changes in the level of minerals inside the body i.e. Electrolytes ( $K^+$ ,  $Ca^{2+}$ ,  $Mg^{2+}$ ,  $Na^+$ ) resulting into Tachycardia condition, which is increased in the heart rate (*Tachycardia*, 2024). It was also observed that during nebulization, patient heart rate also gets elevated. *Salman A Syed*, 2021 states in study that Salbutamol nebulization, even at a degraded dose, can lead to a significant increment in heart rate when compared to nebulization with normal saline in healthy individual (*Short-Term Effect of Inhaled Salbutamol on Heart Rate in Healthy Volunteers*, 2021).

During study few patients are pregnant lady. Thus, Pre-eclampsia condition is also the reason for the elevated heart rate. One condition that can result in high blood pressure (hypertension) during pregnancy is preeclampsia. Preeclampsia is believed to be brought on by a malfunction in the blood vessels supplying the placenta, which prevents it from developing normally (*Preeclampsia (Beyond the Basics)*, 2024).

This study has found that, Oxygen saturation level is not gets disturbed due to polypharmacy. The saturation level is well monitored inside the hospital.

## Conclusion

Polypharmacy is the administration of 5 or more than 5 medicines. This leads to an increased risk of medical related issues. Age

related physiological changes such as decreased renal excretion, decreases hepatic function, decreased total body water, decreased lean body mass and impaired vision and hearing. These are the primary causes. Recently, studies have highlighted that, polypharmacy has number of detrimental effects, including high adverse drug response, fragility and even death. Moreover, it leads to increased out of pocket costs.

Throughout this study, it was found that patients have major effect on their blood pressure and heart rate simultaneously which could be due to number of medicines prescribed or the hospital environment and restriction. Changes in the patient behaviour is also one of the major concerns which needs to be focused sincerely. However, diet and SpO<sub>2</sub> level is maintained and well monitored by the medical staff so that they have positive effect on the patient well being with polypharmacy.

## Future Recommendation

Involvement that decreases the risk of drug-related trouble are essential to consider. These may be rendered by health care vocations, educators, policy makers & health care work planners.

- Future study must consider a large sample size with different disease so that reliable conclusion can be monitored and generalized.
- The study must include the OPD patients also.
- Medical Reconciliation must be introduced for inpatient and outpatients. This involves matching up a patient's prescription orders with every medicine the patient has ever taken. In order to prevent pharmaceutical mistakes like omissions, duplication, incorrect dosages, or drug interactions, this reconciliation is carried out.
- A methodical procedure that entails gathering data particular to the patient, assessing drug therapy to detect medication-related issues, ranking these issues, and formulating a plan of action for resolving them.

- Integrated educational and counselling programs tailored to the aged population should be developed to help them comprehend the issues and repercussions of over medicating.
- More research needs to be conducted so as to study geriatric health & the result of polypharmacy.

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