**ORIGINAL RESEARCH PAPER ON "PROSPECTIVE OBSERVATIONAL STUDY FOR RISK OF POLYPHARMACY PRESCRIPTION PATTERNS AT TERTIARY CARE HOSPITAL"**

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**ABSTRACT**

**Background**: Polypharmacy, the concurrent use of multiple medications, has become a prevalent concern in healthcare systems worldwide. This prospective observational study aimed to assess the relative risk and incidence of polypharmacy while investigating its impact on patient outcomes and exploring strategies for minimizing its irrational use. The data collection process involved the utilization of comprehensive case report forms and informed consent forms. The study encompassed a total population of 68 participants, consisting of both males and females. Utilizing statistical tools various parameters were analyzed to evaluate the adverse effects of polypharmacy. Hepatic and renal abnormalities, adverse drug reactions, drug-drug interactions, and demographic factors were meticulously examined. Furthermore, medication adherence, patient history (both medical and social), and co-morbidities were assessed to provide a comprehensive understanding of polypharmacy's implications. By adopting a patient-centered approach, this study sought to improve the quality of life, reduce mortality and morbidity, and minimize irrational medication practices. The findings shed light on the critical role of clinical pharmacokinetic considerations in addressing the challenges associated with polypharmacy. **Result**: this study highlights the need for effective strategies in preventing and managing polypharmacy. Through the identification and understanding of associated risks and adverse effects, healthcare professionals can develop new approaches to reduce the prevalence of polypharmacy and enhance patient care. By optimizing medication regimens and fostering individualized treatment plans, healthcare providers can significantly mitigate the potential harm caused by polypharmacy and improve patient outcomes. **Conclusion:** Addressing the challenges posed by polypharmacy by employing a multidisciplinary approach that encompasses patient education, healthcare provider collaboration, and the development of evidence-based guidelines, can effectively minimize the occurrence of polypharmacy and optimize medication practices.

**Keywords:** Polypharmacy, Adverse drug reaction, Case report, Irrational use, Co-morbidities.

**INTRODUCTION**:

Polypharmacy refers to the practice of taking multiple medications drugs simultaneously to treat one or more medical conditions. Polypharmacy commonly occurs in older adults who have multiple chronic health conditions and require multiple medications to manage their symptoms [1]. However, polypharmacy can also occur in younger individuals who have multiple acute or chronic health conditions [2].

Polypharmacy can lead to various problems such as drug interactions, adverse drug reactions, medication non-adherence, and increased risk of falls. Additionally, the use of multiple medications can result in increased healthcare costs, and may not always be necessary or effective in treating a patient's health conditions. Therefore, it is important for healthcare providers to carefully evaluate and monitor the use of medications in their patients to avoid the negative effects of polypharmacy [3].

Polypharmacy is a complex and multifaceted issue that involves the use of multiple medications or drugs by an individual. This can occur for a variety of reasons, including the treatment of multiple medical conditions, the management of symptoms, the prevention of disease, or the treatment of side effects caused by other medications [4]. Polypharmacy is often associated with older adults who have multiple chronic health conditions, such as hypertension, diabetes, and cardiovascular disease, among others. As a result, they may require multiple medications to manage their symptoms and improve their overall health. However, polypharmacy can also occur in younger individuals who have multiple acute or chronic health conditions [5].

One of the main concerns with polypharmacy is the potential for drug interactions, which can occur when two or more medications are taken together and interact with each other in ways that can affect their effectiveness or increase the risk of adverse drug reactions. These drug interactions can be unpredictable and can vary from person to person, depending on factors such as age, gender, genetics, and other health conditions [6]. Another concern with polypharmacy is the risk of adverse drug reactions, which can occur when a medication causes a harmful or unintended effect on the body. Adverse drug reactions can range from mild to severe, and can include symptoms such as nausea, dizziness, confusion, or even death in rare cases, Polypharmacy can also lead to medication non-adherence, which occurs when a patient does not take their medication as prescribed by their healthcare provider. This can occur for a variety of reasons, including forgetfulness, confusion about the medication regimen, or a lack of understanding about the importance of the medication [7]. To avoid the negative effects of polypharmacy, healthcare providers must carefully evaluate and monitor the use of medications in their patients. This may involve reviewing the patient's medical history, conducting a thorough medication review, and monitoring the patient's response to medication over time [8]. Additionally, healthcare providers must work closely with their patients to educate them about their medication regimen, provide clear instructions on how to take their medications, and encourage open communication about any concerns or questions the patient may have [9]. In conclusion, while polypharmacy can be beneficial in managing multiple medical conditions, it also carries significant risks [10]. Healthcare providers must take a proactive approach to manage the use of medications in their patients to avoid the consequences of polypharmacy [11].

This study primarily focuses on the prescription patterns of Drug related problem. Drug-Drug interaction and ADRs for specific drugs. Estimate the potential DRP and set a new outcome for drug use. It is method of drug utilization review for interpretating irrational use of medications Individualization of dosage regimen for each and individual patients can minimize such consequences. Incidence of disease occurrence and relative risk of drug use can easily qualify [12].

**AIM**

Prospective assessment for Risk of Polypharmacy Prescription patterns at tertiary care Hospital.

**OBJECTIVES**

1. To determine incidence and relative risk of polypharmacy at tertiary care hospital.

2. To identify most common medication classes involved in polypharmacy in the hospital.

3. To assess the factors associated with polypharmacy, including patients' demographics, co-morbidities and medication-related factors.

4. To evaluate the impact of polypharmacy on patient's outcome, including length OF hospital stay, adverse drug events and mortality.

5. To develop new strategies for reducing the polypharmacy in the hospital settings.

**NEED OF RESEARCH STUDY**

The study has to carry out for the minimization of irrational drug use and as well as Adverse event. Study directly relates with quality of life for each patient. It helps to identify errors. improper medication prescribing and dispensing. It also helps to improve practice of physician and prescribers because of determination of DRPs. Study mainly focuses on prescription patterns each department of tertiary care hospital which significantly important to identify newer drug interactions. We can easily distribute all the data on the basis of posological factors such as age, gender, weight, genetics and co-morbidities to individualization of dosage regimen. Therapeutic intervention of clinical pharmacist can reduce the mortality and morbidity disease condition and indicate appropriate use of medications.

**METHODOLOGY AND STUDY DESIGN**

LOCATION OF STUDY: Smt. Fulabai Bhausaheb Bansude Multi-Specialty Hospital, Latur.

(A tertiary care Hospital)

RESEARCH DESIGN: A prospective observational study was conducted on inpatients who were admitted to all departments of Smt. Fulabai Bhausaheb Bansude Multi-Specialty Hospital.

RESEARCH DURATION: This study was carried out for 6 months of duration from Dec 2022 to May 2023,

DATA COLLECTION: Primarily all the data collected with help of Case papers at inpatients department.

RESEARCH TOOLS: Case Report Form, Informed Consent Form

SAMPLE SIZE: The study was conducted over total population of 68 in which there were both males and females are included.

SELECTION OF SUBJECT: The Study subject was selected on the basis of inclusion and exclusion criteria.

**INCLUSION CRITERIA**:

1. Patients who were admitted to hospital more than 24 hrs.

2. Patients from any gender included in this study.

3.Patient’s age> 12 years who were admitted to hospital.

4. Patients who were admitted to In-Patient department.

**EXCLUSION CRITERIA**:

1. Patients who were admitted to hospital less than 24 hrs.

2. Female patients who were pregnant and child bearing condition was excluded.

3. Patient’s age < 12 years were excluded from this study.

4. Patients who were visited to Out-Patient department.

**STATISTICAL TOOLS**: All the data collected, recorded and calculated for its interpretation with the help of Microsoft excel 2019 and analysis as frequency distribution and percentages to access the prescribing indicators in software SPSS (Statistical package for social science) Version 20.

**OBSERVATIONS & RESULT**

To evaluate the polypharmacy prescription patterns for therapeutic drug monitoring, we have collected data of 68 cases patients admitted to inpatient department of Smt. Fulabai Bhausaheb Bansude multi-specialty hospital and observations & results are as follow:

 **DEMOGRAPHICAL DATA**:

**DISTRIBUTION OF DATA ON THE BASIS OF GENDER:**

Among total 68 patients were involved in this study, from all the data distribution there are 42 (61.76 %) male patients and 26 (38.23%) were female patients from both rural and urban areas. From this data distribution we interpretated that in this study there were higher number of male patients than that of female patients.

|  |  |  |
| --- | --- | --- |
| Gender | No of patient | % Distribution of data |
| Male | 42 | 61.66% |
| Female | 26 | 38.23% |
| total | 68 | 100& |

Table no 1: Distribution of data the basis of gender

 Fig.1 Distribution of Data on The Basis of Gender:

**DISTRIBUTION OF DATA ON THE BASIS OF AGE**:

As per our observation, we found that highest distribution of data from total number of patients belongs to age group of 40-49 and 50-59 i.e., 14 (20.58 %) patients in each group and lower data distribution has observed in 100-109 age group i.e., 1 (1.47%) patient.

Fig 2 Distribution of data the basis of age

**DISTRIBUTION OF DATA ON THE BASIS OF CO-MORBIDITIES:**

From all the Polypharmacy prescription patterns we observed that some patients have concurrent co-morbidities so that data consideration on the basis of co-morbidities is as follow:

Tab no 3 Distribution Od Data on The Basis of Co-Morbidities

|  |  |  |
| --- | --- | --- |
| CO-MORBIDITIES | DISTRIBUTION OD DATA | NO OF PATIENTS |
| ALD | 2.94% | 2 |
| AMl | 1.47% | 1 |
| DM1 | 2.94% | 2 |
| DM2 | 5.88% | 4 |
| HTN | 16.17% | 11 |
| HTN &CKD | 2.94% | 2 |
| HTN &DM 2 | 7.35% | 5 |
| HTN, DM 2,& CKD | 1.47% | 1 |
| HTN &DM1 | 2.94% | 2 |
| HTN&HTH | 1.47% | 1 |
| RTA | 1.47% | 1 |

 fig. 3 Distribution of data on the basis of co-morbidities.

**DISTRIBUTION OF POLYPHARMACY PRESCRIPTION PATTERNS:**

 It is the core part of the study in which we have estimated the patients on the basis of polypharmacy or without polypharmacy prescription from which we obtained following data (Table. No. 3). After collection of data, we calculated the incidence and relative risk of polypharmacy prescription patterns in total number of populations.

 Table no 4 Distribution of Polypharmacy Prescription Patterns.

|  |  |  |
| --- | --- | --- |
| TYPE OF PATIENT | NO. OFPRESCRIPTIONS | % DISTRIBUTION OFDATA |
| WITHPOLYPHARMACY | 43 | 63.23% |
| WITHOUTPOLYPHARMACY | 25 | 36.76% |
| TOTAL | 68 | 100% |

 Fig.4 Distribution of Polypharmacy Prescription Patterns.

**INCIDENCE OF POLYPHARMACY (Exposed group):**

Give data:

No. of patients with polypharmacy: 43

Person-time population: 68

Incidence $=\frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 43/68

Incidence= 0.6323 X 100

Incidence = 63.23%

INCIDENCE OF WITHOUT POLYPHARMACY (Unexposed group)

Give data:

No. of patients with polypharmacy: 25

Person-time population: 68

Incidence =$\frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence= 25/ 68

Incidence =0.3676 X 100

Incidence =36.76%

 RELATIVE RISK:

Relative risk=$\frac{incidence or prevalince of decease in the exposed group}{sincidence or prevalince of decease in the unexposed group}$

Relative risk= 0.6323/0.3676

Relative risk- = 1.75/ 1 =1.75>1

INTERPRETATION: Exposed group has more risk than that of Unexposed group.40

**DISTRIBUTION ON THE BASIS OF CATEGORIES OF DRUG SIGNIFICANT FOR POLYPHARMACY:**

As per research random prescriptions from tertiary care hospital in which 5 drug categories are majorly significant for polypharmacy prescription patterns. Hence estimated that each class has their significant polypharmacy and drug related problems which are further prone to cause hepatic and renal abnormalities. Distribution of data for different classes of drug polypharmacy are as follow:

|  |  |  |
| --- | --- | --- |
| CATEGORIES OFDRUGS | NO. OF PATIENTS | % DISTRIBUTION OFDATA |
| ANALGESICS | 28 | 41.17 |
| ANTIBIOTICS | 13 | 19.11 |
| ANTI-EPILEPTIC | 5 | 7.35 |
| DIURETICS | 2 | 2.94 |
| PPI | 0 | 0 |

 Table no 5 Drug Significant for Polypharmacy.

Fig. 5 Drug Significant for Polypharmacy

ASSESSMENT OF DATA ON THE BASIS OF LIVER FUNCTION TEST:

Most of the time drug abuse, misuse of drug, prescription error can significant for defects related to liver abnormalities. Our consideration for this study is assessment of liver function and defects based on polypharmacy prescription patterns. Total number cases collected with LFT are 22 in which 15 are with polypharmacy and 7 cases are without polypharmacy in which we distributed data as follow:

 Table no 6 Assessment of Data on The Basis of Liver Function Test.

|  |  |  |  |
| --- | --- | --- | --- |
| Type Of Patient |  LFT | Total | % Distribution Of Data |
| ABNORMAL | NORMAL |
| WithPolypharmacy | 11 | 4 | 15 | Abnormal | Normal |
| 73.33% | 26.66% |
| WithoutPolypharmacy | 0 | 7 | 7 | Abnormal | Normal |
| 0% | 100% |
|  |  | TOTAL | 22 |  |

**INCIDENCE OF POLYPHARMACY (Exposed group):**

ABNORMAL LFT:

Given data:

No. of patients with Abnormal LFT: 11

Person-time population: 15

Incidence =$\frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 11/15

Incidence = 0.7333 X 100

Incidence-=73.33%

NOMARL LFT:

Give data:

No. of patients with Normal LFT: 4

Person-time population: 15

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 4/15

Incidence = 0.2666 X 100

Incidence = 26.66%

RELATIVE RISK:

Relative risk=$\frac{incidence or prevalince of decease in the exposed group}{incidence or prevalince of decease in the unexposed group}$

Relative risk= 0.7333 / 0.2666

Relative risk =275/1 = 2.75>1

INTERPRETATION: Relative risk of Exposed group has more risk than that of Unexposed group.

INCIDENCE OF WITHOUT POLYPHARMACY (Unexposed group):

ABNORMAL LFT:

Give data:

No. of patients with Abnormal LFT: 0

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Person-time population: 0/7

Incidence = 0 X 100

Incidence = 0%

NOMARL LFT:

Give data:

No. of patients with Normal LFT: 7

Person-time population: 7

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 7/7

Incidence =1 X 100

Incidence = 100%

RELATIVE RISK:

Relative risk=$\frac{incidence or prevalince of decease in the exposed group}{incidence or prevalince of decease in the unexposed group}$

Relative risk = 0.0/1

Relative risk = 0/1 = 0<1

INTERPRETATION: Relative risk of Exposed group has low risk than that of Unexposed group.

**ASSESSMENT OF DATA ON THE BASIS OF KIDNEY FUNCTION TEST:** Our consideration for this study is assessment of Kidney function and defects based on polypharmacy prescription patterns. Total number cases collected with KFT are 23 in which 15 are with polypharmacy and 8 cases are without polypharmacy in which we distributed data as follow:

|  |  |  |  |
| --- | --- | --- | --- |
| TYPE OF PATIENT | LFT | TOTAL | % DISTRIBUTION OF DATA |
| ABNORMAL | NORMAL |
| WITHPOLYPHARMACY | 9 | 6 | 15 | ABNORMAL | NORMAL |
| 60% | 40% |
| WITHOUTPOLYPHARMACY | 2 | 6 | 8 | ABNORMAL | NORMAL |
| 25% | 75% |
|  |  | TOTAL | 23 |  |

 Table no. 7: Assessment of Data on The Basis of Kidney Function Test.

INCIDENCE OF POLYPHARMACY (Exposed group):

ABNORMAL KFT:

Given data

No. of patients with Abnormal KFT: 9

Person-time population: 15

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 9/15

Incidence= 0.6 X 100

Incidence = 60 %

NOMARL KFT:

Give data:

No. of patients with Normal KFT: 6

Person-time population: 15

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 15

Incidence = 0.4 X 100

Incidence = 40%

**RELATIVE RISK:**

Relative risk=$\frac{incidence or prevalince of decease in the exposed group}{incidence or prevalince of decease in the unexposed group}$

Relative risk = 0.6/0.4

Relative risk= 1.5/1=1.5>1

INTERPRETATION: Relative risk of Exposed group has more risk than that of Unexposed Group.

**INCIDENCE OF WITHOUT POLYPHARMACY (Unexposed group):**

 **ABNORMAL KFT:**

Give data:

No. of patients with Abnormal KFT: 2

Person-time population: 8

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 2/8

Incidence 0.25 X 100

Incidence = 25%

**NOMARL KFT:**

Give data:

No. of patients with Normal KFT: 6

Person-time population: 8

Incidence =$ \frac{number of new cases during a specified time period}{size of the population at risk during the same time period}$

Incidence = 6

Incidence = 0.75 X 100

Incidence = 75%

RELATIVE RISK:

Relative risk=$\frac{incidence or prevalince of decease in the exposed group}{incidence or prevalince of decease in the unexposed group}$

Relative risk = 0.25/0.75

Relative risk= 0.33/1 = 0.33 <1

INTERPRETATION: Relative risk of Exposed group has low risk than that of Unexposed group.

**DISCUSSION**

Our research study focused on the growing phenomenon of polypharmacy in drug utilization patterns, which has become a significant concern in healthcare. Polypharmacy encompasses various factors, including the additive effects and synergism of drugs. Through our observations, we aimed to understand the impact of polypharmacy on patient outcomes by analyzing patient demographics, such as age, gender, and co-morbidities.

Using statistical tools like Microsoft Excel and SPSS, we collected and organized data in a well-defined format to derive meaningful insights. Among the 68 patients included in the study. 12(61.76%) were male, while 26 (38.23%) were female. The highest distribution based on age was observed in the 40-49 and 50-59 age groups, each accounting for 14 (20.58%) patients, while the lowest data belonged to the 100-109 age group, with only 1 (1.47%) patient. Regarding co-morbidities, we identified 11 different types of diseases, with hypertension being the most prevalent, affecting 11 (16.11%) patients. Other co-morbid conditions, such as Acute myeloid Leukemia, Hypertension with DM2 and Chronic kidney disease. Hypertension with Hyperthyroidism and renal tubular acidosis, were observed in 1 patient each (1.47%).

Our study focused on the prescription patterns of polypharmacy, categorizing patients into those with polypharmacy and those without. From our prospective observational assessment, we found that 63.23% (43 patients) were exposed to polypharmacy, while 36.76% (25 patients) did not receive polypharmacy prescriptions. The relative risk analysis indicated that the exposed group (polypharmacy) had a higher risk compared to the unexposed group (without polypharmacy).

Additionally, we randomly selected prescriptions from a tertiary care hospital, emphasizing the categories most relevant to polypharmacy and drug-related problems (DRPs). These categories directly correlated with hepatic and renal abnormalities, which are commonly associated with drug abuse/misuse and prescription errors. We examined a total of 15 polypharmacy prescriptions to assess abnormalities in liver function (LFT) and kidney function (KFT). Our findings revealed that 11 (73.33%) patients had abnormal liver function, while 4 (26.66%) patients exhibited normal liver function. In terms of kidney function, 9 (60%) patients showed abnormalities, while 6 (40%) patients had normal kidney function.

These results emphasize the critical role of polypharmacy in contributing to hepatic and renal abnormalities. Drug-related defects and prescription errors often lead to these complications. Our study sheds light on the need for effective interventions to minimize polypharmacy and enhance patient safety.

Our research provides valuable insights into the prevalence and impact of polypharmacy in a tertiary care hospital setting. By understanding the demographic patterns, relative risks, and associated abnormalities, healthcare professionals can develop strategies to optimize medication regimens, improve patient outcomes, and ensure the safe use of medications.

This study emphasizes the urgent need to address the challenges posed by polypharmacy. By employing a multidisciplinary approach that encompasses patient education, healthcare provider collaboration, and the development of evidence-based guidelines, we can effectively minimize the occurrence of polypharmacy and optimize medication practices. Such efforts will enhance patient safety, reduce healthcare costs, and improve overall healthcare quality. ultimately leading to improved patient outcomes and a healthier society.

**CONCLUSION**

This study emphasizes the urgent need to address the challenges posed by polypharmacy. By employing a multidisciplinary approach that encompasses patient education, healthcare provider collaboration, and the development of evidence-based guidelines, we can effectively minimize the occurrence of polypharmacy and optimize medication practices. Such efforts will enhance patient safety, reduce healthcare costs, and improve overall healthcare quality, ultimately leading to improved patient outcomes and a healthier society.

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