

STUDY OF POLYPHARMACY IN GERIATRIC PATIENTS IN A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY.

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ABSTRACT

Objective: To identify drugs, diseases involved, to find out the inappropriate drugs and consequences involved in Polypharmacy.

Methodology: A prospective observational study was conducted in a tertiary care hospital between August 2016-January 2017. We included geriatric patients of age above 60 years with all diseases involving comorbidities in departments like general medicine, general surgery, gastroenterology and orthopedics. We analyzed the data using statistical method ANOVA using software windostat version 9.2. **Results:** 105 patients were included in our study among them 71 were male and 34 were female. Among the common drugs included in

our study, Pantoprazole, Mannitol and Nifedipine were found to be significant. Diseases such as cardiovascular diseases, Cerebrovascular accident, Peritonitis, Cholelithiasis, Traumatic quadriplegia, Osteoarthritis were found to be significant. Inappropriate drugs such as Pantoprazole, Aspirin, Spironolactone and Diclofenac were found to be significant.

Conclusion: By conducting this study we conclude, that the inappropriate drugs are found to be significant in geriatrics so while prescribing drugs Beers criteria and STOPP/START criteria should be used as a standard guideline so that inappropriate drugs can be reduced.

KEYWORDS: Polypharmacy, geriatrics, inappropriate drugs, Beers criteria, START/STOPP criteria.

INTRODUCTION

Geriatrics represents the most vulnerable section of our society and tends to be the largest consumers of prescribed drug. Treating the elderly is the most challenging part to physician and it can be sorted through a holistic multidisciplinary approach.

It is predicted that the population of geriatrics in the country will rise from 8.3% to 10.7% by 2021. This is because of increased life expectancy at births, which are 67.3 years for males and 69.6 years for females. It is commonly observed that geriatrics suffer from multiple co-morbid conditions and is hospitalized several times, so there is an increased occurrence of Polypharmacy.

According to the WHO Polypharmacy is defined as “the administration of many drugs at the same time or the administration of an excessive number of drugs.

Some researchers made distinction between minor (2-4 drugs) and major (5 or more drugs) Polypharmacy. In general, most commonly accepted definition of Polypharmacy is use of 5 or more drugs.

The unnecessary drug therapy problems frequently tend to be overlooked in Polypharmacy prescribing. Drug therapy is considered unnecessary for the patient if there is no longer valid medical indication of a particular drug.

MATERIALS AND METHODOLOGY

Study site: In-patient and Outpatient departments of General medicine, Orthopaedics, General surgery and Gastroenteritis, Gandhi hospital, Secunderabad.

Study design: A Prospective Observational study.

Study duration: 6 months.

Study period: August 2016 to January 2017.

Study approval: Institutional ethical committee approval was obtained before commencing study and Study protocol was submitted to Institutional Ethical Committee (IEC), CMR College of Pharmacy and Hyderabad for approval.

Inclusion criteria

- Inpatients and outpatients of age above 60 years of either gender.

Exclusion criteria

- Tuberculosis patients, HIV patients, Psychiatric patients.
- Patients with severe organ failure.
- Cases from emergency departments.

Study Procedure

A Prospective Observational study was conducted in a tertiary care hospital it includes the following:

- Data regarding the study was collected using the suitable data collection form, which was designed to collect and document the data.
- Data collection form includes:
 - Demographic details of patient
 - Information regarding disease
 - Past medical and medication history of patient
 - Treatment chart
 - Detail basis of laboratory investigations
 - Duration of stay
- The medication details were reviewed during ward rounds on a daily basis from the day of admission to day of discharge.
- The medications received by subjects were counted separately, medication appropriateness for each patient was analysed based on their medical history and clinical findings and inappropriate medications were identified by comparing medications received by each patient using Beer's criteria, STOPP/START criteria.
- The inappropriate medications found were assessed and categorized using the following screening tools.

RESULTS

105 cases have been collected in the departments like General Medicine, General Surgery, Orthopedics and Gastroenterology.

Age Wise Distribution of Polypharmacy: N=105

Table 1: (Age wise distribution).

| Age group | Frequency | Percentage % | P-value |
|-----------|-----------|--------------|---------|
| 60-70 | 66 | 63 | 0.626 |
| 71-80 | 20 | 19 | |
| >or=80 | 19 | 18 | |

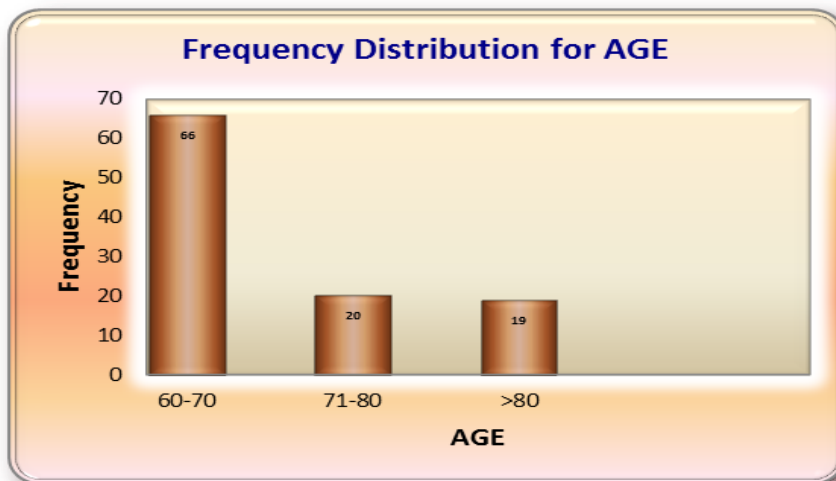


Figure 1: (Graph of frequency distribution of age).

From Table: 1 and Figure: 1, it was found that the Polypharmacy is prevalent in the age group of 60-70years.

Gender Wise Distribution of Polypharmacy: N=105

Table 2: (Gender wise distribution).

| Gender | Frequency | Percentage % | P-value |
|--------|-----------|--------------|---------|
| Male | 71 | 68 | 0.723 |
| Female | 34 | 32 | |

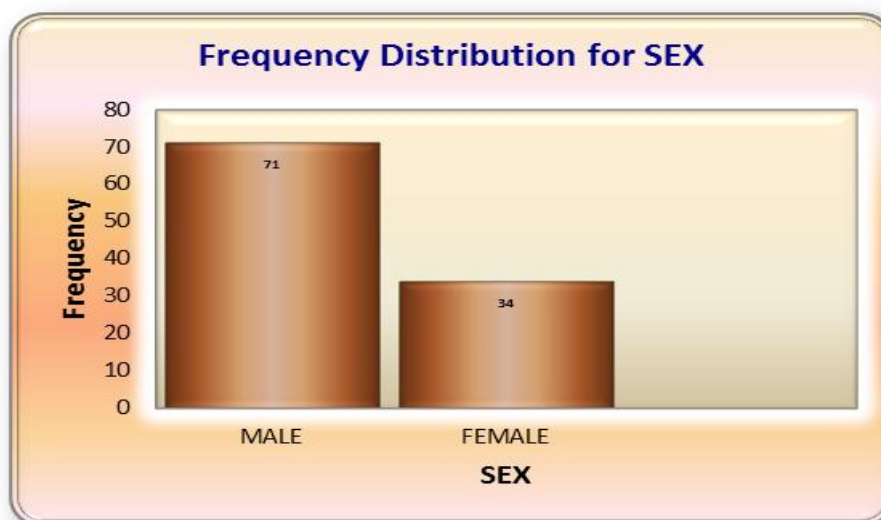
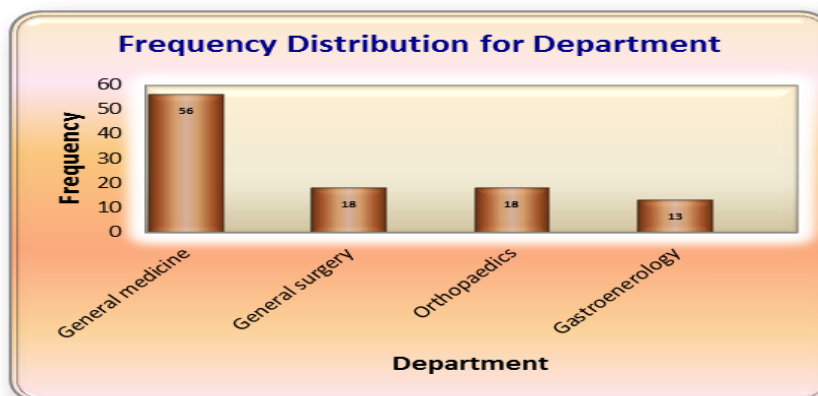


Figure: 2a (Graph of frequency distribution of sex).

From Table: 2 and figure: 2a, it was found that the Polypharmacy is more in male when compared to female.

Department Wise Distribution of Polypharmacy: N=105**Table 3: (Department wise distribution).**

| Department | No.of cases | Percentage % | P-value |
|------------------|-------------|--------------|---------|
| General medicine | 56 | 53.3 | 0.0072 |
| General surgery | 18 | 17.1 | |
| Orthopaedics | 18 | 17.1 | |
| Gastroenterology | 13 | 12.3 | |

**Figure 3a: (Graph of frequency distribution of department).**

From Table:3 and fig:3a it was clearly indicated that the Polypharmacy is involved more in the department of general medicine when compared to other departments like general surgery, orthopedics and gastroenterology which are included in our study.

Common Drugs: n=105**Table 4: (Common drugs).**

| Common drugs | Frequency | Percentage % | P-value |
|-----------------|-----------|--------------|----------|
| Pantoprazole | 44 | 41.9 | 0.023*** |
| Ceftriaxone | 26 | 24.7 | 0.093 |
| Tramadol | 22 | 20.9 | 0.199 |
| Ranitidine | 20 | 19.0 | 0.389 |
| Paracetamol | 18 | 17.1 | 0.839 |
| Cefuroxime | 12 | 11.4 | 0.632 |
| Aspirin | 11 | 10.4 | 0.196 |
| Metrogyl | 11 | 10.4 | 0.352 |
| Atorvastatin | 10 | 9.5 | 0.342 |
| Cefixime | 9 | 8.5 | 0.368 |
| Amlodipine | 8 | 7.6 | 0.707 |
| Clopidogrel | 8 | 7.6 | 0.736 |
| Furosemide | 8 | 7.6 | 0.508 |
| Nicardia retard | 7 | 6.6 | 0.034* |
| Mannitol | 6 | 5.7 | 0.005** |
| Insulin | 6 | 5.7 | 0.776 |
| Amikacin | 5 | 4.7 | 0.414 |
| Augmentin | 4 | 3.8 | 0.072 |
| Eptoin | 3 | 2.8 | 0.567 |
| Tibrolin | 2 | 1.9 | 0.273 |

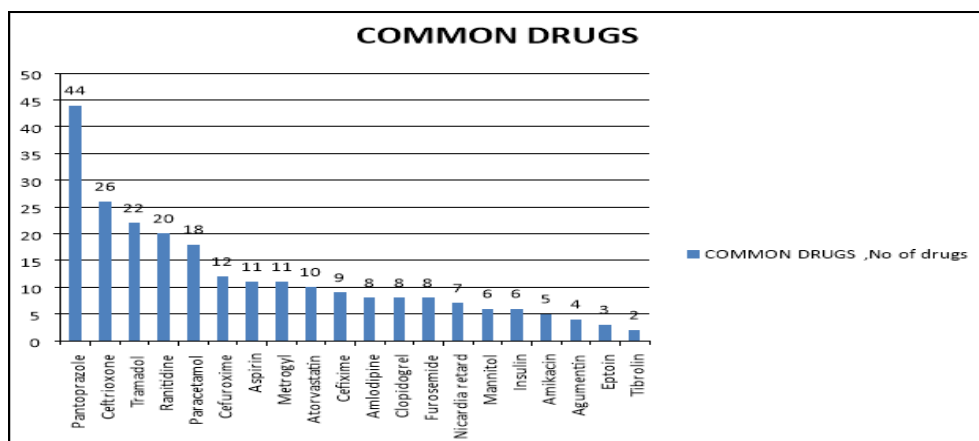


Figure 4a: (Graph showing common drugs).

From Tab:4 and fig: 4a, it was found that among the common drugs included in our study pantoprazole and mannitol are more prevalent in the age group of 80 years.

Diseases Involved: n=105

Table 5: (Diseases involved).

| Disease | Frequency | Percentage % | P-value |
|--|-----------|--------------|------------|
| CVA | 18 | 17.1 | 0.0134** |
| OLD CVA WITH ISCHEMIC SEIZURES | 2 | 1.9 | 0.62824 |
| CAD | 4 | 3.80 | 0.01749* |
| DIABETIC FOOT WITH CAD | 3 | 2.85 | 0.01855* |
| COL WITH ASCITES | 7 | 6.66 | 0.06863 |
| DVT | 1 | 0.95 | 0.83566 |
| COPD | 3 | 2.85 | 0.4624 |
| CVA WTH RIGHT LL DVT | 1 | 0.95 | |
| OSTEOARHRITIS | 3 | 2.85 | 0.00139** |
| SURGERY | 19 | 18.0 | 0.00001*** |
| PERITONITIS | 3 | 2.85 | 0.01728* |
| CELLULITIS | 3 | 2.85 | 0.00139** |
| TRAUMATIC QUADRIPARESIS | 3 | 2.85 | 0.01855* |
| GASTROENTERITIS | 3 | 2.85 | 0.44944 |
| HEART FAILURE | 1 | 0.95 | 0.18467 |
| CRHD | 2 | 1.9 | 0.83566 |
| CHOLETHIASIS | 3 | 2.85 | 0.01728* |
| VARICOSE ULCERS | 1 | 0.95 | 0.18467 |
| VARICOSE VEINS | 1 | 0.95 | 0.83566 |
| MADURA FEET | 1 | 0.95 | 0.16467 |
| FRACTURES | 1 | 0.95 | 0.18467 |
| MENINGOENCEPHALITIS | 2 | 1.9 | 0.62824 |
| HYDRONEPHROSIS | 1 | 0.95 | 0.60546 |
| OBSTRUCTIVE UROPATHY WITH UTI | 2 | 1.9 | 0.62824 |
| ALD WITH COL | 1 | 0.95 | 0.06719 |
| GROWTH IN FUNDUS AND BODY OF STOMACH | 1 | 0.95 | 0.06719 |
| MULTIPLE GASTRIC ULCERS WITH UGI BLEED | 1 | 0.95 | 0.83566 |
| NSAID ABUSE | 1 | 0.95 | 0.83566 |
| ACIROM INDUCED HEMATURIA | 1 | 0.95 | 0.83566 |
| HEMOSUCCUS PANCREATITIS WITH UGI BLEED | 1 | 0.95 | 0.83566 |

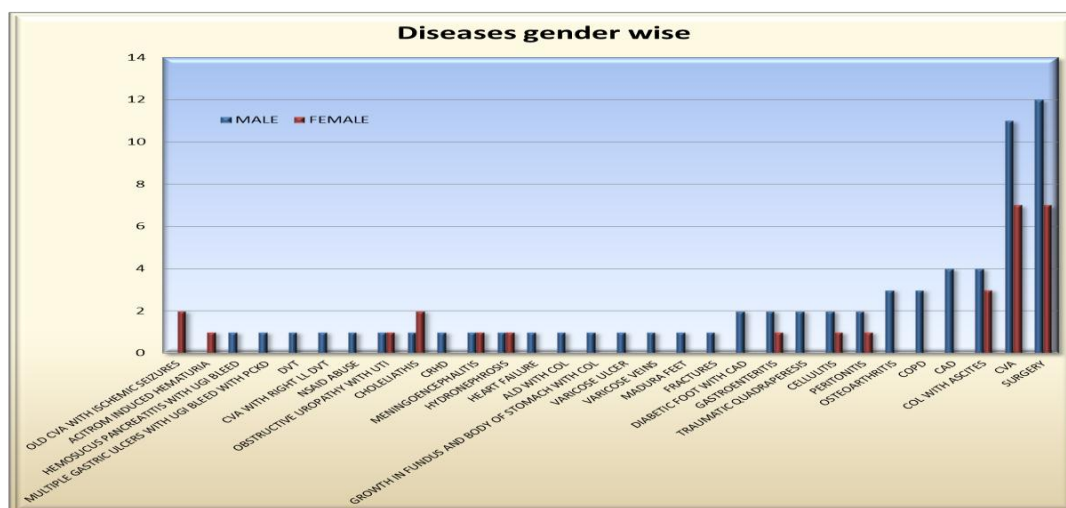


Figure 7: (Graph showing diseases involved).

From Table: 5 and Fig: 7, it was found that among the diseases included in our study Cerebrovascular accident and surgery cases are predominant in the male and females followed by Col with ascites and COPD.

Consequences Involved: n=105

Table 16: (Consequences involved).

| Consequences | Frequency | Percentage % | P-value |
|----------------------------|-----------|--------------|---------|
| ADR's | 2 | 1.90 | 0.493 |
| Minor | 39 | 37.1 | |
| Major and | 14 | 13.3 | |
| Moderate drug interactions | 71 | 67.6 | |

Inappropriate Drugs: n=105

Table 17: (Inappropriate drugs).

| Inappropriate drugs | Frequency | Percentage % | P-value |
|---------------------|-----------|--------------|------------|
| Aspirin | 19 | 18.0 | 0.00070*** |
| Clopidogrel | 6 | 5.71 | 0.07854 |
| Nifedipine | 7 | 6.66 | 0.62824 |
| Insulin | 8 | 7.61 | 0.10176 |
| Chlordiazepoxide | 2 | 1.90 | 0.37126 |
| Dexamethasone | 7 | 6.66 | 0.28427 |
| Haloperidol | 3 | 2.85 | 0.83566 |
| Hydrocortisone | 5 | 4.76 | 0.69422 |
| Pantoprazole | 37 | 35.2 | 0.0001*** |
| Digoxin | 1 | 0.95 | 0.69422 |
| Diclofenac | 6 | 5.71 | 0.00821** |
| Spirolactone | 13 | 12.38 | 0.01038* |
| Diazepam | 1 | 0.95 | 0.83566 |
| Warfarin | 3 | 2.85 | 0.18467 |

From the table: 7, it was found that among the inappropriate drugs such as pantoprazole, aspirin, diclofenac were found to be more prevalent than the other drugs involved in our study.

Start/Stop Criteria Inappropriate Drugs List

Table 18: (START/STOPP Criteria).

| Inappropriate drugs | Rational/Recommendation | Alternatives |
|-------------------------------|--|---|
| Digoxin | Avoid in Heart failure, may increase risk of toxicity. | Dose reduction with monitoring. |
| Aspirin | Avoid chronic use. Increase the risk of GI Bleeding/PUD in patients using oral or parenteral anticoagulants, antiplatelet or PPIs. | Add a gastro protective agent or reduce dose to 81 mg. |
| Clopidogrel | Avoid long-term use, increase risk of bleeding. | Asses the risk/benefit ratio. |
| Proton pump inhibitors | Avoid long-term use, may cause deficiency in magnesium and vitamin B12. | Adjust dose or use alternatives like H2 receptor antagonist's ranitidine and famotidine. |
| Nifedipine | Avoid. Potential for Hypotension, risk of precipitating myocardial ischemia. | Use alternatives like diuretics, ACE inhibitors, or Beta blockers. |
| Spirolactone | Avoid in patients with heart failure. Risk of precipitating hyperkalemia if taken > 25mg/day. | Use safer alternatives. |
| Insulin | Avoid higher risk of hypoglycemia. | Use alternatives like Metformin and other oral anti-diabetics. |
| Hydrocortisone | Avoid, increase risk of toxicity. | Use inhaled corticosteroid or acetaminophen topicals. |
| Diclofenac | Avoid chronic use increase risk of GI Bleeding/PUD patients. | Use topical acetaminophen. |
| Chlordiazepoxide | Avoid BZDs for treatment of insomnia, agitation, or delirium. Increase risk of cognitive impairment, delirium, falls, and fractures. | For insomnia consider non drug therapy, use zolpidem5mg, zolpiclone 3.75mg |
| Haloperidol | Avoid, increase risk of stroke and mortality in persons with dementia. | Dosage reduction/Discontinuation of drug. |
| Warfarin | Avoid, inappropriate in patients with bleeding disorder, with NSAIDS and with aspirin. | Assess the risk/benefit ratio or use acetaminophen topical. |
| Diazepam | Avoid benzodiazepines (any type) for treatment of insomnia, agitation, or delirium. | For anxiety: Use SSRI, SNRI, shorter benzodiapines like alprazolam, lorazepam, oxazepam, buspirone. |
| Dexamethasone | Potentially inappropriate for elderly over 65 years and older. Risk of causing potential side effects. | For rheumatoid arthritis: DMARD. For COPD: Inhaled corticosteroid and/or bronchodilator. |

Categories of Drugs Prescribed

Table 19: (Categories of drugs involved).

| Category of drugs | No.of drugs | Percentage (n=105) |
|--|-------------|--------------------|
| Analgesics and Anti-inflammatory drugs | 76 | 73.7 |
| Antimicrobials | 133 | 129.1 |
| Drugs acting on cardiac system | 68 | 66 |
| Drugs acting on respiratory system | 13 | 12.6 |
| Drugs used in dyslipidaemia | 14 | 13.5 |
| Drugs acting on CNS | 16 | 15.5 |
| Antacids | 79 | 76.6 |
| Anti- diabetic drugs | 21 | 20.3 |
| Multivitamins | 40 | 38.8 |

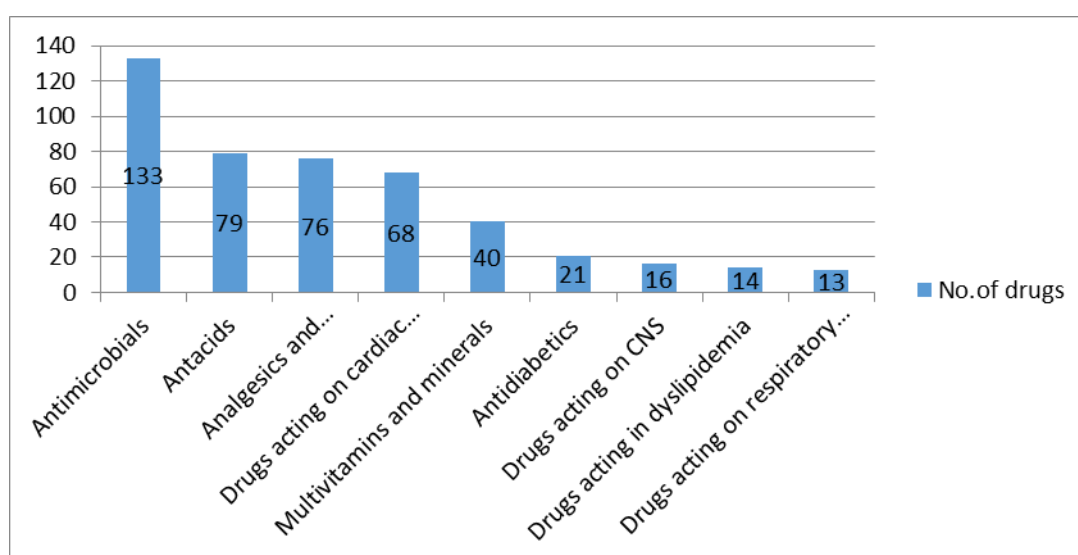


Figure 8: (Graph of categories of drugs involved).

DISCUSSION

- A total of 105 geriatric group were included to assess the use of Polypharmacy in tertiary care hospital and was analyzed by ANOVA using Windostat Version 9.2 from Windostat services.
- Among 105 cases, it was observed that 62% were male and 38% were female.
- There was no significant difference in the departments included in the work such as General Medicine, General Surgery, Orthopedics, Gastroenterology, which was contradictory to the study conducted by Chitra et.al, 2015.
- Negar Golchin et.al. 2011 conducted a study and concluded that there was no significant difference (age-0.16 and gender-0.32) between age and gender which was similar to our study (P-value age-0.072, gender-0.723).

- Pantoprazole (P-value- 0.028), Nicardipine (P-value-0.03) were inappropriate as per Beer's criteria and were significant in our study, which was similar to the study conducted by Md. Mamum Al-Amin *et al.*, RJ Lithe, M.Lankar *et al.*, 2013.
- Mannitol was appropriate as per Beer's criteria (P-value-0.005) which was correlated to the study conducted by Chitra *et al.* 2015.
- It was observed that inappropriate drugs as per our study were Aspirin (P-value-0.0007), Spironolactone (P-value-0.010), Diclofenac (P-value-0.008), which was parallel to study conducted by Chitra *et al.*, 2015.
- Cardiovascular disease (P-value-0.01749) has shown significant difference in our study, which was similar to study conducted by Md.Mamum Al-Amin *et al.*, 2013.
- Cerebrovascular accident (P-value- 0.0134) has shown significant difference in our study which was related to the study conducted by Kaite Gallacher *et al.* 2013.
- Surgery (P-Value 0.008) was found significant difference in our study, which was correlated to the study conducted by Harstedt M, 2016.
- Osteoarthritis (P-value0.001) has shown significant difference in our study, which is parallel to the study conducted by John L Wallace, 2013.
- Diseases like Diabetic foot with CAD(P-value-0.018), Cholelithiasis(P-value-0.017), Cellulitis(P-value-0.001), Peritoinitis(P-value-0.017), Traumatic quadriperisis(P-value-0.017) has shown significant difference which was contradictory to the study conducted by Negar Golchin *et al.*, 2011.
- A consequence of polypharmacy like drug interactions has no significant difference (Minor-0.06, Moderate-0.181 and Major-0.122) which was similar to the study conducted by Akram Ahmad *et al.*, 2015.
- ADR's have shown no significance difference of (P-value 0.001) which was similar study conducted by James Wooten *et al.*, 2005.

CONCLUSION

In our study, we concluded that the Polypharmacy and the inappropriate drug use are prevalent among the elderly. Diseases such as cardiovascular diseases, cerebrovascular accident and surgeries such as fractures were found to be more significant than the others included in our study. Inappropriate drugs such as pantoprazole, aspirin, spironolactone, and diclofenac were found to be significant. So, while prescribing drugs to the elderly Beers criteria and STOPP/START criteria should be used as a standard guideline to avoid

unnecessary risks or other drug related problems.

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