POLYPHARMACY INDUCED DRUG-DRUG INTERACTIONS AT TERTIARY CARE TEACHING HOSPITAL IN NORTH KARNATAKA

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ABSTRACT
The objective of the study was to observe the occurrence of drug related problems due to polypharmacy. Materials and Methods: A prospective observational study was conducted using prescriptions prescribed at General medicine department. Results: A total of 60 prescriptions were involved in the study, out of which majority of the prescriptions were containing more than 06 drugs i.e. 48.33%. The result showed 65 drug-drug interactions among those moderate drug-drug interactions were at higher side (61.66%). Apart from severe drug-drug interactions (8.33%), the study also revealed the drug duplication (6.6%) and class duplication (1.6%). Conclusion: The study concluded that, though the prescription contains multi-medications can be accepted as they are clinically appropriate and/or meet the need of the patient condition but monitoring or observation is required by the Clinical Pharmacist for the prevention of drug related problems.

KEYWORDS: Drug related problems, Drug-drug interactions, drug duplication, and class duplication.

INTRODUCTION
Polypharmacy: The basic definition is quite simple more drugs are prescribed or taken than clinically appropriate. The specific number of drugs taken is not itself indicative of polypharmacy as all of the drugs may be clinically necessary and appropriate for the patients. However as the number of prescribed drugs increases, so do the chances of polypharmacy.\[1\] The administration of more medications than are clinically indicated, representing unnecessary drug use. Unfortunately, using multiple medications may cause problems such as...
the increased risk of inappropriate use of medications.\textsuperscript{[2]} In addition, it is also assumed that polypharmacy causes unnecessary health expenditure, directly due to the reluctant drug sales and indirectly due to the increased level of hospitalization caused by drug related problems.\textsuperscript{[3]} The growth of elderly population is significant, and many people will need low or high-complexity multiple drug therapy due to existence of a acute or chronic diseases. The factors associated to polypharmacy in the elderly include the number of serious diseases which require a high number of medications for its treatment and incur in higher expenditure with physicians and pharmacists as more providers will be involved. Admission rates may increase since increasing population age is associated to higher risk of side effects in the elderly, a condition that can be aggravated by the use of polypharmacy.\textsuperscript{[4]} Analysis of prescription data could provide the bases for reviewing prescriptions practices and developing measures to promote the rational use of drugs and prevent drug related problems. According to the WHO, the rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to the and their community.\textsuperscript{[5]} The definition of polypharmacy in the literature is not uniform. There are basically two approaches to the definition. The first refers only to the number of drugs taken simultaneously. According to this, polypharmacy means the concurrent use of 2 or more drugs. However, some authors distinguish between minor polypharmacy (the concurrent use of 2 to 4 drugs) and major polypharmacy (the concurrent use of 5 or more drugs).\textsuperscript{[6-11]} The other approach to the definition focuses on the clinical indication and the effect of the administered medication. According to this definition, irrational, clinically not indicated drug use is regarded as polypharmacy.\textsuperscript{[6,12-14]} In the present study, the standard definition was used, and therefore concurrent use of 4 or more medications was considered to be polypharmacy.

The most threatening consequences of polypharmacy is the drug related problems such as occurrence of ADR’s, Drug-Drug interactions, Medication errors, and increased risk of hospitalization, therefore increases the cost to manage the same and quality of life of the patients is also significant issue.

**OBJECTIVE:** The goal of study was to observe the occurrence of drug related problems due to polypharmacy.
MATERIALS AND METHODOLOGY

Study Design
A prospective observational study.

Study Site
The study was carried out in Tertiary care teaching hospital in north Karnataka by collecting prescription of general medicine department after the consent of H.O.D along with prior consent of the patients.

Study Period
The study was conducted for 2 months period during April/May 2014.

Study Population
A total of 60 patients/prescriptions were included in the study.

Study Criteria

Inclusion criteria: All prescriptions containing 4 and above drugs/medication were included in the study.

Exclusion criteria: TB and HIV patients
- Pediatric population
- Pregnant women

Sources of Data
Data was collected from the case sheets /inscriptions from the general medicine ward.

Statistical Analysis

RESULTS AND DISCUSSION
The elderly population, which often suffers from multiple chronic disease requiring multiple medications continue to increase. These patients are much more likely to expensive polypharmacy and its negative consequence, especially ADR’s. The effect of polypharmacy in elderly patients may lead to confusion with drugs name, doses and dosage schedule.

In the study population of 60 prescriptions, male were found to less than (40%) than the female (60%).
Table 1: Gender wise distribution of the study population

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total (n=60)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>24</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>60</td>
</tr>
</tbody>
</table>

Figure 1: Gender wise distribution of the study population

Majority of the patients of age group between 55 to 65 years (31.66%) followed by the age group of 35-55yr (21.66%).

Table 2: Age wise distribution of the study population.

<table>
<thead>
<tr>
<th>Age in Yrs</th>
<th>Total (n=60)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>04</td>
<td>6.6</td>
</tr>
<tr>
<td>25-34</td>
<td>11</td>
<td>18.33</td>
</tr>
<tr>
<td>35-44</td>
<td>13</td>
<td>21.66</td>
</tr>
<tr>
<td>45-54</td>
<td>11</td>
<td>18.33</td>
</tr>
<tr>
<td>55-64</td>
<td>19</td>
<td>31.66</td>
</tr>
<tr>
<td>&gt;65</td>
<td>02</td>
<td>3.33</td>
</tr>
</tbody>
</table>

Figure 2: Age wise distribution of the study population.
The total number of prescriptions which contains more than 6 drugs were predominately high (48.33%).

Table 3: Number of prescribed medications in study population.

<table>
<thead>
<tr>
<th>No. of Drugs</th>
<th>Total (n=60)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6</td>
<td>17</td>
<td>28.33</td>
</tr>
<tr>
<td>Equal to 6</td>
<td>14</td>
<td>23.33</td>
</tr>
<tr>
<td>More than 6</td>
<td>29</td>
<td>48.33</td>
</tr>
</tbody>
</table>

Figure 3: Number of medications prescribed in study population.

The total of 60 prescription containing 472 drugs out of which 65 drug-drug interactions were found. Severity of drug interaction was observed among that 23 were minor, like interaction between Ranitidine and Diclofenac which results in change in gastric pH that decreases the absorption and or reduce the urinary elimination and between Tetracycline and Furosemide which leads to decreased renal manifested in serum creatinine, blood urea nitrogen (BUN). 37 moderate interactions were found, like interaction between Alprazolam and Telmisertan which effects in lowering blood pressure, interaction between Aspirin and Insulin which causes hypoglycemia and 5 were severe interactions, like Hydrocortisone and Levofloxacin which may increase the risk of tendinitis, Levofloxacin and Lumefantrine which results in irregular heart rhythm, Omeprazole and Clopidogrel which may reduces the effectiveness of Clopidogrel in preventing heart attack.

Table 4: Total number of drug-drug interactions with severity.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Total (n=65)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>23</td>
<td>38.33</td>
</tr>
<tr>
<td>Moderate</td>
<td>37</td>
<td>61.66</td>
</tr>
<tr>
<td>Severe</td>
<td>05</td>
<td>8.33</td>
</tr>
</tbody>
</table>
Out of 60 prescriptions, 4 were found drug duplication with Paracetamol, Ranitidine, Nitroglycerine and Levofloxacine and 1 prescription was found class duplication with Pentaprazole and Rabiprazole.

Table 5: Drug duplication and class duplication among prescriptions.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total (n=60)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug Duplication</td>
<td>04</td>
<td>6.6</td>
</tr>
<tr>
<td>Class duplication</td>
<td>01</td>
<td>1.6</td>
</tr>
</tbody>
</table>

The average numbers of drugs prescribed per prescription per day were (7.86), average number of doses taken per day (12.65). In other study it was found that, the average number of doses taken per day was 23.5 before intervention and it has come down to 16.5. The decrease in average number of doses taken per day was observed because of clinical pharmacist intervention. The average drug cost per prescription per day (INR 384.78). In
some study it was observed that Pharmacist not only results in positive clinical outcomes but can also results in cost savings of patients when they are on multiple medications, so pharmacist intervention is needed to bring down the drug cost.\(^1\) In our study there were no ADRs were observed.

**CONCLUSION**

The study concluded that, though the prescription contains multi-medications can be accepted as they are clinically appropriate and/or meet the need of the patient condition but monitoring or observation is required for the occurrence of drug related problems. Hence the Clinical Pharmacist act as a potential role in health care system in assisting physician in altering the number of medications taken, the number of doses taken, improving the patient medication adherence, preventing the adverse drug reactions, drug-drug interactions, improve the health related quality of life and decreasing the health care cost of the patient. So the pharmacist intervention can play a vital role on both humanistic and clinical outcomes as well as economic outcomes.

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**REFERENCES**