CHAPTER 6
DISCUSSION OF RESULTS

This study mainly aimed to provide the prevalence and severity of possible drug-drug interactions at an Indian tertiary care teaching hospital. Based on the sample size determination, a total of 784 cases were fixed to screen the drug-drug interactions in this tertiary care teaching hospital. Among these 784 cases, 423 cases were found to have possible drug-drug interactions and the prevalence was found to be 53.9%. More than half of the cases were observed to be with possible drug-drug interactions and there is a need to focus on the prescription monitoring and prevention of the possible drug-drug interactions. This result was almost similar with the study done by Kumara Swamy et al\textsuperscript{[27]}. Our study was found to be with high prevalence rate when compared to the studies done by Joice et al\textsuperscript{[63]} and Patel Jaskumar et al\textsuperscript{[64]}.

In this study, the cases were collected from the medical records section for the screening of possible DDIs and the cases from various departments like General Medicine, Pediatrics, Psychiatry, Gynecology and Obstetrics, Chest & TB and Orthopedics were included. Majority of the cases with repeated prescriptions were excluded from the study in order to decrease the bias. Among all the departments included in the study, General Medicine cases were found to be with more number of possible DDIs compared to the other departments followed by Pediatrics. Usually, the department of General Medicine will have more number of cases with concurrent disease conditions and prescriptions with polypharmacy. Very less number of cases were found to be with possible DDIs in the department of Orthopedics where there will be a limited use of drugs when compared to the other departments.

All the age groups were included in this study for the screening of possible DDIs and the age group 51-60 years was observed to be with high prevalence rate (18.2%) followed by the age group 41-50 years with a prevalence rate of 14.7%. This result was similar to the study done by Edisa Trumic et al\textsuperscript{[65]}. The mean age of the overall study population who were observed with possible drug-drug interactions was found to be 39.9 years. A huge variation in the mean age was observed when
compared to the study done by Edisa Trumic et al\textsuperscript{[65]} where the mean age was observed to be 46.3 years.

Polypharmacy plays a significant role in predisposing the drug-drug interactions. Several studies demonstrated a positive correlation between polypharmacy and DDIs\textsuperscript{[27,28,29]}. In our study, majority of the prescriptions were observed to be with major polypharmacy (44%), followed by moderate polypharmacy (35.9%) and minor polypharmacy (20.1%). This result was found to be similar with the study done by Kumara Swamy et al\textsuperscript{[27]} where most of the cases were found to be with major polypharmacy. Majority of the cases with minor, moderate and major polypharmacy were found to be in the department of General Medicine with 36.5%, 42.8% and 70.4% respectively. The average number of drugs per patient used in this study was observed to be 8.54±3.51.

Among the 423 cases observed with possible DDIs, a total of 1125 possible DDIs were observed in the present study. In this study, majority of the interactions were of moderate severity (62.1%) followed by major (27.8%) and minor (10.1%). The high prevalence of moderate interactions in this study was similar to the study done by Huda Kafeel et al\textsuperscript{[16]}. Majority of the minor interactions (17.5%) were observed in the age group 21-30 years. Majority of the moderate interactions (22.2%) and major interactions (17.2%) were observed in the age group 51-60 years. Elderly patients were observed to be with more moderate and major interactions as they had concurrent disease and be usually under multiple drug therapy. Indian population may touch 1.53 billion mark by 2030. Among the overall population, 14% of the population may be expected to be the geriatric population by 2040. According to the current literature available geriatrics are the largest consumers of the drugs\textsuperscript{[66]}. Usually, prescribing medication for the geriatrics is a complex process. This include selection of the drug as per the indication, selection of the dose and dosage form and fixation of dosing schedule which is appropriate for physiological status of the patient\textsuperscript{[67]}.

In this study, majority of the minor, moderate and major interactions were observed in the department of General Medicine with 40.3%, 61.2% and 64.5%
respectively. According to a recent study in Switzerland, 56.2% of the patients reported one or more major and/or moderate potential drug-drug interactions in the department of General Medicine. Very few minor interactions were observed in the department of Psychiatry (0.9%). Very few moderate and major interactions were observed in the department of Orthopedics with 3.4% and 1.6% respectively. Majority of the possible DDIs (54.7%) were observed in the prescriptions with major polypharmacy followed by moderate polypharmacy (33.2% DDIs) and minor polypharmacy (12.1% DDIs).

Duration of stay plays a crucial role in the aspect of treatment by means of prolonged exposure of the drugs. In this study, duration of stay was categorized at a 5 day class interval. Majority of the patients who were observed with possible DDIs were found to be staying for 6-10 days (43.8%). Among all the departments, majority of the cases in the departments of General Medicine, Gynecology & Obstetrics, Chest & TB and Orthopedics were found to be with a maximum duration of 6-10 days and majority of the cases in the departments of Pediatrics and Psychiatry were found to be with a maximum duration of 1-5 days. Majority of the minor (43.9%), moderate (41.5%) and major (46%) were found in the cases that were stayed for 6-10 days. The minimum length of stay and the maximum length of stay of the patients who were observed with possible DDIs were found to be 1 day and 30 days respectively. The average length of stay of the whole study population who were observed with possible DDIs was found to be 9.29 ±5.61 days. The huge variations in the standard deviations were due to different disease conditions with varying severities that may affect the course of treatment and length of stay.

In this study, we also categorized the occurrence of possible DDIs at various stages of treatment i.e., during admission, during stay and during discharge. Majority of the interactions (50.2%) were found to be observed in the prescriptions which were prescribed on the day 1 (i.e., during admission) followed by during stay (48.5%) and at discharge also (1.3%). In this study, it was noticed that there is a need for the prevention of possible DDIs during admission and at stay as these two stages of treatment were observed with majority of the possible DDIs. During these stages, the drugs have to be prescribed based on the risk-benefit ratio and the clinical pharmacist
has to show the impact at these stages for providing better pharmaceutical care. During all the three stages, the department of General Medicine was observed to be with majority of the possible DDIs and it was noted that no possible DDIs were found in the departments of Psychiatry, Gynecology & Obstetrics and Orthopedics during the discharge stage. Least number of possible DDIs was observed during admission (1.9%) and also during the stay (4.2%) in the department of Orthopedics. Minor (51.7%) and major (52.1%) interactions were found to be more during admission and moderate interactions (49.3%) were found to be more at stay.

In this study, at least one possible DDI was observed in 43.5% of the patients who were observed with possible DDIs and about 1.9% of the patients who were observed with possible DDIs were found to have more than 10 possible DDIs in their prescriptions. The average number of possible DDIs per patient was found to be 2.57 interactions in this study. The average number of possible DDIs per patient was observed to be more in the department of Gynecology & Obstetrics (3.69 DDIs) followed by General Medicine (2.97 DDIs). In case of minor drug-drug interactions, the drug combination Calcium + Iron (1.3%) was found to be more prevalent followed by the drug combinations Amikacin + Ampicillin (0.5%), Aspirin + Phenytoin (0.5%) and Phenytoin + Ranitidine (0.5%). In case of moderate drug-drug interactions, the drug combination Atorvastatin + Clopidogrel (3.1%) was found to be more prevalent followed by Haloperidol + Trihexyphenidyl Hydrochloride (1.6%). In case of major drug-drug interactions, the drug combination Metronidazole + Ondansetron (2.1%) was found to be more prevalent followed by Ofloxacin + Ondansetron (1.8%).

There is a high chance of the occurrence of DDIs between the OTC drugs and the prescription drugs. Hence, OTC medication should also be taken into consideration during prescription analysis. It is difficult to detect and manage the DDIs by only depending upon the skills and knowledge of the health care professionals. In order to provide better monitoring and management of DDIs the clinical pharmacists have to utilize the available software which mainly deals with the detection, monitoring and the management of DDIs. The use of various drug information resources may show a significant impact while comparing the prevalence of potential drug-drug interactions between the studies.