

## COMPARISON AND ASSESSMENT OF DRUG-DRUG INTERACTIONS IN THE PRESCRIPTIONS WRITTEN BY VARIOUS MEDICAL SPECIALISTS

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**ABSTRACT:** A drug-drug interaction (DDI) is a major cause of adverse drug reactions (ADRs) in the world. The main purpose of this study was to identify the reasons, frequency, and level of drug interactions in prescriptions written by various medical specialists. In this study 677, prescription orders of different medical specialists were collected and evaluated for the presence of DDIs. Furthermore, we used the Micromedex Drug-Reax System to assess the prevalence and extent of drug-drug interactions. Out of 677 prescriptions, 178 prescriptions contained 245 drug-drug interaction and remaining 499 prescriptions were free of interactions Among 245 detected interactions 11.4%, 57.6%, and 31% were of major, moderate and minor type respectively. It was observed that the highest number of interactions was present in the prescriptions containing more medicines and written by cardiologists and general practitioners. Hence there is an essential need for management strategies to prevent the risk of DDIs.

**Keywords:** Prescriptions; Medical specialists; Drug-drug Interactions; ADRs (Adverse drug reactions).

### INTRODUCTION

The use of more than one drug to achieve the desired effects is common in clinical practice. Sometimes more than one drug intended for treatment turns into ailment by causing drug-drug interactions. DDI is a common adverse and unpredicted outcome of treatment because two or more than two drugs being chemicals interacts each other to yield adverse drug reactions and may cause morbidity and mortality in patients [1]. It may also cause severe adverse events which can result in patient hospitalization. Some previous reports have estimated that up to 3% of hospital admissions are caused by DDIs [2-4]. The majority of these interactions occur due to the negligence of prescriber [5] or prescribers' awareness about DDIs is very limited[6]. Moreover, the risk of drug interactions is proportional to the number of drugs taken [7]. The occurrence of adverse actions increases to 13% with the use of two medications augments to 58% with use of five medications, and increase to 82% by using up to ten or more medications [8].

According to the World Health Organization (WHO) report, In Pakistan, there is no appropriate disease-surveillance method and the use of information for medical decisions is very limited. It is also pointed out that doctors and other healthcare professionals are mostly overburdened in hospitals. An average number of medications prescribed per patient is more as compared with other parts of the world [9]. In most of the hospitals, established clinical pharmacy structure does not present to monitor and optimize medication usage. Further, it has also been observed that the irrational consumption of medicines is a very frequent and crucial problem in Pakistan [10-14]. On the basis of the above information and evidence, it can be expected that peoples in Pakistan are at higher risk of DDIs. To the best of our knowledge, our study is the first

study of its type in Hyderabad, Pakistan to evaluate the prevalence and nature of DDIs in different medical specialties.

### METHODS

This is a descriptive cross-sectional study conducted in district Hyderabad. Hyderabad city is the second biggest city of the Sindh province and the seventh largest city in Pakistan.

#### Data collection

This survey based research carried out by using prescription orders, written by a different medical specialist for the treatment of various patients. The prescriptions were collected at the stage when the patient was coming to medical stores for procurement of medicines prescribed to them by their prescriber. Afterward collected prescriptions were sorted out for a selection of appropriate data. Not clear/confused and prescriptions in which only one medicine was prescribed were excluded, conversely clearly written and prescriptions contained two or more medicines were selected for exploration of drug-drug interactions.

#### Grouping of data and Analytics of Drug-drug interactions (DDIs)

In this study, six hundred seventy-seven clearly written prescriptions were selected and grouped in thirteen different categories according to medical specialties as depicted in **Table 1**. After categorizing, separately they were screened for drug-drug interactions (DDIs). Drug-drug interactions (DDIs) were detected by using Micromedex Drug-Reax System (Thomson Reuters Healthcare Inc., Greenwood Village, Colorado, United States) [15].

Furthermore, all the detected DDIs were classified on the basis of their severity and labeled as Major, Moderate, and Minor interactions and presented in the forms of graphs and tables.

**Table 1. Number and percentage of Prescription from each specialty.**

S.No:	Medical Specialty	Prescriptions
		n (%)
1	Primary care physicians	120 (18)
2	General Practitioner	101 (15)
3	Cardiologists	84 (12)
4	Orthopedics	46 (07)
5	ENT Specialists	37 (05)
6	Psychiatrists	60 (09)
7	Gynecologists	42 (06)
8	Neurologists	27 (04)
9	Urologists	31 (05)
10	Ophthalmologists	29 (04)
11	Gastroenterologists	41 (06)
12	Dermatologists	39 (06)
13	Dentists	20 (03)
	Total	677 (100)

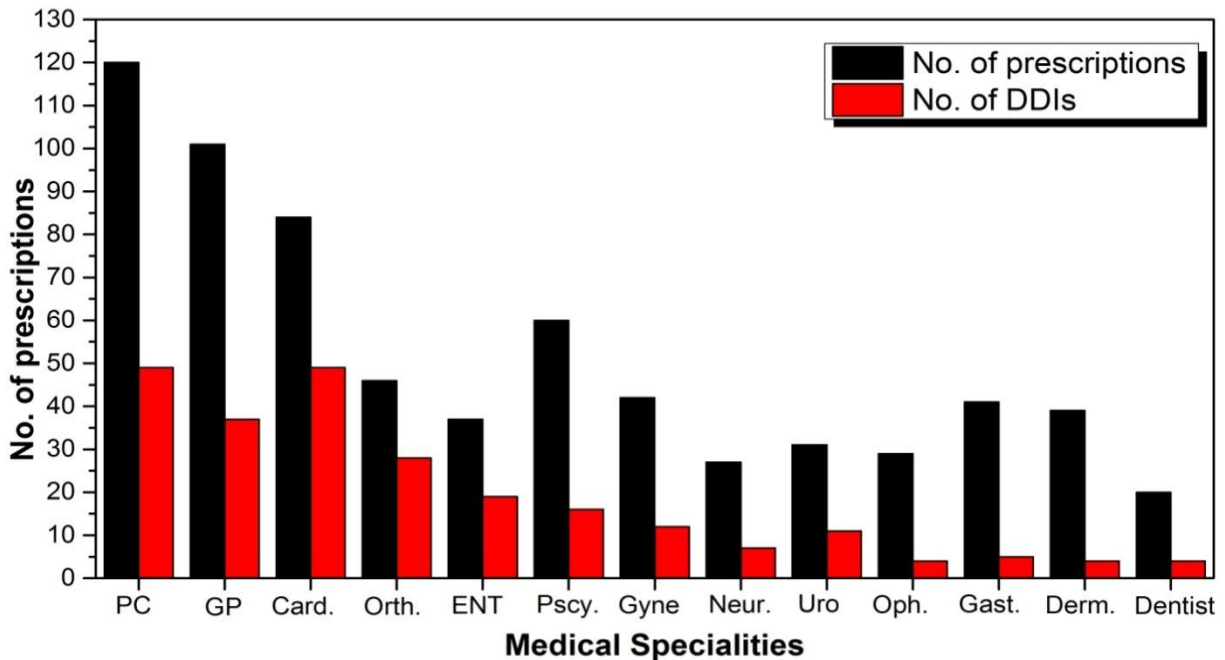
**RESULTS**

Out of total 677 prescriptions, 178 prescriptions (i-e 26.3 %) of all the prescriptions contained 245 drug-drug interaction and remaining 499 prescriptions (i.e. 73.7%) of total prescriptions were free from jeopardy of interactions.

**Number of interactions in each medical specialty**

As described in (figure.1), that 120 prescriptions of primary care physician contained 49 drug-drug interaction , 101 prescriptions of General practitioner contained 37 interactions, 84 prescriptions of cardiologists contained 49 interactions, 46 prescriptions of orthopedics contained 28 interactions, 37 prescriptions of ENT specialists contained 19 interactions , 60 prescriptions of psychiatrists contained 16 interactions, 42 prescriptions of Gynecologists contained 12 interactions, 27 prescriptions of Neurologist contained 07 interactions, 31 prescriptions of Urologists contained 11 interactions, 29 prescriptions of Ophthalmologists contained 04 interactions, 41 prescriptions of gastroenterologists contained 05 interactions, 39 prescriptions of Dermatologists contained 04 interactions and 20 prescriptions of Dentists contained 04 interaction.

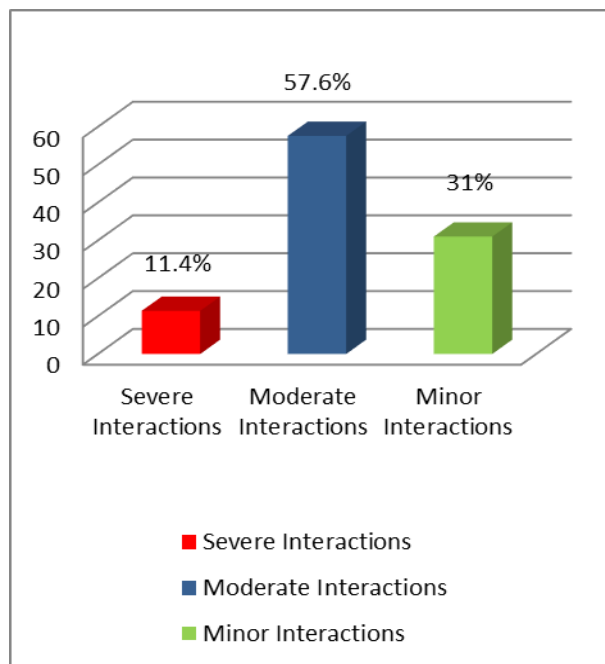
**Figure 1. Number of interactions in each medical specialty**



**Categories of interactions**

On the basis of severity from the total 245 interaction, 28 interaction that is (11.4%) of total interactions were of major type, 141 interactions that is (57.6%) of total interactions

were of moderate type and remaining 76 interactions that is (31%) of all interactions were of minor type as shown in figure 2.



**Figure 2. Categories of interactions.**

***Distribution Of (major, moderate, and minor) interaction in each specialty***

It was observed that the highest number of severe interactions was 9,6,4,3 in the prescription written by cardiologists, psychiatrists, general practitioner, and primary care physicians respectively. Moreover, it also resulted in this

study that highest number of total interactions was 49 in the prescriptions written by a cardiologist and primary care physicians followed by 37,28,19,16 interactions in the prescriptions written by a general practitioner, Orthopedics, ENT specialist, and psychiatrists respectively **Table 2.**

**DISCUSSION**

Drug interactions are one of the most important drug mistakes known and are only predictable and preventable by the revision of previous documentation, reports, and clinical studies [16]. Hyderabad city is selected to conduct this study because of most of the patients from all over the Sindh province visit this city for treatment of their ailments. Moreover, Hyderabad is a big center of health care due to the presence of a variety of medical specialist. Data was collected from the outpatients because when a patient is receiving medicines from medical stores after that there is no chance of any drug intervention to avoid drug-drug interactions. In this study 245, drug-drug interactions were detected in which 28 (11.4%) of total interactions were of a severe type, 141 (57.6%) interactions were of a moderate type and remaining 76 (31%) interactions were of minor type. The results of our study are similar with some recent study conducted in Karachi Pakistan [17], but higher than the study conducted in neighboring countries like Iran [18], it indicates that there is lack of proper preventive measures to reduce the risk of drug-drug interactions.

**Table 2: Distribution of (major, moderate and minor) interaction in each specialty.**

Medical Specialty	Interactions Type			
	Severe DDIs n (%)	Moderate DDIs n (%)	Minor DDIs n (%)	Total DDIs n (%)
Primary care physician	3(1.22)	27(11)	19(7.7)	49 (19.92)
General Practitioner	4(1.63)	20(8.16)	13(5.3)	37 (15.09)
Cardiologists	9(3.7)	26(10.6)	14(6)	49 (20.3)
Orthopedics	2(0.8)	17(7)	9(3.7)	28 (11.5)
ENT Specialists	0(0)	17(7)	2(0.8)	19 (7.8)
Psychiatrists	6(2.45)	6(2.45)	4(1.63)	16 (6.53)
Gynecologists	1(0.4)	9(3.7)	2(0.8)	12 (4.90)
Neurologists	2(0.8)	3(1.22)	2(0.8)	07 (2.82)
Urologists	1(0.4)	8(3.26)	2(0.8)	11 (4.46)
Ophthalmologists	0(0)	3(1.22)	1(0.4)	04 (1.62)
Gastroenterologists	0(0)	2(0.8)	3(1.22)	05 (2.02)
Dermatologists	0(0)	1(0.4)	3(1.22)	04 (1.62)
Dentists	0(0)	2(0.8)	2(0.8)	04 (1.60)
<b>Total</b>	<b>28 (11.4)</b>	<b>141(57.6)</b>	<b>76(31)</b>	<b>245</b>

In this study it also results that highest number of interactions were present in the prescriptions written by cardiologists, general practitioner, primary care physicians & psychiatrists, now this may be due to habits of these specialists to prescribe multiple drugs per prescriptions. Because poly-pharmacy is an important factor which leads to DDIs; however, the number of items per prescriptions, the more the likelihood of DDI's (drug-drug interactions) occurrence. A previous study conducted in Switzerland observed that incidence of DDIs increased with an increase in the number of drugs prescribed [19]. Some other studies also pointed out a similar association of poly-pharmacy with the incidence of DDIs [20-23]. In our study, it is clearly observed that the majority of the physicians prescribed more medications per prescription, maybe to get quick results/response from patients instead to think about the peril of drug-drug interactions. As concurrent use of numerous medications is the main cause of drug-drug interactions

### CONCLUSION

Risk of drug-drug interactions can be reduced when a physician will keep itself up-to-date on drug knowledge, also pay closer attention to DDIs and avoid prescribing less appropriate/number of medicines per prescription. Further drug-drug interactions can be abridged by providing some gape of time in the administration of two different types of medicines. Our study suggests for further investigation about the reasons of increasing polypharmacy and possible measures to reduce the risk of drug-drug interactions.

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