



## **Assessment of Knowledge, Attitude, and Practice of Pharmacists towards Drug Interactions in Saudi Arabia**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Background:** Drug interactions, which are generally encountered in medical prescriptions, may lead to severe health issues. Pharmacists in both the public and private pharmacy setting are by profession in a unique position to gain and use their competencies to find and prohibit drug interactions.

**Aim of the Study:** To assess knowledge, attitude and practice of pharmacists toward drug interactions in Saudi Arabia.

**Materials and Methods:** A cross-sectional study was conducted using a self-administered questionnaire.

**Results:** Two hundred sixty-three pharmacists participated in the survey and results were expressed in frequencies and percentages. The mean age of participant pharmacists was (31.7) years showing a relatively young participant's population. Males were (75.3%), while females were (24.7%). Majority of pharmacists (67.3%) were working in public sector. Half of them had a bachelor's degree in pharmacy as their latest academic degree.

Participants' averages of awareness, attitude and practice regarding drug interactions, correct knowledge of drug-drug, drug-food, drug-disease interactions were, (90.7%), (65.3%), (67.7%), (61.7%) respectively. Most (79.8%) of the participants asserted that the notified doctors usually agree with pharmacists' opinion and decision. This percentage indicates a good cooperation when compared to other studies.

**Conclusion:** Pharmacists' knowledge about drug interactions was inadequate. Lack of knowledge of drug interactions may lead to improper patient counseling and the appearance of adverse effects. There is a need to improve the knowledge and to uplift the level of awareness of pharmacists about the potential drug interactions that are clinically related.

*Keywords: Pharmacists; drug-interactions; knowledge; awareness.*

## 1. INTRODUCTION

Drug-drug interactions (DDI) can be specified as the clinical or pharmacological response of a drug combination that is dissimilar from that expected from the known effects of the two drugs when given alone and that may lead to a decrease in efficacy or increase in toxicity. Three levels of DDI severity are minor, moderate and major [1]. Drug interactions may change the pharmacodynamics and/or pharmacokinetics of a drug. The pharmacodynamics interaction may be antagonistic, additive, or synergistic effects of a drug. One of the widely and important sources of medication errors is the drug interactions (DIs) [2].

Food may have negative or positive effects on the bioavailability of the drug and may lead to drug toxicity or therapeutic failure. Food-drug interactions (FDIs) are a serious issue in the medical practice; they may negatively affect the drug's efficacy, extend the patient's hospitalization or threaten their life [3].

The prevalence of potential FDIs is variable in different countries and it ranges from 6 to 70 % [4-6]. Food may change the bioavailability of drugs by introducing some changes in the GI physiology such as GI motility, gastric pH, gastric emptying, transport proteins such as P-glycoprotein and the activity of the metabolizing enzymes. Moreover, food components may chelate or bind to the active pharmaceutical ingredients [7].

Drug-disease interactions (DDIs) are conditions whereby a new drug treatment elicits the preexisting medical condition. It may also indicate the ability of a newly prescribed drug to lead adverse effects similar to one of the patient's diseases conditions [8]. In addition, the most recurrent interactions between the prescriptions studied included treatment with non-steroidal anti-inflammatory drugs (NSAIDs) in hypertensive patients and chronic heart failure patients and co-administration of ACE inhibitors and non-steroidal anti-inflammatory drugs [9].

Pharmacists, especially in the community setting are on the front line to detect DDIs. In addition, the evaluation of drug interaction knowledge in the kingdom of Saudi Arabia seems missing. The Evaluation of and then improving the knowledge of potential common DDIs among pharmacists by implementing helpful programs could limit the incidence of harmful effects, emergency visits, hospitalizations, and health cost [10].

### 1.1 Aims of Study

To assess knowledge, attitude and practice of pharmacists towards drug interactions in Saudi Arabia.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

A cross-sectional study was carried using the self-administered questionnaire. The questionnaire was performed over a period of 7

months from April to October 2018. This study involved pharmacists in Saudi Arabia.

### 2.2 Sample Size Calculation

The online calculator (RaosoftInc) was used to estimate the study sample size (263 pharmacists) and this based on total number of pharmacists licensed to practice (Saudi commission for health specialties, 2018). This study used the rate tolerates of 5% and 95% confidence level to give 263 pharmacists.

### 2.3 Survey Questionnaire

The questionnaire used contained three sections; the 1st section was related to demographic data including the age, years of practice, area of practice and academic qualification. The second section was related to attitude and practice of participants regarding drug interactions. The third section regarded the evolution of the pharmacist's knowledge about drug interactions (DIs). Twenty-four (24) selected drug interaction pairs were used to investigate the potential pharmacist's knowledge about drug interactions (drug-food, drug-drug and drug-disease interactions). They were selected, as they are the most prevalent drug interactions mentioned in medical literature.

### 2.4 Data Analysis

Data were entered into Excel (Microsoft office) worksheets and then transferred to SPSS (version 26, IBM) for statistical analyses. Categorical analyses of frequencies and cross tabulations were done using the Chi-square and standardized residual analysis in SPSS.

## 3. RESULTS

This study was conducted from April to October 2018. Two hundred sixty-three pharmacists participated in the survey and results were expressed in frequencies and percentages. The mean age of participant pharmacists was (31.7) years showing a relatively young participant's population. Males were (75.3%), while females were (24.7%). Majority of pharmacists (67.3%) were working in public sector. Half of them had a bachelor's degree in pharmacy as their latest academic degree.

## 4. DISCUSSION

Participants' attitude and practice towards drug interactions was evaluated. Results showed that around (85.9%) of them had come across drug-interactions during their practice, which confirms the potential high incidence of drug interactions in the patient's prescriptions which is comparable to other studies [11,12].

Regarding the attitude of the participant pharmacists toward cooperation with the prescribers on drug-interactions in their prescription, most (98.1%) of the participants used to contact the prescribers, before dispensing the prescription, mainly by telephone the prescriber for verification. Most (79.8%) of the participants asserted that the notified doctors usually agreed with the pharmacists' opinion and decision and without reservations. This percentage indicates a good cooperation when compared to other studies.

**Table 1. Pharmacists' demographic characteristics**

Demographic	Frequency	Percentage
Gender		
Male	198	75.3%
Female	65	24.7%
Age group		
21-25	30	11.4%
26-30	116	44.1%
> 31	117	44.5%
Academic qualification		
Pharm D	104	39.5%
Bachelor	132	50.2%
Master	20	7.6%
PhD	7	2.7%
Year of practice		
1-3 years	117	44.5%
4-6 years	94	35.7%
> 6 years	52	19.8%
Area of practice		
Public	177	67.3%
Private	86	32.7%

**Table 2. Attitude and practice of pharmacists regarding drug interactions**

Attitude and Practice		Frequency	%
Was drug interactions part of your undergraduate course studies?	Yes	213	81%
	No	50	19%
	Total	263	100%
Have you ever come across cases of drug- interaction during your practice?	Yes	263	85.9%
	No	37	14.1%
	Total	263	100%
Before dispensing any drug, do you consider its potential interactions?	Yes	138	90.5%
	No	25	9.5%
	Total	263	100%
Do you usually ask your patient about the prescription, Over the Counter, drugs and food supplements, herbal medication he/she is using or intends to use?	Yes	210	79.8%
	No	53	20.2%
	Total	263	100%
Do you usually contact doctors when there is a drug-interaction in their prescriptions?	Yes	202	76.8%
	No	61	23.2%
	Total	263	100%

**Table 3. Pharmacists’ reaction and Media of contact, and inter-professional communion with prescribers, when informed of obvious drug interactions in their prescriptions**

Attitude and Practice		Frequency	%
If yes, what is the way you usually use to contact doctors?	Telephone	153	58.2%
	Sending back the patient	46	17.5%
	Meeting him/her personally	41	15.6%
	Other facilities	18	6.8%
	Total	258	98.1%
Doctor’s acceptance to opinion pharmacists when pointing to a drug- interaction in their prescriptions.	Agree	210	79.8%
	Disagree	20	7.6%
	Verify it first	33	12.5%
	Total	236	100%
Pharmacists’ reaction, when the prescriber insists on dispense the prescription as it is, without any change, though it contains clear drug- interaction.	Dispense as it is	65	24.7%
	Warning the patient and dispense as it is	103	39.2%
	Warning the patient and refuse to dispense it	95	36.1%
	Total	236	100%

**Table 4. Pharmacists’ general awareness and knowledge about drug-interactions**

Awareness and knowledge of drug-interactions.		Frequency	%
Do you know that some drug- interactions can be fatal?	Yes	238	90.5%
	No	25	9.5%
	Total	263	100%
Have you ever used a handbook or software program to check drug- interaction before dispensing?	Yes	236	89.7%
	No	27	10.3%
	Total	263	100%
Do you agree that, the drug- interaction must be given more time and attention during undergraduate pharmacy studies?	Yes	241	91.6%
	No	22	8.4%
	Total	263	100%
Is it important that doctors and pharmacists update their knowledge about drug-interactions?	Yes	239	90.9%
	No	24	9.1%
	Total	263	100%

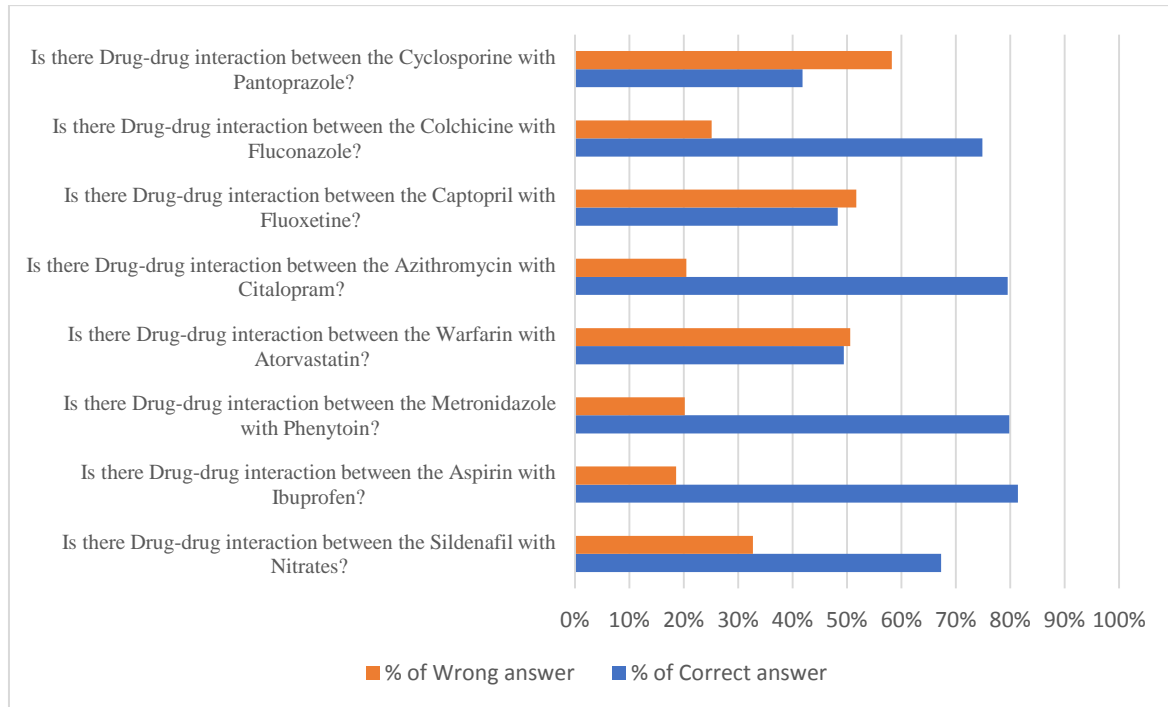
Respondent’s average of awareness= 90.7%

Despite all ongoing and implemented initiatives, DDIs are still an international problem. DDIs identification is varied according to the practice setting. In a hospital pharmacy, for example, there are various methods that may help in

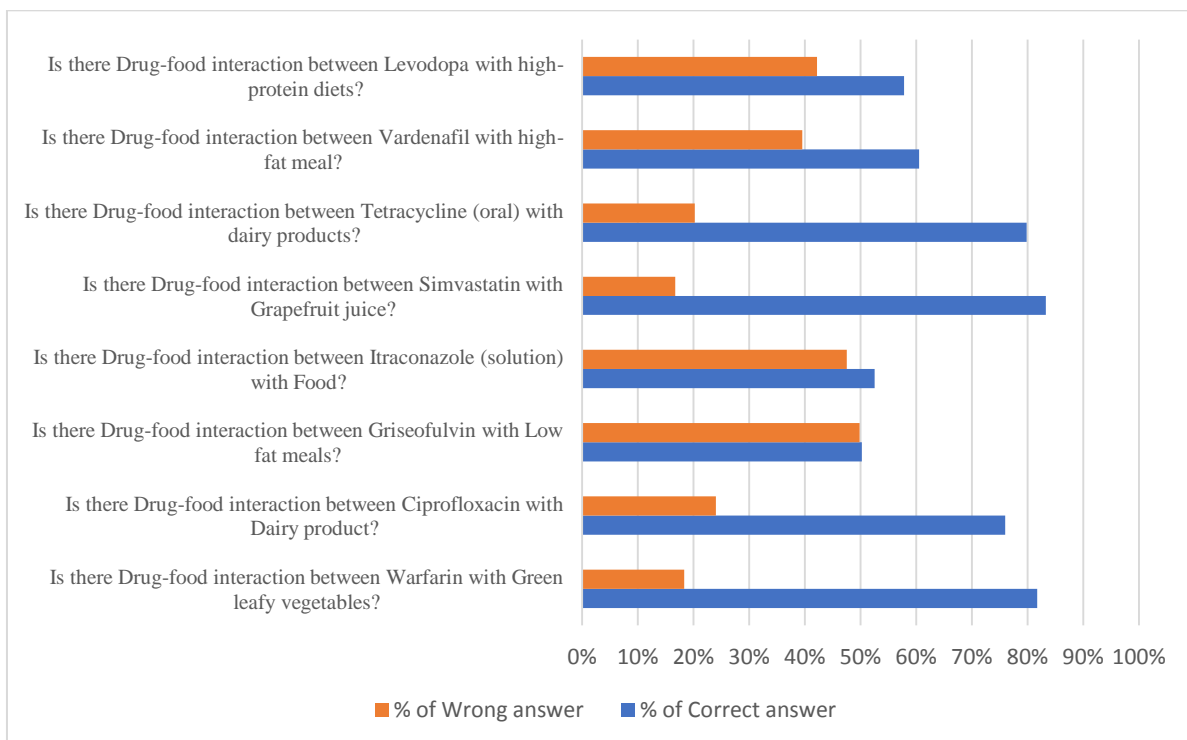
recognizing drug interactions and preventing them such as attainable scientific resources and electronic systems [13-15]. In most community pharmacies in the kingdom of Saudi Arabia, these tools are not available. Also, many

medication safety standards are not available in this setting yet. The deficiency of electronic systems in the community pharmacy setting has a remarkable effect on both patient and

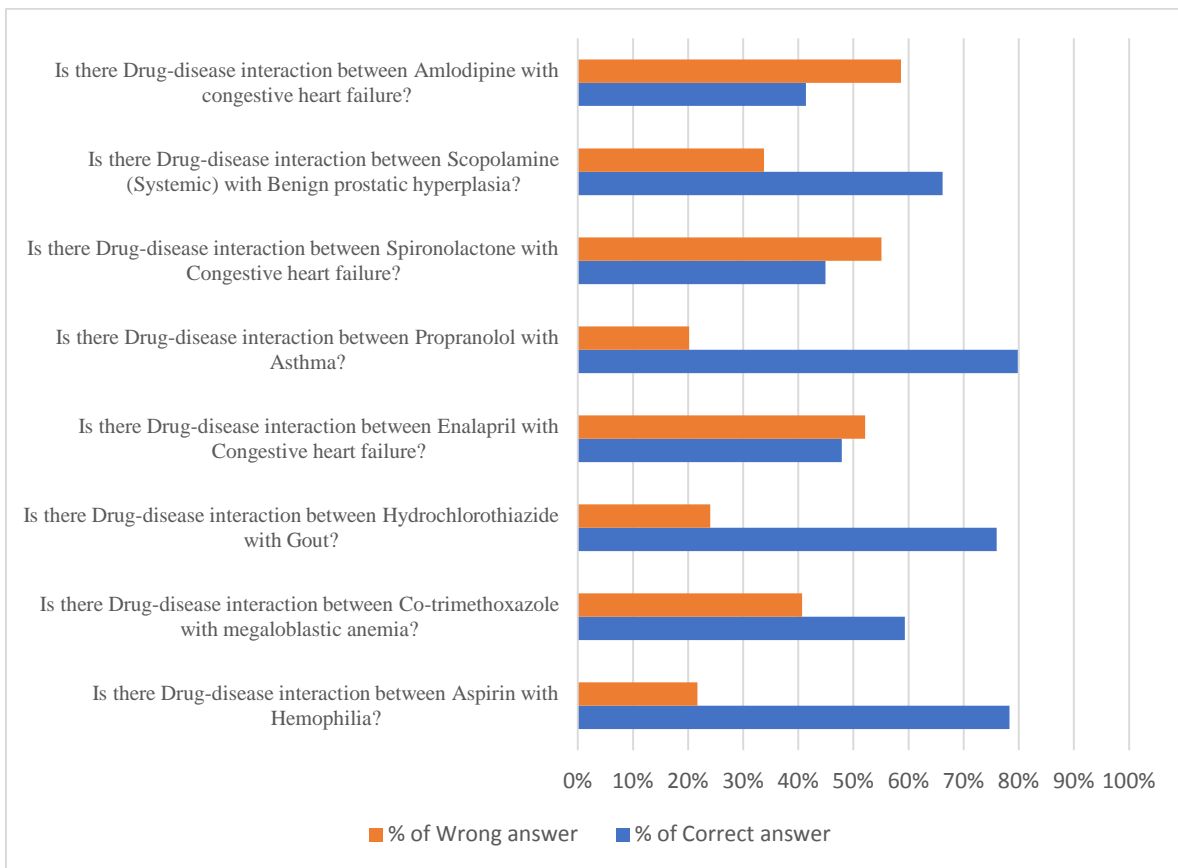
medication safety. Subsequently, most of the medication safety standards are based on pharmacist's knowledge only.



**Fig. 1. Pharmacists' knowledge of drug-drug interactions**



**Fig. 2. Pharmacists' knowledge of drug-food interactions**



**Fig. 3. Pharmacists' knowledge of drug-disease interactions**

The results of the present study declared that the knowledge of pharmacists about DDIs was inadequate. Electronic and education systems can help pharmacists in detecting such interactions easily which is comparable to other studies in Saudi Arabia [16].

Regarding drug-food interactions, the most common interactions involved questions in the knowledge part of the collection data tool and the pharmacists were asked to answer them. Most of the pharmacists thought that they had enough information regarding this issue. But they did not appear to have the adequate knowledge to realize a number of these interactions. In comparison to other studies there is improvement in pharmacist's knowledge regarding FDIs [17].

Regarding drug-disease interaction the use of calcium channel blockers (Amlodipine) in patients suffering from congestive heart failure (CHF), the correct responses were (41.4%) which is the lowest percentage in this issue. These results showed the poor knowledge of pharmacists toward drug-disease interactions,

especially for heart disease, which is comparable to other studies [12].

## 5. CONCLUSION AND RECOMMENDATION

In conclusion, pharmacist's knowledge about all drug interactions was insufficient and inadequate. The deficiency in drug interaction knowledge may lead to the appearance of adverse effects and improper patient counseling. Therefore, there is a need to improve the knowledge and to uplift the level of awareness of pharmacists about all the potential drug interactions that are clinically related. Finally, pharmacists still need more training and education programs about drug interactions in order to be more competent to improve patient's therapeutic outcomes and supply better pharmaceutical care.

## DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely

no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The research protocol was approved by research ethics committee, Pharmacy College, Shaqra University, Dawadmi, Saudi Arabia (Approval number: 1/38/39 Dated (19/11/2017)).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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