



## EVALUATE OF KNOWLEDGE, ATTITUDE AND PRACTICE OF JORDANIAN PHARMACISTS TOWARD MEDICATIONS INTERACTIONS

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### ABSTRACT

**Introduction:** The problem of drug interactions has recently attracted the attention of many medical communities around the world. A huge number of medications are introduced each year and more interactions with new drugs are being reported. Medication interactions have been associated with higher rates of adverse reactions, morbidity and mortality. Therefore, The ability to identify potentially harmful drug interactions is an important part of the pharmacist's role. **Object:** To assess pharmacists experiences, practice and attitude against medications, food and disease interactions. **Method:** Online cross-sectional study was conducted among pharmacists from April 2022 to Jun 2022. A total of 110 pharmacists involved in this study. All pharmacists who meet the inclusion criteria were selected using a random sampling method. The pretested structured self-administered questionnaires was used to collect data. The collected data coded, entered, and analyzed using (SPSS) version 21.0. The questionnaire was structured into seven sections with 37 questions that focused in sociodemographic characteristics, attitude and practice of participants regarding drug interactions, knowledge of respondents toward informed of drug interaction, knowledge of respondent toward pharmacokinetic and pharmacodynamic of drug interaction, pharmacists knowledge regarding medication interaction, pharmacists knowledge regarding food interaction, pharmacists knowledge regarding disease interaction and knowledge of respondents toward affecting of time to some drugs. **Result:** 110 pharmacists participated in this study with only 100 completed the questionnaire. The majority of respondents was male (62%). 72% of the were less than 40 years old. Only 5% of respondents took a decision when they see any drug-drug interaction in any prescription. 7% of them did not check drug-drug. only 5% of them knew the interaction between cyclosporine and itraconazole. 34% of them know the interaction between captopril and food. More than half of them know the affecting of time toward carbamazepin. **Conclusion:** this study showed a good attitude and practice of pharmacist toward medicine interactions. But their knowledge about medicine interaction is very weak. So, Jordanian government and ministry of health should introduce continues education program about drug interactions to the pharmacists to increase their knowledge.

### INTRODUCTION

The problem of drug interactions (DDI) has recently attracted the attention of many regulatory, scientific and medical communities around the world.<sup>[1]</sup> A huge number of medications are introduced each year, and several new drugs and drug interactions are reported.

Drug interactions may lead to higher rates of adverse reactions, morbidity and mortality.<sup>[2,5]</sup> Human exposure to a drug may differ from that expected due to a drug interaction or due to foods, beverages, and supplements consumed with the drug (food interaction). In addition, a patient's medication can affect their disease.<sup>[6]</sup>

Drug interactions are an important and largely underestimated source of medication errors.<sup>[8]</sup> Food-drug interactions (FDIs) present many problems during drug treatment. Moreover, patients' regular meals are usually

not written in hospital records, and it is often difficult to predict what the patient is likely to eat thereafter.<sup>[9]</sup>

Non-reporting of DFI by patients is one of the main problems with DFI.<sup>[10]</sup> DFIs can cause synergistic, potentiating, or antagonistic pharmacological effects.<sup>[11,12]</sup> For example chelating of ciprofloxacin with milk and enhance absorption of griseovalvin with food.

An earlier study in Sudan found that most pharmacists interviewed were unaware of drug-nutrient interactions.<sup>[13,14]</sup>

In addition, among the prescriptions studied, the most strong interactions included treatment with (NSAIDs) in patients with high blood pressure or chronic heart failure.<sup>[15]</sup>

However, polypharmacy is associated with an increased risk of DDI<sup>[17]</sup>, which increase exponentially with the number of drugs used simultaneously<sup>[18]</sup>, and drug interactions may mask the desired effects of drugs on the disease.

Epidemiological pharmacological studies conducted primarily in Europe and the US have identified various levels of potential DDI ranging from 10% to 70%.<sup>[15, 19, 20,21]</sup>

Some drugs interact more actively with others (for example, NSAIDs, ACE inhibitors, aspirin, metronidazole ,etc are listed. As a result, in Jordan , as in other developing countries, irrational medicine use and the frequency of drug-drug interactions are reported to be high.<sup>[22,24]</sup>

General practitioners and pharmacists are important healthcare professional with the necessary knowledge and skills and are expected to play an effective role in working with their patients to prevent these problems.<sup>[29]</sup>

However, because some doctor do not counsel well with patients, they are usually asked about their medical history and given enough advice to see if there are potential DDI.<sup>[25-30]</sup> Therefore, they are more prone to drug interactions.

Clinical pharmacology also ensures that adverse reactions are minimized by avoiding medicines which have serious side effects. Thus, the pharmacist plays an important role in the detection, prevention and notification of side effects of medications.<sup>[31]</sup>

The aim of this study was to evaluate of knowledge, attitude and practice of Jordanian pharmacists toward medications interactions.

## RESULTS

Part One: sociodemographic characteristics 110 pharmacists participated in this study with only 100 completed the questionnaire. The majority of respondents was male (62%). 72% of the were less than 40 years old. the minority of them have master degree (5%).further results are shown in table 1.

**Table 1: Sociodemographic characteristics.**

	%	%
1- Gender		
male	62	62
female	38	38
2- Age		
Less than 40 year	72	72
40 year-50year	15	15
More than 50	13	13
3-years of experience		
less than 6 years	25	25

6 years to less than 10 years	55	55
More than 10 years	20	20
4-graduates level		
Bachelor	51	51
Pharm D	43	43
Masters	5	5

**Part two:** attitude and practice of participants toward medicine interactions: 31% of respondents took course of drug-drug interaction during university study. Only 5% of respondents took a decision when they see any drug-drug interaction in any prescription. the minority of them (5%) counseled the patients about their medication ,food , herbal products, OTC. further results are shown in table2.

**Table2: attitude and practice of participants toward medicine interactions.**

	Yes %	No %
5-Did you take a course of drug-drug interaction during university study	31	69
6-Did you take any decision when see any drug interaction	5	95
7-Did you dispense the drugs without considering its interaction with any medications	5	95
8-Did you counsel the patients about their medication ,food , herbal products, OTC	5	95
9-Did you call the physicians if you see any drug interaction in the prescribing	20	80

## Part Three: knowledge of respondents toward informed of drug interaction

15% of them did not know the serious interaction between certain drugs.7% of them did not check drug – drug interaction for some prescriptions by books or internet. . further results are shown in table3.

**Table 3: knowledge of respondents toward informed of drug interaction.**

	YES %	NO %
10-I know the serious interaction between certain drugs	15	85
11-I used to check drug –drug interaction for some prescriptions by books or internet	7%	23
12-Health care professional should update their knowledge about D-D interaction	91	9

## PART FOUR: knowledge of respondent toward the reason of drug interaction.

The pharmacists reported that interaction between medications may be due to 12% absorption,33%

excretion, etc.... further results are shown in table 4 below.

**Table 4: knowledge of respondent toward the reason of drug interaction.**

13-Interaction between medications may be due	Absorption 12% -metabolism 20% -excretion 33% -distributions 33% -others 2%
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**Part five: pharmacists knowledge regarding medication interaction**

More than half of them know the interaction of epanutin and simvastatin (55%). only 5% of them know the interaction between cyclosporine and itraconazole. Further result are shown in table 5.

**Table 5: pharmacists knowledge regarding medication interaction.**

Medications interactions	Yes %	No %
14-Epanutin-simvastatin	55	45
15-Omeprazole-clopidogril	5	95
16-Tetracylin-ferrus	32	68
17-Cyclosporine-itraconazole	5	95
18-Ibrufen-aspirin	12	88
19-Smoking-theophyllin	14	86
20-Epanutin-cyclosporin	12	88

**Part six: pharmacists knowledge regarding food interaction**

More than fifth of respondents (21%) knew the interaction between tetracycline and food. 34% of them knew the interaction between captopril and food. Further result are shown in table 6.

**Table 6: pharmacists knowledge regarding food interaction.**

Food interaction	Yes %	No %
21-Warfarin-green leaf	32	68
22-Tetracylin-dairy products	21	79
23-Simvastatin-grab fruit	32	68
24-Captopril-food	34	66
25-Entric coated -empty stomach	9	91

**Part seven: : pharmacists knowledge regarding disease interaction**

Only 3% knew the interaction between aspirin and hemophilia. Less than quarter of respondent between sulidafil and nitrate. Further result are shown in table 7.

**Table7: pharmacists knowledge regarding disease interaction.**

Disease interaction	Yes %	No %
26-Ibuprofen-peptic ulcer	98	2
27-ACE I- congestive heart failure	48	52
28-Sulindafil-nitrate	22	88
29-Aspirin-Hemophilia	3	97
30-BB-asthma	45	55

**Part eight: knowledge of respondents toward affecting of time to some drugs**

More than half of them knew the affecting of time toward carbamazepin. Less than fifth of them knew the effect of time toward methotrexate. Further result s are shown in table eight.

**Table 8: knowledge of respondents toward affecting of time to some drugs**

	Yes %	No %
31-Carbamazepine	55	45
32-Isotretinoin	22	88
33-Methotrexate	9	91
34-Omeprazole	88	22
35-NSAIDs	99	1
36-Levothyroxine	45	55
37-ACEI	45	55

#### 4. DISCUSSION

Respondents' attitudes and practices regarding drug interactions were assessed using these questions. The results showed that approximately (72%) of the respondents experienced drug interactions during their work, indicating a potential high frequency of drug interactions in the patient registry.

A similar surveyed which was conducted in Sudan<sup>[34]</sup> found that (67%) of surveyed pharmacists experienced drug interactions in their daily work, (16%) showed drug interactions and (5%) experienced DFI interactions.

The majority of them stated that they usually consider possible drug interactions before dispensing medications. If so, you should ask your patients about their medical history before submitting.

However, given their answer to this question: they regularly asked their patients about their medical history before taking their medications. (75.6%) of them reported that sometimes yes! This response is inconsistent with the extent to which preoperative drug interactions have been considered.

Protection against possible drug interactions is almost impossible, if not impossible, without obtaining an accurate medical history (review) of affected patients.<sup>[35]</sup> These results consistence with another study that

conducted in Sudan which reported that over than half of patients of patients were not counseled by the examined physician or pharmacist on medication use and drug interactions.<sup>[29]</sup>

Only (22%) of the respondents confirmed that the doctors provided unconditionally agree with the opinion and decision of the district pharmacist. This percentage is considered very low. When the physician does not agree with the pharmacists more than half of the them interviewed, only inform the patient about the state.

The findings of this study reported poor coordination between doctors and pharmacists in this area. These results are inconsistency with another study which conducted in Sudan that reported an acceptable level of interprofessional communication and cooperation between the two parties.<sup>[36]</sup>

Many authors advocate closer coordination between different members of the medical staff, especially pharmacists and physicians, for the benefit of patients.<sup>[37-38]</sup>

It should be noted that the results of two previous studies that took part in Sudan found that about more than three quarter (66.4%) of the physicians surveyed indicated that they agreed with the pharmacists' decision and opinion.<sup>[39]</sup>

Almost the same perception of doctors about community pharmacists is expressed in a study which conducted in Sudan.<sup>[36]</sup>

To ensure that drug interactions do occur, healthcare providers (HCPs) have used drug interaction testing guidelines and/or existing software for the same purpose.

Approximately (72.8%) of the subjects indicated that they regularly use such reliable tools, knowing that respondents have completed refresher courses on drug interactions.

This improves respondents ability to easily and reliably identify potential drug interactions that are often overlooked. Pharmacists can access individual databases to help your doctor and patients.

The knowledge of community pharmacists about the purpose of changes in drug interactions in vivo is very important as it allows the prediction and therefore detection and prevention of any potential prescription drug interactions.

According to previous study that took part in India<sup>[41]</sup>, pharmacists should inform patients about food – drug interaction. The results of this study reported that pharmacists' knowledge of drugs and their interactions with juices was not much higher than expected.

A study that took part in Sudan concluded that: "Additional training and a combination of knowledge and experience on drug-food reactions among healthcare professionals to ensure proper consultation with patients is essential to ensure optimal treatment results."<sup>[14]</sup>

These low results are consistence to those of previous studies, which highlight the lack of knowledge of DF interactions among health professionals.<sup>[10, 14, 45, 46]</sup>

Due to the scientific competence of the pharmacists surveyed, the B.Pharm respondents surprisingly gave more correct answers than the M.Pharm respondents. The results of the study did not show a significant relationship between the respondents' knowledge of drug interactions and their long-term experience (P = 0.99). This is consistence with another study that took part in Nigeria.<sup>[48]</sup>

On the one hand, pharmacists are in charge of carrying out medical and pharmaceutical agreements and must be immunized or updated on drug interactions. Additionally, pharmacy associations are required to provide advanced training programs (CPDs) for pharmaceutical professionals to limit their professional qualifications. It should be noted that globally there is little research on the knowledge and skills of pharmacists on drug interactions.

#### 4. CONCLUSION

Poor of knowledge of the pharmacists appear in this study. Insufficient knowledge of the various forms of drug interaction can lead to poor patient counseling and adverse medical outcomes.

Therefore, higher education and a combination of knowledge and experience of drug interactions among pharmacists are essential to ensure effective patient counseling and optimal treatment outcomes.

Appropriate and rational basic training courses and integration of knowledge among health professionals are useful to optimize the use of medicines.

#### REFERENCES

1. Farkas D, Shader RI, von Moltke LL, Greenblatt DJ. Mechanisms and consequences of drug-drug interactions. In: Gad SC. Preclinical Development Handbook: ADME and Biopharmaceutical Properties. Philadelphia; John Wiley and Sons, 2008; 879-917.
2. Juurlink DN, Mamdani M, Kopp A, et al. Drug-drug interactions among elderly patients hospitalized for drug toxicity. JAMA, 2003; 289(13): 1652-8.
3. Knijff-Dutmer EA, Schut GA, van de Laar MA. Concomitant coumarin-NSAID therapy and risk for bleeding. Ann Pharmacother, 2003; 37(1): 12-6.

4. Shad MU, Marsh C, Preskorn SH. The economic consequences of a drug-drug interaction. *J Clin Psychopharmacol*, 2001; 21(1): 119-20.
5. Ray WA, Murray KT, Meredith S, et al. Oral erythromycin and the risk of sudden death from cardiac causes. *N Engl J Med*, 2004; 351(11): 1089-96.
6. Anne MH, Jennifer AP, Renee L, Heather McDonald, James DD, Mark C, Philip SW. Systematic Overview of Warfarin and its Drug and Food Interactions. *Arch Intern Med*, 2005; 1095-1106.
7. Edward AH. Handbook of drug interactions. 3rd ed., Hamilton press Inc. United states of America: 1976; 12.
8. Hansten PD. Appendix II: Important interactions and their mechanisms, In: Katzung BG. Basic and clinical Pharmacology. 9th ed., Boston; McGraw - Hill, 2004; 1110.
9. Bland SE. Drug-food interactions. *J Pharm Soc Wisconsin*, 1998; 14(Suppl 2): 28-35.
10. Benni JM, Jayanthi MK, Tubaki BR, Renuka M. Knowledge and awareness of food and drug interactions (FDI): a survey among health care professionals. *Int J Pharmacol Clin Sci*, 2012; 1(4): 97-105.
11. Bushra R, Aslam N, Khan AY. Food-drug interactions. *Oman Med J*, 2011; 26(2): 77-83.60 www.wjpr.net Vol 6, Issue 4, 2017. 424 Tokka et al. World Journal of Pharmaceutical Research
12. Otles S, Senturk A. Food and drug interactions: a general review. *Acta Sci Pol Technol Aliment*, 2014; 13(1): 89-102.
13. Pugh MJV, Starner CI, Amuan ME, Berlowitz DR, Horton M, Marcum ZA, et al. Exposure to potentially harmful drug-disease interactions in older community-dwelling veterans based on the healthcare effectiveness data and information set quality measure: who is at risk? *J Am Geriatr Soc*, 2011; 59(9): 1673-8.
14. Ali A A A, Abdallah AA. Evaluation of attitudes of the community pharmacists toward warfarin interactions. *Sudan Medical Monitor*, 2014; 35-38.
15. Dubova SVD, Reyes-Morales H, Torres-Arreola LDP, Suárez-Ortega M. Potential drugdrug and drug-disease interactions in prescriptions for ambulatory patients over 50 years of age in family medicine clinics in Mexico city. *BMC Health Serv Res*, 2007; 7: 147.
16. Veehof L, Stewart RE, Haaijer- Ruskamp FM et al. The development of polypharmacy. *Fam Pract*, 2000; 17: 261-7.
17. Bjerrum L, Sjøgaard, Hallas J et al. Polypharmacy in general practice differences between practitioners. *Br J Gen Pract*, 1999; 49: 195-8.
18. Atkin AP, Veitch PC, Veitch EM et al. The epidemiology of serious adverse drug reactions among the elderly. *Drugs Aging*, 1999; 14: 141-52.
19. Gagne, J.J., Maio, V. and Rabinowitz, C. Prevalence and Predictors of Potential DrugDrug Interactions in Regione Emilia-Romagna, Italy. *Journal of Clin Pharm Therap*, 2008; 33: 141-151.
20. Glintborg, B, Andersen S.E. and Dalhoff K. Drug-Drug Interactions among Recently Hospitalized Patients— Frequent but Mostly Clinically Insignificant. *Europ J Clin. Pharm*, 2005; 61: 675-681.
21. Vonbach, P., Dubied, A., Krähenbühl, S. and Beer, J.H. Prevalence of Drug-Drug Interactions at Hospital Entry and during Hospital Stay of Patients in Internal Medicine. *Europ J Inter Med*, 2008; 19: 413-420.
22. Cruciol- Souza J M, Thomson JC. Prevalence of potential drug-drug interactions and its associated factors in a Brazilian Teaching Hospital. *J Pharm Pharmaceut Sci*, 2006; 9(3): 427-433.
23. Ansari JA. Drug interactions and pharmacists. *JYP*, 2010; 2(3): 326-331.
24. Patel PS, Rana DA, Suthar JV, Malhorta SD, et al. A study of potential adverse drugdrug interactions among prescribed drugs in medicine outpatient department of a tertiary care teaching hospital. *J Basic Cli Pharm*, 2014; 5(2): 44-48. www.wjpr.net Vol 6, Issue 4, 2017. 425 Tokka et al. World Journal of Pharmaceutical Research
25. Awad AI, Himad HA. Drug –use practices in teaching hospitals of Khartoum State, Sudan. *Euro J Clin Pharmacol*, 2006; 62: 1087-1093.
26. Ahmed AM, Awad AI. Drug use practices at pediatric hospital of Khartoum State, Sudan. *Ann Pharmacother*, 2010; 44(12): 1986-30.
27. Mahmoud RK, Kheder SI, Ali HM. Prescribing rationality in Khartoum state, Sudan: An update. *Sudan Med Monit*, 2014; 9(2): 61-65.
28. Ahmed FMO. Evaluation of prescribing pattern in pediatric outpatient at Albuluk pediatric hospital (Sudan). *IJIPSR*, 2015; 3(4): 244-252.
29. Mudawi MME, Babiker SK, Khalil EN, et al. Evaluation of drug interactions in renal failure centers. *JPPDR*, 2014; 4(1): 4-7.
30. Doume AEA, Hassan KY, Eltayeb BA, et al. Patients' complaints against their doctors at Sudanese Medical Council. *SMJ*, 2009; 45(2): 82-83.
31. Palanisamy S, Arul Kumaran KS, Rajasekaran A. A study on assessment, monitoring, documentation and reporting of adverse drug reactions at a multi-specialty tertiary care teaching hospital in South India. *Int J Pharm Tech Res*, 2009; 4: 1519-22.
32. Elkhawad A O, Abdel Magied A, Hieba M, Gaily A, Edress I, The awareness of Sudanese pharmacists about drug-drug interaction. —*Ahfad Journal*, 2013; 30(1): 47.
33. The Federal Ministry of Health, Federal General Directorate of Pharmacy; Annual pharmaceutical statistical report, 2014; 51.
34. Jamal et al. Pharmacist's interventions in reducing the incidences of drug related problems in any practice setting. *ICPJ*, January 2015; 4(2): 347-352.

35. FitzGerlad R J. Medication errors: the importance of an accurate drug history. *BR J Clin Pharmacol*, 2009; 67(6): 671-675.
36. Mahmoud AAE, Mohamed SSE, Ali AA. Doctors' perceptions on community pharmacists expanded roles in Sudan. *WJPPs*, 2014; 3(12): 335-349.
37. Lee VW, Fan CS, Li AW, Chan AC. Clinical impact of pharmacist-physician comanagement in Hong Kong. *J Clin Pharm Ther*, 2009; 34(4): 407-14.
38. Snyder ME, Zillich AJ, Primack BA, et al. Exploring Successful community pharmacist/physician collaborative working relationship using mixed methods. *Res Social Adm Pharm*, 2010; 6: 307-323.
39. Awad A, Matowe L, Capps P. Medical doctor's perception and expectations of the role of hospital pharmacists in Sudan. *Pharmacy World & Science* 2007; 29(5): 557-564.
40. Ahmed IF, Mohamed I, Albert IW. Pharmacy practice in Indonesia: Pharmacy Practice in Developing Countries achievements and challenges. Elsevier: 2016; 53. [www.wjpr.net](http://www.wjpr.net) Vol 6, Issue 4, 2017. 426 Tokka et al. *World Journal of Pharmaceutical Research*
41. Seth SD, Vimlesh S. Textbook of pharmacology. 3rd ed., Elsevier, A division of Reed Elsevier India private limited. India. 2009; 1-54.
42. Hyacinthe T, Charles P, Adama K, Diarra C-S, et al. Variability of vitamins B1, B 2, and minerals contents in baobab (*Adansonia digitata*) leaves in east and west Africa. *Food Sci Nutr*, 2015; 391: 17-24. Doi:10.1002/fsn3.184.
43. Namratha V, Sahithi P. Baobab. A review about —The Tree of Life—. *IJAHST*, 2015; 1(1): 20-26.
44. DiMaria- Ghalili R, Miratallo JM. Challenges and opportunities for nutrition education and training in the health care profession: intraprofessional and interprofessional call to action. *Am J Clin Nutr*, 2014; 99(5): 1184S-1193S.
45. Lasswell AB, Deforge BR, SobalJ, Muncie HL Jr, Michocki R. Family medicine residents' knowledge and attitudes about drug nutrient interactions. *J Am Coll Nutr*. 1995; 14: 137-43.
46. Couris R.R, Tataronis G.R., Dallal G.E., Blumberg J.B., Dwyer J.T., Assessment of healthcare professionals' knowledge about warfarin-vitamin K drug-nutrient interactions. *J. Am. Coll. Nutr.*, 2000; 19: 439-445.
47. Alhassan M. Community pharmacy practice in Saudi Arabia: An Overview. *IJPHARM*, 2009; 9(1).
48. Adisa and Fakeye. Assessment of the knowledge of community pharmacists regarding common phytopharmaceuticals sold in South Western Nigeria. *Trop J Pharm Res*, December 2006; 5(2): 619-625.