

Assessment of Awareness and Knowledge about Various Types of Drug-Related Interactions among Nurses in a Tertiary Care Hospital

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ABSTRACT

Objective: The aim of this study is to determine awareness of nurses about drug interactions.

Material and Methodology: A cross-sectional questionnaire based study was carried out on nurses to assess the knowledge, attitude and practice regarding drug interactions. Those who gave their consent to participate were included in the study. The obtained data was analyzed using the Statistical Package for Social Sciences (SPSS) statistical software, version 25. Qualitative variables were expressed as percentages and quantitative variable expressed in terms of mean and SD. For all statistical analysis $p < 0.05$ was considered statistically significant.

Results: 50 pretested and post tested questionnaires were distributed among the participants. The study results showed that mean age of the nurses was 31.7 ± 5.96 years. 68% of the nurses had 5-10 year of experience, nurses from department of medicine found good knowledge after training, also those who had experience between 5-10 years were found to have good knowledge of drug interactions.

Conclusion: It is important that knowledge of nurses about different drug interaction is very essential to improve safety of patients. Therefore, additional training and integration of knowledge and expertise about drug interactions among nurses is needed to improve the therapeutic efficacy, patient's drug compliance and patient's safety.

Keywords: Drug Interaction

INTRODUCTION

A drug interaction can be defined as a situation in which a substance influences the activity of drug and as a result the effects of drug might be increased or decreased or produce a fresh response that neither generates on its own. It has been observed that 7% of drug side effects were responsible for drug interactions in United States. Diet and lifestyle can sometimes have a significant impact on drugs response.^[1]

Interactions between the food and drugs can have profound influence on the compliance and success of drug treatment. In the health care setting, adverse drug reactions (ADR) and drug interactions (DI) present a growing concern. Several studies had shown the DI incidence ranging from 3% to 30%.^[2]

Drug interactions have immense economy burden also. Different types of drug interaction occur when one drug was ingested with other drug or food items. This type of interaction might lead to changes in the kinetics, dynamics, and therapeutic effectiveness of the drug. It is usually more common in polypharmacy for chronic cases which is more prevalent in the aged patients and such group of patients should be closely

monitored frequently for food and drug interactions. Clinically significant drug interactions are potentially life threatening, and in some instances, fatal.^[3]

Food can alter drug's bioavailability by introducing changes in the GI physiology such as; gastric emptying, gastric pH, GI motility, the activity of the metabolizing enzymes and the transport proteins such as P-glycoprotein. Furthermore, food components may bind or chelate to the active pharmaceutical ingredient^[4].

Several studies have reported the evidence of interactions between certain types of food and medications. Grapefruit juice has many drug interactions and is known for its ability to inhibit the cytochrome P450 3A4 enzyme, thereby reducing the metabolism and increasing the bioavailability of drugs metabolized by this pathway^[5]. Ingestion of large quantities of vitamin K rich vegetables (broccoli, parsley, spinach) may interfere with the effectiveness and safety of warfarin therapy^[6]. Dietary fiber, such as wheat bran may reduce the absorption of digoxin^[7]. Consumption of large amounts of tea and coffee while taking theophylline could increase the risk of drug toxicity^[8]. Milk and other dairy products intake may reduce the bioavailability of tetracycline due to the formation of insoluble chelates^[9].

Timing of the medications intake with respect to food does affect the therapeutic effectiveness of drugs especially those with low bioavailability, which results in a profound effect on their GI absorption. A previous study suggested that taking clodronate with food could reduce the absorption of this drug to up 10% of the optimal compared to taking it 2 h before meal^[10]. It is recommended to take some medications, such as NSAIDs, with food in attempt to reduce possible GI irritation such as dyspepsia and nausea. Therefore, the knowledge of the appropriate timing of drug consumption in relation to food could help in avoiding possible adverse effects and interactions. Knowledge of these

interactions can help in the prevention of food–drug interactions.^[11]

High-risk patients taking three or more medications for chronic conditions like diabetes, hypertension, depression or congestive heart failure should be particularly monitored for DI.^[12]

Nurses have a vital role in detection of medical errors. The knowledge and clinical reasoning of nurses are very crucial to administer medication safely to the patients.^[13]

Nurses constitute the group of providers in closest proximity to patients receiving medications. Thus, understanding the degree to which these providers can recognize an interaction and identify a proper management strategy is vital to developing new methods to reduce drug interactions.^[14]

Even though fresh nurses have a good academic knowledge about nursing skills, there is no doubt that experienced nurses usually serve a better and safer level of practice. However, a continuous learning is must for the experienced nurses for better performance.^[15]

Nurses require enough knowledge about foods and drug interaction to prevent of food-drug interactions (FDIs) which come from the nurse's previous experience and understanding. The nurses have vital role for the education of the patient regarding foods interaction with certain drugs along with details of the signs and symptoms due to adverse reactions from such interactions. Continuous education actually improves the knowledge and ability of the nurse's regarding drug-related interactions and it would definitely improve the patient safety.^[16]

Although several studies have evaluated the frequency and consequences of medication errors, few have explored their causes. In particular, nurses' knowledge regarding medications has been evaluated minimally.

Nurses are uniquely positioned in the prevention of drug interactions. Little is known about nurses' knowledge regarding

this area; therefore, the aim of this study is to determine awareness of nurses about drug interactions. [17]

MATERIALS AND METHODS

This was a cross-sectional descriptive study using the validated, self structured questionnaire which was focused on common drug interactions to evaluate the knowledge and awareness of drug related interactions among nursing staff of Chalmeda Anand Rao Medical Sciences, Karimnagar. The questionnaire was developed by reviewing available questionnaires in the literature. The study was as follows:

Step 1: The structured questionnaire was used to find out the knowledge among nursing staffs about drug-related interactions

Step 2: All participants were educated about different drug-related interactions

Step 3: The same structured questionnaire was then used to find out the improvement in knowledge and attitude among nursing staffs about drug interactions before and after awareness and educational training.

Selection of Participants

The survey included a convenience sample of 50 nurses, divided into 3 groups (0-5 years, 5-10 years, 10-15 years 15-20 years of nursing experience) from health care facilities in the CAIMS, Karimnagar, Telangana, India. Researchers interviewed patients if they were unable to read the survey questions. Survey completion was voluntary, no incentives were provided, and the subjects were assured that their responses would be kept confidential. The study was carried out during the period of July– October 2019.

Inclusion Criteria:

1. Age group more than 20 years
2. Those who were willing to participate in the study

Exclusion Criteria:

1. Age group less than 20 years

2. Nurses in the outpatient department

Ethical Considerations

Informed consent was obtained from all the participants before distribution of the Drug Interaction questionnaire (DIQ). Personal identifiers were excluded in the questionnaire. Institutional Ethical Committee approved this study.

Data Collection

There were 25 questions which included dichotomous, multiple choice and open-ended questions. On average it took 30 minutes for participants to complete the questionnaire.

Data Analysis

Statistical analysis was carried out using the Statistical Package for the Social Sciences Statistics (SPSS) Version 22. Results were expressed as mean \pm SD. Questions scored correct, were given one point while incorrect answers, were given a zero point. T-test was used to compare the Mean score among the different groups. The level of significance was set at $p < 0.05$.

OBSERVATION AND RESULTS

Table 1: Distribution of age among nursing staff²⁵

Age Intervals	Frequency	Percent
≤ 25 Years	10	20
26-30 Years	11	22
31-35 Years	15	30
36-40 Years	9	18
> 40 Years	5	10
Total	50	100
Mean \pm SD	31.7 \pm 5.96	

In the present study there were total 50 nursing staff were participated, out of which 30% of the staff were participated belonged to the age group of 31-35 years of age, followed by 22% from 26-30 years of age, 20% from < 25 Years and 18%, 10% were from 36-40 years and > 40 years respectively. Mean age for all the nursing staffs were 31.37 with standard deviation of 5.96 years.

Table 2: Distribution of Nursing experience staff²⁵

Experience	Frequency	Percent
< 5 Years	5	10
5 - 10 Years	34	68
≥ 10 Years	11	22
Total	50	100

Nursing experience in the staff were distributed in the intervals said that maximum staff had experience of 5-10 years which was 68% of the staff had 5-10 years

of experience followed by 22% of the staff had ≥ 10 years of experience and only 10% of the staff had < 5 Years' experience shown in the above table

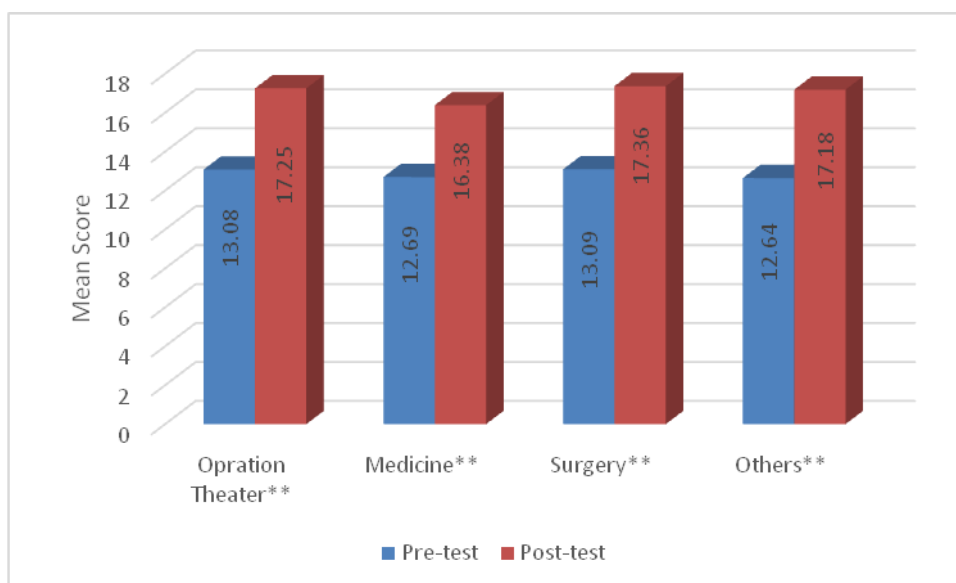


Figure 1: Distribution of Scores in Nursing experience staff²⁵
 ** Highly significant at 5% level of Significance

Above figure explained about knowledge and awareness score, in which Surgery department from institute shown more score which was 13.09 in pretest followed by those who were working in operation theater (13.08), Department of Medicine (12.69), others department (12.64). While in posttest after educating

them score was significantly different, in this posttest department of Medicine staff scored good score which was 17.30 (p-value – 0.0002), followed by department of surgery 17.30 (p-value -0.0001), those who were working in Operation Theater 17.25 (P-value – 0.0016) and other departments 17.18 (P-value – 0.0002) shown in fig 1

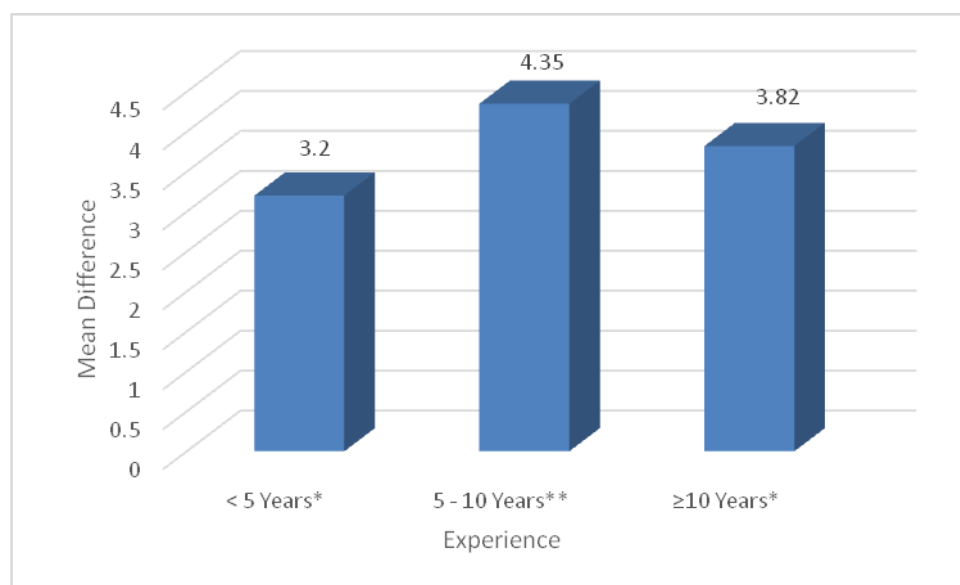


Figure 2: Distribution of Mean difference of score (Posttest – Pretest)²⁵
 *Significant at 5% level of Significance, ** Highly significant at 5% level of Significance

In general more experience staff having good knowledge of particular work,

here in nursing staff those having experience between 5 - 10 years had more

mean difference in their score observed there was difference of 4.35 was observed for this group (p-Value < 0.001), followed

by ≥ 10 years of 3.38 and <5 Years of 3.2 mean difference was observed shown in above figure.

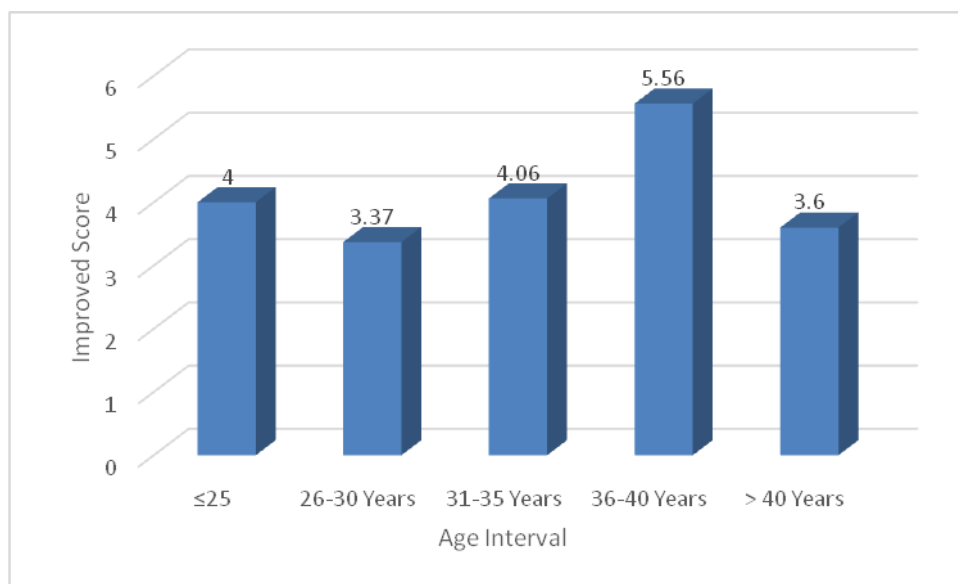


Fig 3: Distribution of Improved score (Posttest – Pretest)²⁵

After educating the staff about various drugs there was some improvement among the nursing staff were observed, maximum difference of 5.56 score was observe in the age group of staff between 36-40 years, followed by 4.06 from 31-35 years of age group, ≤ 25 years had improved score of 4, 40 years had improved score of 3.6 and finally 26-30 years age group had 3.37 improved score was observed shown in above figure.

DISCUSSION

Drug interactions are becoming grave issue with complex drug treatments. It can cause anything from minor morbidities up to fatal outcomes. Many problems in pharmacotherapy result due to drug interactions (DI). Drug interactions are consequences in which the effects of one drug are altered by prior or concurrent administration of another drug. The concept of DI is also extended to include: food drug interactions, herb drug interactions, laboratory drug interactions etc.^[18]

Our study was successful in evaluating the knowledge and awareness of drug interactions among nurses with varying degree of clinical experience. The main

intention of this study was to evaluate whether continuous learning will reduce the medication errors related to drug interactions. It has been observed that by improving the knowledge of the nurses about different types of drug interactions, awareness among nurses about common harmful interactions has been enhanced and the chances of medication error can be minimized. Further, with the help of regular vigilance and awareness program, nurses are able to avoid mistakes or minimize harm to the patients.

Our results are similar to the previous studies who have also reported lack of knowledge about drug interactions among health care professionals.^[19] Vitamin K rich food stuffs like broccoli, spinach and other green leafy vegetables promote blood clot formation and oppose the effects of the anticoagulants like warfarin, heparin, etc. A study showed deficiencies of the healthcare team with regard to warfarin-vitamin K interactions which can lead to disruption in anticoagulant outcomes.^[20] Similar deficiencies were seen in our study, nurses had less information about vitamin K containing foods and their interaction with

anticoagulants like warfarin. They were also not aware of interactions of dairy products with tetracyclines and fluoroquinolones, as earlier studies revealed tetracyclines to be taken one hour before or two hours after meals and avoided with milk as it forms insoluble chelates by binding with calcium and iron, affecting its bioavailability. Similarly casein and calcium present in milk decrease the absorption of ciprofloxacin.^[21]

In the present study, all nurses had average performance with relation to timings of drugs and food intake. All were aware about NSAIDs and PPIs but lacked knowledge regarding the FDIs involving commonly used drugs like antidiabetics such as glipizide and acarbose, antithyroid, antacids, antiviral for HIV, isoniazid, etc. Earlier studies have shown that food greatly decreases isoniazid bioavailability, therefore must be taken on empty stomach in the early morning for maximum benefit. PPIs must be taken 30 minutes before breakfast as proton pumps are maximally active, than after meals.^[22]

Of the nine questions related to drug-food interactions, nurses of medicine department performed the best while nurses of surgery and others department performed poorly. Twenty-one nurses could not mark the correct answer related to interaction of drug with vegetables. Whereas in post-test, all participants answered correctly about drug interactions with different fruits and disulfiram like reaction with metronidazole. The results of one study that has observed that tacit knowledge was more in experienced nurses than theoretical one.^[23] This study supports the policy of preserving experienced nurses for a longer period through educating them continuously. Hence, it becomes necessary that nurses should be regularly updated about drug-related reactions to ensure patient safety.

The nurses' clinical experience may be an important factor to minimize any type of medication error.^[24] In addition, as nurses' experience grows up, they are more able to interpret a situation and intercept medication errors.

The routine awareness and education of the nurses had a great impact on decreasing the medication errors. The study has proved it that by regular and appropriate training of the nursing staff, patient safety outcomes can be improved. The study allows for future research work as limited literature is available about nurse's knowledge of drug interactions.

Smaller sample size and duration of study are the limitations of this study. Multicenter study with larger samples will be beneficial. Future research calls for a larger sample size and to assess drug interaction knowledge and awareness amongst nurses working in different clinical units, nurses with varied experience and education, and nurses working in different facility (hospital, nursing home, college), to enable more validated results.

CONCLUSION

It is important that knowledge of nurses about different drug interaction is very essential to improve safety of patients. Therefore, additional training and integration of knowledge and expertise about drug interactions among nurses is needed to improve the therapeutic efficacy, patient's drug compliance and patient's safety.

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REFERENCES

1. Phillips J, Beam S, Brinker A, Holquist C, Honig P, Lee LY, et al. Retrospective analysis of mortalities associated with medication errors. *Am J Health Syst Pharm* 2001;58:1835-41.
2. Gosney M, Tallis R. Prescription of contraindicated and interacting drugs in elderly patients admitted to hospital. *Lancet* 1984;2:564-7.
3. Mouly S, Morgand M, Lopes A, Lloret-Linares C, Bergmann JF. Drug-food interactions in internal medicine: What

- physicians should know? Rev Med Interne 2015;36:530-9.
4. Welling PG. Effects of food on drug absorption. Annu Rev Nutr.1996;16:383–415.
 5. Kirby BJ, Unadkat JD. Grapefruit juice, a glass full of drug interactions? Clin Pharmacol Ther. 2007;81:631–3.
 6. Karlson B, Leijd B, Hellstrom K. On the influence of vitamin K-rich vegetables and wine on the effectiveness of warfarin treatment. Acta Med Scand. 1986;220:347–50.
 7. Johnson BF, Rodin SM, Hoch K, Shekar V. The effect of dietary fiber on the bioavailability of digoxin in capsules. J Clin Pharmacol. 1987;27:487–90..
 8. Jonkman JH, Sollie FA, Sauter R, et al. The influence of caffeine on the steady-state pharmacokinetics of theophylline. Clin Pharmacol Ther. 1991;49(3):248–55.
 9. Hung H, Peregrina AA, Rodriguez JM, Moreno-Esparza R. The influence of coffee with milk and tea with milk on the bioavailability of tetracycline. Biopharm Drug Dispos. 1997;18:459–63.
 10. Laitinen K, Patronen A, Harju P, Löyttyniemi E, Pyökkänen L, Kleimola T, Perttunen K. Timing of food intake has a marked effect on the bioavailability of clodronate. Bone. 2000;27:293–6.
 11. Joint Commission on Accreditation of Health Care Organizations (PF1.5). Accreditation manual for hospitals: standards. AMH pro vision for counselling about drug–food interaction. JCAH Perspectives 1986, 1994.
 12. D'Arcy PF. Nutrient-drug interactions. Adverse Drug React Toxicol Rev 1997; 14:233-54.
 13. Gaffney TA, Hatcher BJ, Milligan R. Nurses role in medical error recovery: An integrative review. J Clin Nurs 2016;25: 906-17.
 14. Blix H, Viktil K, Moger T, Reikvam A. Identification of drug interactions in hospitals–computerized screening vs. Bedside recording. J Clin Pharm Ther 2008;33(2):131-139.
 15. Hill K. Improving quality and patient safety by retaining nursing expertise. OnlineJ Issues Nurs 2010;15:1.
 16. Enwerem NM, Okunji P, Johnson A. Editorial: Food-drug interactions: Implications for nursing practice. Nurs HealthCare Int J 2017;1:102.
 17. Karahan A, Isik S, Kav S, Abbasoglu A. Oncology nurses awareness of drug interactions. Asia-Pacific Journal of Oncology Nursing. 2015;2(4):271-275.
 18. Sharma HL, Sharma KK. Drug Interactions. In: Principles of Pharmacology. 1st ed. Hyderabad: Paras medical; 2007. p.945-51.
 19. Jyoti MB, Jayanthi MK, Basavaraj RT, Renuka M. Knowledge and Awareness of food and drug interactions (FDI): A survey among health care professionals. Int J Pharmacol Clin Sci 2012;1:97-105.
 20. Couris RR, Tataronis GR, Dallal GE, Blumberg JB, Dwyer JT. Assessment of healthcare professional's knowledge about warfarin-vitamin K drug-nutrient interactions. J Am Coll Nutr 2000;19:439-45.
 21. Cardona Pera D. Drug-food interactions. Nutr Hosp 1999;14 Suppl 2:129S-140S.
 22. Self TH, Chrisman CR, Baciewicz AM, Bronze MS. Isoniazid drug and food interactions. Am J Med Sci 1999; 317:304-11.
 23. Evans RJ, Donnelly GW. A model to describe the relationship between knowledge, skill, and judgment in nursing practice. Nurs Forum 2006;41:150-7.
 24. Chang YK, Mark BA. Antecedents of severe and nonsevere medication errors. J Nurs Scholarsh 2009;41:70-8.
 25. Singh M, Kaushik NK, Panghal N. Evaluation of impact of lunch on cognition in healthy working individuals using Stroop test. Natl J Physiol Pharm Pharmacol 2020;10(12):1025-1029.

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