

Concurrent prescribing: Evaluation of its knowledge among dentists

ABSTRACT

Introduction: Considering the staggering number of drugs being prescribed to the patients for dental ailments, the ability of the dentists to recognize potential drug–drug interactions (DDIs) is essential to reduce their occurrence. This study aims to assess the dentist's ability to recognize the potentially clinically significant DDIs in clinical practice.

Subjects and Methods: This questionnaire-based study was carried out among the dentists working at private tertiary care teaching dental hospitals in Jaipur city. Eighty-five dentists working as faculty members in various departments and having postgraduate degree in their respective specialty were enrolled after taking their written informed consent. A prevalidated close-ended questionnaire was given to the respondents to check their knowledge about common DDI possible in clinical dentistry practice.

Statistical Analysis Used: Statistical analysis was done using descriptive statistics. Data were collected in a predesigned Microsoft Excel 2010. Continuous variables were presented as mean values \pm standard deviation, and categorical variables were presented as percentages.

Results: Among 85 dentists recruited for the study, no one had knowledge about all the common DDIs in dental practice. The participants could correctly identify only 47.86% of drug pairs. Drug information services available on the Internet were the most common source (32%) of knowledge of DDIs among them. Knowledge of the prescribed drug (40%) and complete drug history including over-the-counter and herbal products (35%) were the two important ways identified by them for avoiding unwanted drug interactions in clinics.

Conclusion: The study revealed that the existing knowledge of the dentists was not adequate. Hence the knowledge of the dentists about DDIs pertinent to dentistry should be enriched and should be reinforced by arranging training sessions at constant intervals of time.

Keywords: Dentists, drug–drug interactions, information sources, questionnaire study

INTRODUCTION

With the expeditious advancement in pharmacotherapeutic clinician's knowledge of new drugs, drug interactions and useful therapeutic trends should be persistently upgraded.^[1] When prescribing a medication, a meticulous drug history along with the sound knowledge of general principles of drug interactions, anticipating and preventing the major risks for the interaction for the principal drug classes prescribed is beneficial. Drug–drug interactions (DDIs) are said to occur when the effect of one drug is altered by the concurrent administration of other.^[2] The chance of DDIs increases with the increased number of drugs prescribed for a patient, being approximately 6% when two to four drugs are used to 50% with five drugs and as high as nearly 100% when eight drugs are prescribed.^[3]

DDIs can be of pharmacokinetic type when either of the concurrently administered drugs has potential to alter other patterns of absorption, distribution, metabolism, and excretion or it can be of pharmacodynamic type where the

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concurrently administered drugs have similar or opposite effects.^[4] DDIs contribute to about 6%–30% of all adverse drug reactions (ADRs) which can be avoided by applying the principles of clinical pharmacology judiciously while prescribing.^[5] Conjointly, 2.8% of hospital admissions every year are due to ADRs caused by DDI.^[6] Although in dental practice, the drug interactions are not as plentiful as they are in medical practice due to the shorter duration of drug therapy and smaller number of drug classes being prescribed, still their sound knowledge is imperative for safe and rational prescribing. It is in this regard that this study was undertaken among the faculty of private tertiary care teaching dental hospitals in Jaipur city.

SUBJECTS AND METHODS

The dentists having postgraduate qualification and working as faculty members in different clinical and nonclinical departments of private tertiary care teaching hospitals in Jaipur were approached for this study. Prior to this survey, Institutional Ethics Committee approval of the respective institution and then informed consent from the participants were sought [Figure 1].

Data collection tool

A pretested, structured questionnaire involving potential drug interactions of the commonly prescribed drugs in dental practice was developed. The questionnaire was subjected to peer review by senior faculty members from dental and pharmacology specialty and subsequently modified. The final questionnaire consisted of 15 multiple choice questions pertaining to the knowledge of drug interactions.

Each participant noted their response under any of the four different categories (“contraindicated,” “may be used together but with monitoring,” “no interaction,” and

“not sure”). For each drug pair, the generic names of the drugs were provided.

Statistical analysis

Statistical analysis was done using descriptive statistics. Data were collected in a predesigned Microsoft Excel 2010. Continuous variables were presented as mean values \pm standard deviation, and categorical variables were presented as percentages.

RESULTS

A total of 92 dentists were approached, out of which 85 dentists agreed to fill the questionnaire form, resulting in response rate of 92.4%. Figure 1 shows the steps followed for the recruitment of the respondents in this study.

Ability of dentists to recognize potential drug–drug interactions

In the present study, a total of 85 dentists were involved. The participants correctly identified $47.86\% \pm 21.5$ of drug pairs. Among all the drug pairs, the pair ketorolac and prednisolone was the most correctly classified pair ($n = 74, 87.1\%$) while atenolol and ranitidine ($n = 13, 15.3\%$) and alprazolam and fluconazole ($n = 14, 16.5\%$) were the least correctly identified drug pair. The average percentage of incorrectly identified interacting drug pair as having no interaction (i.e. false-negative error) was 11.01 ± 7.2 . By contrast, the average percentage of incorrectly identified noninteracting drug pair as having interaction (i.e., false-positive error) was 76.5% [Table 1].

Dentist's sources of information and their perceptions of interventions to avoid drug–drug interaction

Drug information service available on Internet (32%) was the most common source of knowledge of DDI among dental prescribers followed by the information written on drug package insert (30%) [Figure 2]. Knowledge of the prescribed drug (40%) and complete drug history including over-the-counter and herbal products (35%) were the most important ways as suggested by the prescribers to avoid unwanted DDIs in clinical practice [Figure 3].

DISCUSSION

Implication of the knowledge of drug interactions in clinical practice is essential for maximizing the therapeutic efficacy and minimizing the adverse effects which may have fatal consequences. The present study highlights the present status of knowledge of dentists about potential DDIs, in the era of rapidly progressing pharmacotherapeutic. Incorrect choice, dosage, route of drug administration, and failure to

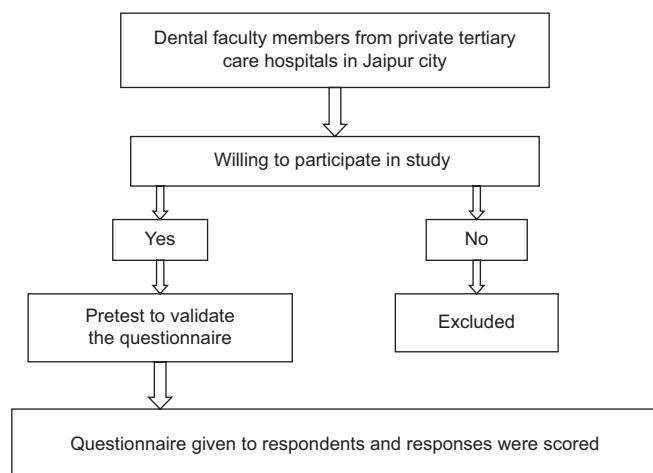


Figure 1: Flowchart of the study design

Table 1: Dentists responses regarding drug–drug interactions

Prescribed drug	Object of interaction	Dentist's responses (n=85)			
		Avoid, n (%)	Use with monitoring, n (%)	No interaction, n (%)	Not sure, n (%)
Ibuprofen	Enalapril	37 (43.5)	28 (33)*	14 (16.5)	6 (7)
Ibuprofen	Glipizide	12 (14.1)	62 (73)*	8 (9.4)	3 (3.5)
Ketorolac	Prednisolone	6 (7.1)	74 (87.1)*	2 (2.3)	3 (3.5)
Aspirin (high dose)	Warfarin	67 (78.8)*	11 (13)	7 (8.2)	.
Fluoxetine	Tramadol	15 (17.6)	63 (74.1)*	2 (2.4)	5 (5.9)
Ofloxacin	Sodium bicarbonate	46 (54.1)*	23 (27.1)	9 (10.6)	7 (8.2)
Ofloxacin	Iron dextran complex	32 (37.6)*	35 (41.2)	4 (4.7)	14 (16.5)
Amoxicillin	Ethinylestradiol	23 (27.1)	37 (43.5)*	11 (12.9)	14 (16.5)
Metronidazole	Ethanol	73 (85.9)*	9 (10.6)	-	3 (3.5)
Atenolol	Ranitidine	12 (14.1)	53 (62.4)	13 (15.3)*	7 (8.2)
Lidocaine	Propranolol	10 (11.8)	49 (57.6)*	16 (18.8)	10 (11.8)
Adrenaline	Imipramine	15 (17.6)*	38 (44.7)	8 (9.4)	24 (28.3)
Adrenaline	Propranolol	78 (91.8)*	7 (8.2)	.	.
Alprazolam	Fluconazole	45 (52.9)	14 (16.5)*	.	26 (30.6)
Metoclopramide	Promethazine	19 (22.3)	27 (31.8)*	22 (25.9)	17 (20)

*Correct responses

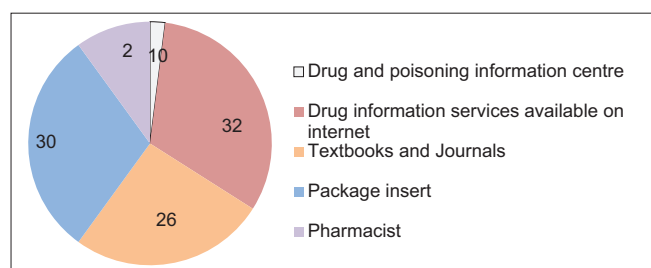


Figure 2: Dentists sources of information of drug–drug interactions

take renal functions into account are few most important causes of unwanted drug interactions.^[7] Polypharmacy also increases the likelihood of adverse DDIs.^[8] Furthermore, advanced age is an additional risk factor for DDIs.^[9] List of DDIs is voluminous, and the task to remember it is daunting, but the dental prescribers should be thorough with those interactions which are pertinent to dentistry.

In this study, the dentists were asked about 15 DDIs that are relevant to practicing dentist and that had been approved and considered clinically important by experts. The result of this study reflects that many dentists may not identify all the potentially harmful DDIs and may also believe that interactions exist when none have been shown. In the case of identification of these clinically important DDIs, our results were similar to those of previous studies.^[10] In our study, on average, 47% of the respondents answered incorrectly for the asked DDIs. Our results were consistent with the two previous studies as well.^[10,11]

The results of our study showed that two drug pairs that were less frequently identified compared to others were ibuprofen and enalapril and ofloxacin and iron dextran

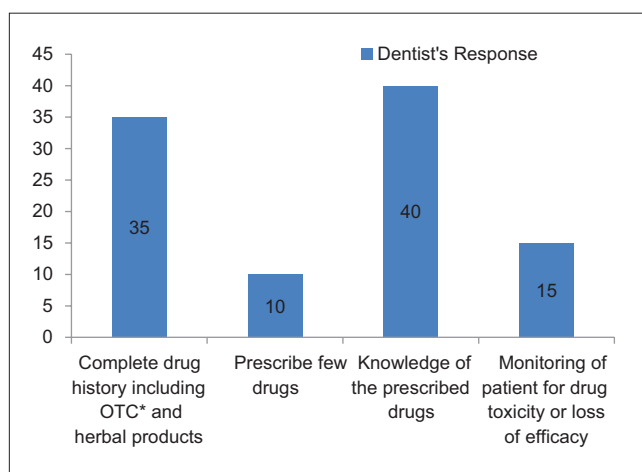


Figure 3: Dentist's perception of various interventions to avoid unwanted drug–drug interactions in clinical practice

complex (more than half of the respondents could not correctly identify them). On the other hand, two drug pairs that were more frequently identified compared to others were adrenaline and propranolol ($n = 78, 91.8\%$) and ketorolac and prednisolone ($n = 74, 73\%$) (three-quarters of the respondents could correctly identify them). Similar levels of knowledge of DDIs in the prescribers were found in another study, but this study involved medical doctors, and the drug pairs evaluated were not completely identical to our study.^[12]

Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for pain management in dentistry. Although drug interactions with analgesics are reported often, only a handful of them are of relevance in dentistry. Awareness of the significance of these interactions will allow the dentists to prescribe the analgesics optimally.^[13] The co-administration

of NSAIDs and antihypertensive agents (especially renin–angiotensin system blockers such as captopril and losartan) may result in blunting of the effect of antihypertensive therapy through inhibition of vascular and renal prostaglandin synthesis, with resulting vasoconstriction and impaired renal excretion of Na⁺ and water.^[14,15] All NSAIDs can prolong bleeding time by inhibiting platelet function. Hence, in patients receiving warfarin, concomitant use of these NSAIDs should be avoided.^[16] Seventy-nine percent of the respondents in this study were aware of this DDI.

Most NSAIDs do not have clinically important interactions with oral hypoglycemic agents, whereas phenylbutazone, azapropazone, and aspirin prolong their half-life.^[17] Concurrent use of selective serotonin reuptake inhibitor (SSRI) and NSAID increases the risk of gastrointestinal adverse outcomes such as bleeding and so negative outcomes can be dealt by altering NSAID or SSRI therapy or by providing ulcer-protective drugs.^[18] Simultaneous treatment with SSRIs and NSAIDs should chiefly be avoided in at-risk patients with a known history of bleeding.^[19] Concurrent use of NSAIDs and corticosteroids may also increase gastrointestinal risk,^[20] but in this study, only 87% of the respondents were aware of this potential DDI.

Judicious use of antimicrobials is an integral part of dental practice. Although antimicrobials have been implicated in numerous drug interactions, fortunately both periodontal and odontogenic infections are managed using a fairly limited number of antibiotic classes.^[21] The adverse drug interactions associated with the use of local anesthetics and central nervous system depressants are reported rarely in dentistry. Practitioners should be alert to the possibility of additive central nervous system depression when these agents are used in combination. By avoiding the most significant reactions discussed in this article, dentists can maintain their patients' safety.

In this study, about 32% of the respondents used information on electronic sources to learn about DDIs, while in another study, 38% of the prescribers had used this type of source. Information technology has taken over in all aspects of learning which could be a possible explanation to this. Only 10% reported that they asked a pharmacist to enrich their knowledge of DDIs. This reflects that the role of clinical pharmacist needs to be emphasized in our country. These findings are not consistent with other studies^[22,23] which states that clinical pharmacist plays a pivotal role to reduce drug–food interactions in hospitals and also takes necessary interventions to prevent medication errors in the medical wards.

The strength of our study is that it is first of this kind which has involved dentists with high response rate. Furthermore, the researchers were present at the time the participants filled the questionnaire, thereby eliminating the possibility of the participants to use any references to answer it, whereas in the previous studies, the researcher was ignorant about the prevailing conditions under which the questionnaire was filled by the participants.^[10,12]

Some limitations to this survey need to be considered. The primary limitation is limited generalizability of the study results as the respondents hailed from Jaipur city. Furthermore, the participants in this study were restricted from using information sources when answering the questionnaire, whereas the dentists in clinical situations usually have access to various drug information sources when prescribing the drugs. In our study, the association between knowledge scores of the participants and their demographic and their practice characteristics was not evaluated unlike in previous studies.^[10,11] The reason for this was that all the participants were postgraduates and working as faculty of different specialties in various tertiary care centers. The last limitation is that participants were not allowed to select more than one option to answer the multiple choice questions in the questionnaire. This limitation was accepted in order to compare our results to previous studies.^[10,11]

The findings of the present study have a number of implications in clinical practice. The knowledge deficits concerning DDIs, found in the present study and the previous ones,^[10,11] justify the need of targeted interventions, such as educational programs to improve prescribers' knowledge.

CONCLUSION

The limited ability of prescribers to identify the high number of interacting drug combinations highlights the need for training and hands-on sessions in computerized alerting systems and electronic sources like Micromedex that can help dentists in recognition of potential DDIs. Based on our results, electronic sources were used more than others to learn more about potential DDIs. Hence, it is recommended that the access to electronic sources in clinical settings should be facilitated further by providing free Internet facilities and desktops in the hospital premises.

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Conflicts of interest

There are no conflicts of interest.

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