

The knowledge of the dental post graduate students of Vadodara to recognize potential drug–drug interactions (DDIs) - A Questionnaire Study

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Abstract

Introduction: Drug–drug interactions (DDIs) are said to occur when the effect of 1 drug is altered by the concurrent administration of other. This cross-sectional questionnaire study is to evaluate the knowledge of the dental post graduate students of Vadodara district to recognize potential drug–drug interactions.

Method: The set of questionnaire contains 15 questions which are already published in an article concerning the

knowledge of the post graduate students to recognize potential drug–drug interactions (DDIs). Dental post graduate students of Vadodara district who wanted to participate voluntarily were involved. ¹ The set of questionnaire, participant information sheet (PIS) and informed consent form (ICF) was personally mailed through Google form to all the post graduate students.

Result: The results of our study showed that two drug pairs that were less frequently identified compared to

others were Amoxicillin-Ethinylestradiol, Metronidazole-Ethanol, Atenolol-Ranitidine (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 Ibuprofen-Enalapril, Ibuprofen-Glipizide, Ketorolac-Prednisolone, Fluoxetine-Tramadol (three-quarters of the respondents could correctly identify them).

Conclusion: The present study, nevertheless, has shed light on what appears to be a sound understanding of various drug-drug interaction by postgraduate students of dental fraternity at designated dental institutes. Drug-drug interaction awareness is strong in interaction of NSAIDS with various drugs and knowledge of interaction of various antimicrobials was poor. So it can be inferred that more knowledge is required for dental post graduate student about the use of various drugs.

Keywords: Drug-drug Interactions, Post graduate students, questionnaire study

Introduction

With continuous progression in pharmacotherapeutics, practitioner is more aware of newer drugs and various drug interactions. Systematic drug history from patient, with adequate knowledge of mechanism of action of the drug is very important in prescribing the medication.¹ Drug- drug interactions (DDIs) occurs when mechanism of one drug is altered by another drug. As the number of drugs increases the chances of DDIs also increases. 2 to 4 drugs may increase the chances of DDIs to approximately 6%, 5 drugs may show 50% and 8 drugs can show upto 100%.²

Most important component of dental curriculum is to include common drug-drug interactions. But the interactions included in the college curriculum quickly becomes obsolete and the practitioner should be constantly upgraded to newer drug interactions which is

more difficult task for them.³ Clinician can easily reduce the adverse drug interactions if he is informed about prevailing complex drug interactions and if he knows the substitute treatment for it. If the patient is having chronic diseases and he is taking drugs from multiple physicians then thorough patient evaluation is necessary.⁷

Acquiring a perfect drug and medical history is a challenging task as the drugs may not remember the drugs and their doses especially over the counter drug. Knowing the drugs as well as their doses are equally important.⁴ Practitioner should always take extra care when patient is taking high risk drugs. One should always remember that as newer drugs and various combinations introduced to the market chances of drug-drug interactions increases.⁸

Monitoring the various drug interactions taken by the patient is very important, as the dentist is a professional healthcare provider.⁵ There may be chances that the physician or a chemist who had prescribed the drug may have missed the possible interaction, but a dental practitioner can recognize it by taking through history.⁹

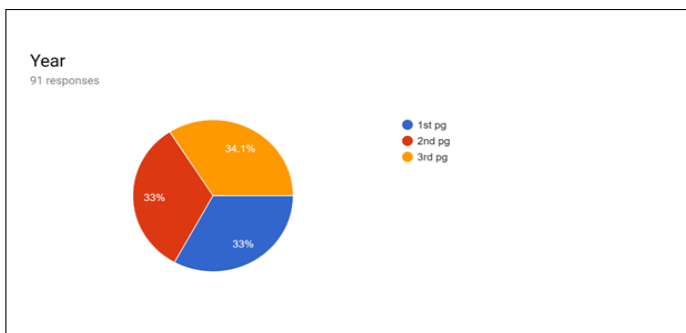
Methodology

This cross-sectional questionnaire study was conducted among the post graduates students of Vadodara district. Set of questionnaire which contained 15 questions which were already published by concerning the knowledge of the post graduate students to recognize potential drug-drug interactions (DDIs). Dental post graduates students of all branches of KMSDCH, Sumandeep Vidyapeeth & Manubhai Patel dental college & hospital was included in study and those who was not willing was excluded. Students Voluntarily accepting to participate in the study were taken.¹ The set of questionnaire, participant information sheet (PIS) and informed consent form (ICF) was personally mailed through Google form to all the respected post graduate students of Vadodara district. Two remainder mails at the interval of 8 days was sent to the

students. All the data regarding mail was stored in the software and then further respondent mails was analyzed for statistical analysis. All the participants who did not respond even after 2 reminders was dropped out from study. A questionnaire form was mailed to all the dental post graduate students of Vadodara district and only completely filled forms was taken into consideration.

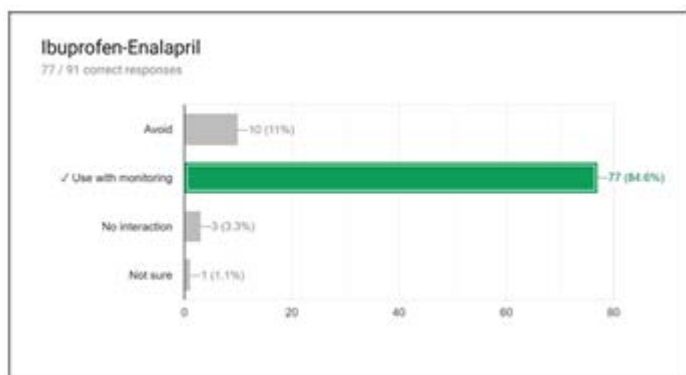
Result:

Graph 1: Number of participants from each post graduate year



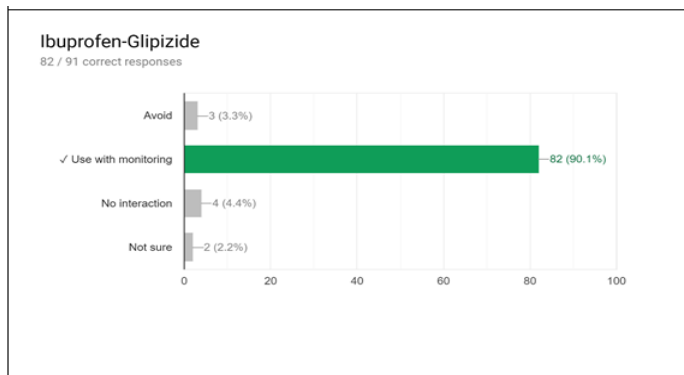
Graph 1: shows total 91 number of postgraduate dental participates are present. In which 30 participates (33%) are from first year batch. 30 participates (33%) are from second year batch, 31 participates (34.1%) are from third year batch.

Graph 2: Interaction between Ibuprofen-Enalapril



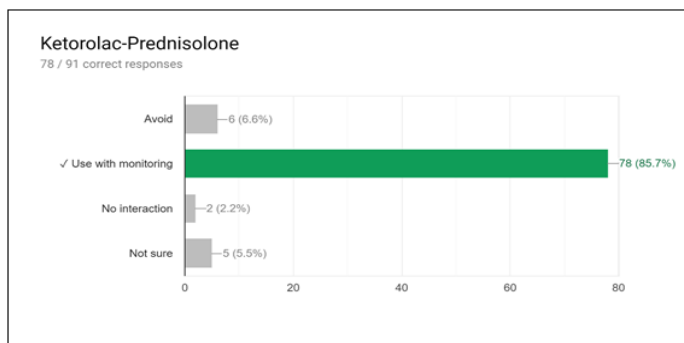
Graph 2: shows from total 91 participants 77(84.6%) participants gave correct answer, which was to use with monitoring. 10 (11%) said to avoid it 3(3.3%) participants said that there will be no interaction and 1(1.1%) participant said not sure which are false answer.

Graph 3: Interaction Between Ibuprofen-Glipizide



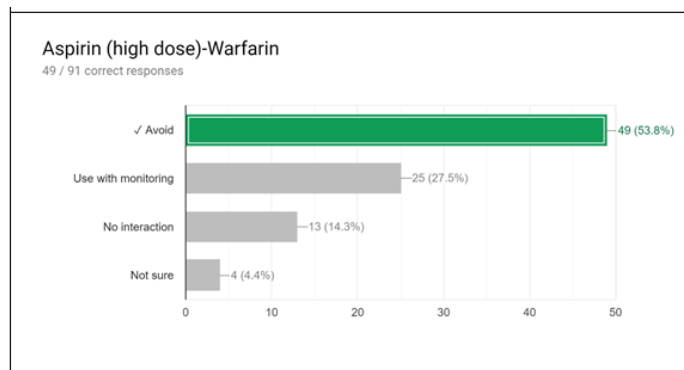
Graph 3: shows from total 91 participants 82(90.1%) participants gave correct answer, which was to use with monitoring. 3 (3.3%) said to avoid it 4(4.4%) participants said that there will be no interaction and 2(2.2%) participant said not sure which are false answer.

Graph 4: interaction between ketorolac-prednisolone



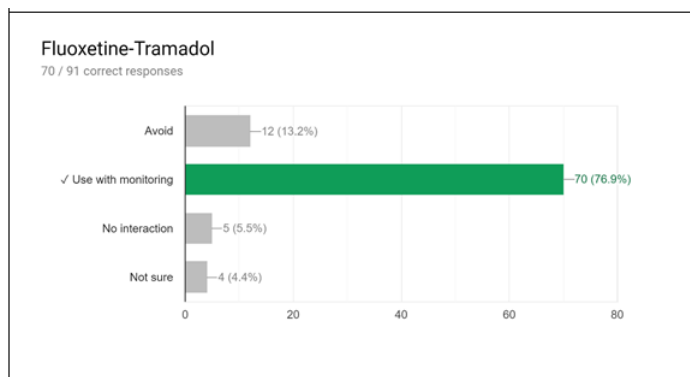
Graph 4 shows from total 91 participants 78(85.7%) participants gave correct answer, which was to use with monitoring. 6 (6.6%) said to avoid it 2(2.2%) participants said that there will be no interaction and 5(5.5%) participant said not sure which are false answer.

Graph 5: interaction between aspirin (high dose)-warfarin



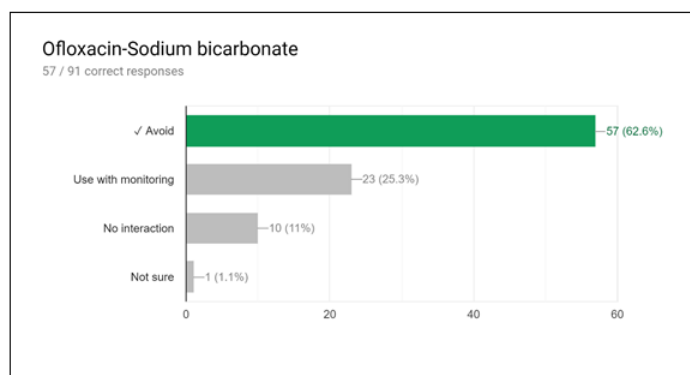
Graph 5: shows from total 91 participants 49(53.8%) participants gave correct answer, which was to avoid it. 25 (27.5%) said to use with monitoring 13(14.3%) participants said that there will be no interaction and 4(4.4%) participant said not sure which are false answer.

Graph 6: interaction between fluoxetine-tramadol



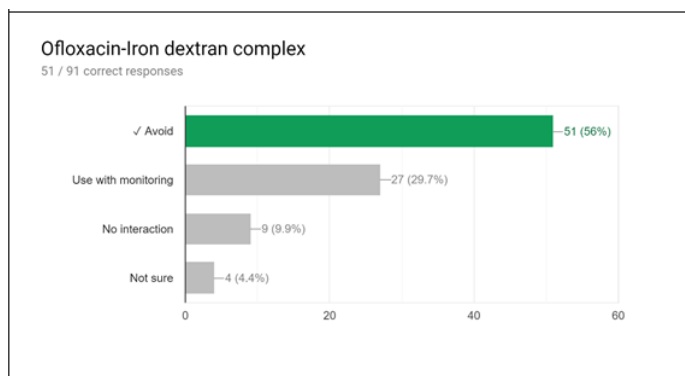
Graph 6 shows from total 91 participants 70(76.9%) participants gave correct answer, which was to use with monitoring. 12 (13.2%) said to avoid it 5(5.5%) participants said that there will be no interaction and 4(4.4%) participant said not sure which are false answer.

Graph 7: interaction between ofloxacin-sodium bicarbonate



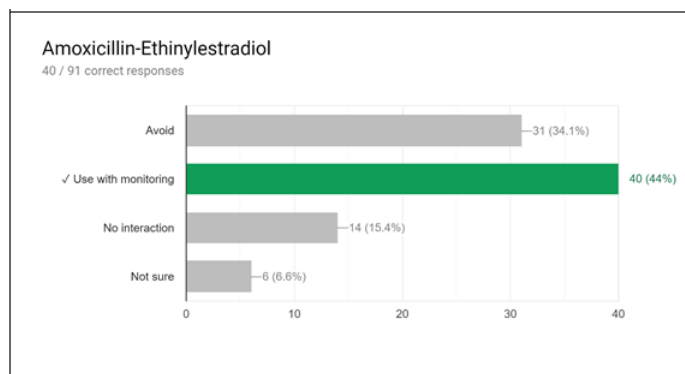
Graph 7 shows from total 91 participants 57(62.6%) participants gave correct answer, which was to avoid it. 23 (25.3%) said to use with monitoring 10(11%) participants said that there will be no interaction and 1(1.1%) participant said not sure which are false answer.

Graph 8: Interaction Between Ofloxacin-Iron dextran complex



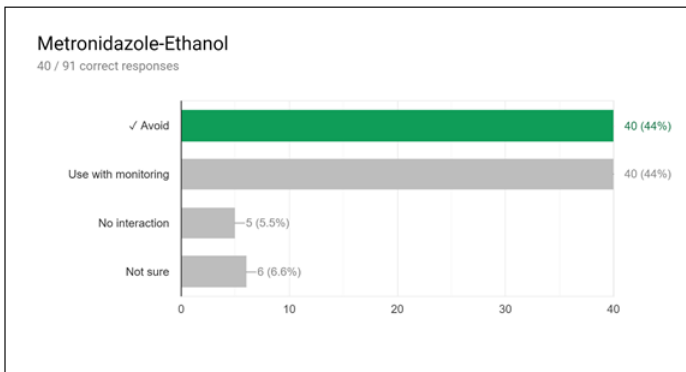
Graph 8: shows from total 91 participants 51(56%) participants gave correct answer, which was to avoid it. 27 (29.7%) said to use with monitoring 9(9.9%) participants said that there will be no interaction and 4(4.4%) participant said not sure which are false answer.

Graph 9: interaction between Amoxicillin-Ethinylestradiol



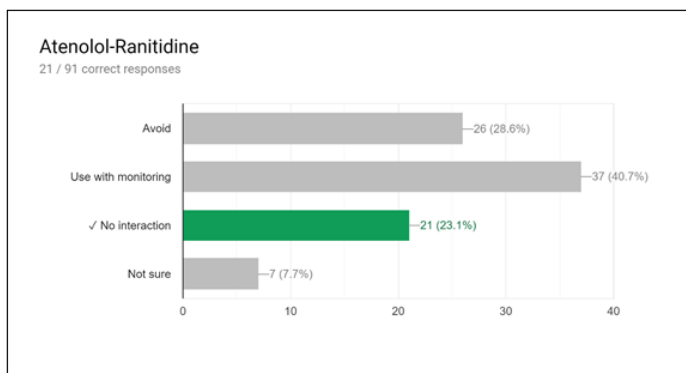
Graph 9 shows from total 91 participants 40(44%) participants gave correct answer, which was to use with monitoring. 31 (34.1%) said to avoid it 14(15.4%) participants said that there will be no interaction and 6(6.6%) participant said not sure which are false answer.

Graph 10: Interaction Between Metronidazole-Ethanol



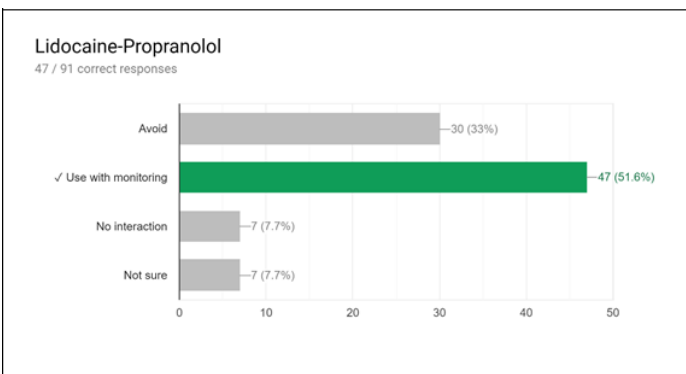
Graph 10 shows from total 91 participants 40(44%) participants gave correct answer, which was to avoid it. 40 (44%) said to use with monitoring 5(5.5%) participants said that there will be no interaction and 6(6.6%) participant said not sure which are false answer.

Graph 11: Interaction Between Atenolol-Ranitidine



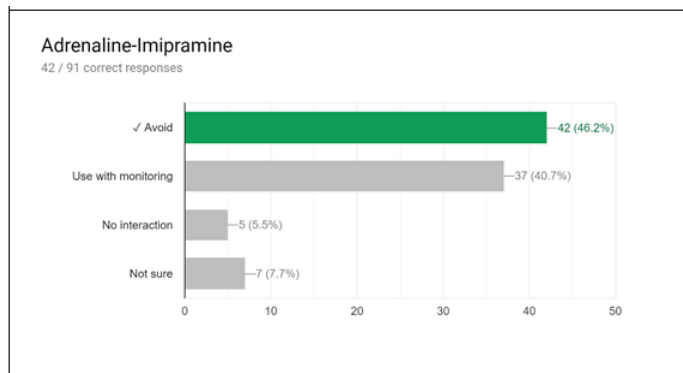
Graph 11 shows from total 91 participants 21(23.1%) participants gave correct answer, which was no interaction. 37 (40.7%) said to use with monitoring 26(28.6%) participants said that to avoid it and 7(7.7%) participant said not sure which are false answer.

Graph 12: Interaction Between Lidocaine-Propranolol



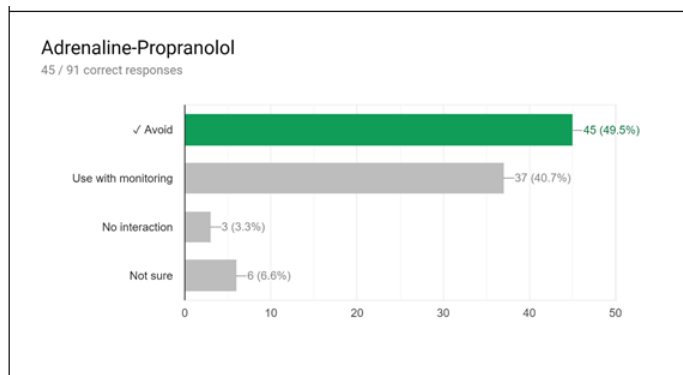
Graph 12: shows from total 91 participants 47(51.6%) participants gave correct answer, which was to use with monitoring. 30 (33%) said to avoid it 7(7.7%) participants said that there will be no interaction and 7(7.7%) participant said not sure which are false answer.

Graph 13: Interaction Between Adrenaline-Imipramine



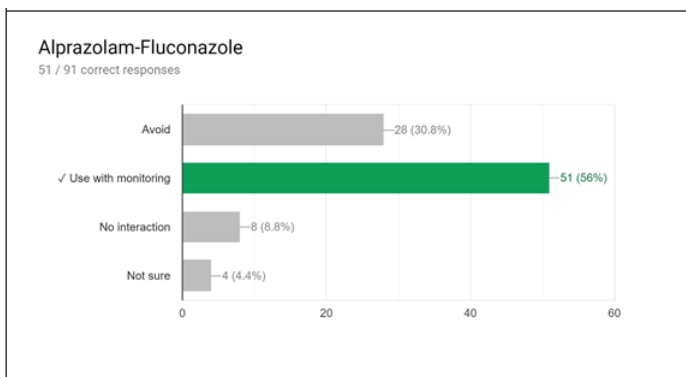
Graph 13: shows from total 91 participants 42(46.2%) participants gave correct answer, which was to avoid it. 37 (40.7%) said to use with monitoring 5(5.5%) participants said that there will be no interaction and 7(7.7%) participant said not sure which are false answer.

Graph 14: Interaction Between Adrenaline-Propranolol



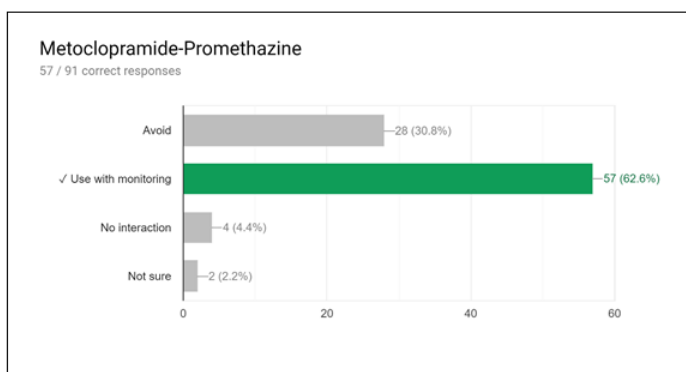
Graph 14: shows from total 91 participants 45(49.5%) participants gave correct answer, which was to avoid it. 37 (40.7%) said to use with monitoring 3(3.3%) participants said that there will be no interaction and 6(6.6%) participant said not sure which are false answer.

Graph 15: Interaction Between Alprazolam-Fluconazole



Graph 15 shows from total 91 participants 51(56%) participants gave correct answer, which was to use with monitoring. 28 (30.8%) said to avoid it 8(8.8%) participants said that there will be no interaction and 4(4.4%) participant said not sure which are false answer.

Graph 16: Interaction Between Metoclopramide-Promethazine



Graph 16: shows from total 91 participants 57(62.6%) participants gave correct answer, which was to use with monitoring. 28 (30.8%) said to avoid it 4(4.4%) participants said that there will be no interaction and 2(2.2%) participant said not sure which are false answer.

Discussion

Implication of the knowledge of drug interactions in clinical practice is crucial for maximizing the therapeutic efficacy and minimizing the adverse effects, which can have fatal consequences. This study highlights this status of information of postgraduate students of dental fraternity about potential DDIs, within

the era of rapidly progressing pharmacotherapeutics. Incorrect choice, dosage, route of drug administration, and failure to require renal functions under consideration are few most significant causes of unwanted drug interactions. List of DDIs is large, and therefore the task to recollect it is frightening, but the dental postgraduates should be thorough with those interactions which are pertinent to dentistry. During this study, the postgraduates were asked about 15 DDIs that are relevant to practicing dentist. The results of our study showed that drug pairs that were less frequently identified compared to others were Amoxicillin-Ethinylestradiol, Metronidazole-Ethanol, Atenolol-Ranitidine, Adrenaline-Imipramine, Adrenaline-Propranolol (more than half the respondents couldn't correctly identify them).

On the opposite hand, drug pairs that were more frequently identified compared to others were Ibuprofen-Enalapril, Ibuprofen-Glipizide, Ketorolac-Prednisolone, Fluoxetine-Tramadol (three-quarters of the respondents could correctly identify them).

Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for pain management in dentistry. Although drug interactions with analgesics are reported often, only some of them are of relevance in dentistry. The co-administration of NSAIDs and antihypertensive agents (especially renin-angiotensin system blockers like captopril and losartan) may lead to blunting of the effect of antihypertensive therapy through inhibition of vascular and renal prostaglandin synthesis. So it should be use with monitoring, 84.6% participants knew it. In questionnaire study done by Sharma, et al in 2019 33% gave correct answer.

Oral hypoglycemic agents commonly do not have any potential interactions with NSAIDS, but may interact with phenylbutazone, azapropazone, and aspirin and extend their half-life. Ibuprofen can increase the consequences of

glipizide and cause your blood glucose levels to induce too low. So it should be used with monitoring, it absolutely was known in 90.1% participants. In questionnaire study done by Sharma, et al in 2019 73% gave correct answer.

The combined use of corticosteroids and anti-inflammatory drugs (NSAIDs) may increase the potential for serious gastrointestinal (GI) toxicity, including inflammation, bleeding, ulceration, and perforation. During this study, 85.7% of the respondents were tuned in to this potential DDI and knew that it should be used with monitoring. In questionnaire study done by Sharma, et al in 2019, 87.1% gave correct answer. All NSAIDs can prolong bleeding time by inhibiting platelet function. Hence, in patients receiving warfarin, concomitant use of those NSAIDs should be avoided.¹⁰

Only 53.8% of the respondents during this study were tuned in to this DDI. In questionnaire study done by Sharma, et al in 2019 78.8% gave correct answer. Chances of a condition called the serotonin syndrome increases when Fluoxetine-Tramadol is used together. The chances of serotonin syndrome increases when concurrent use of fluoxetine with tramadol is administered due to the selective serotonin reuptake inhibitors.⁸ So it should be used with monitoring, which was known by 76.9% participants. In questionnaire study done by Sharma, et al 74.1% gave correct answer.

Judicious use of antimicrobials is an integral a part of practice. Although antimicrobials are implicated in numerous drug interactions, fortunately both periodontal and odontogenic infections are managed employing a fairly limited number of antibiotic classes.

Ofloxacin could be a fluorinated quinolone antibacterial agent extensively used against both Gram-positive and Gram-negative microorganisms. In certain cases, Ofloxacin administered with hydrogen carbonate and iron

dextran complex could modify its dissolution rate and reduce its absorption resulting in therapeutic failure.⁹ So it should be avoided which was given by 62.6% and 56% participants. In questionnaire study done by Sharma, et al 54.1% and 37.6% respectively gave correct answer.

When antimicrobials are administered with estrogen containing contraceptives, it could weaken the effect of contraceptives. Hepatic enzymes are produced by all antimicrobials Except, rifamycins and griseofulvin, and do not upsurge the clearance of estrogens.¹¹ It is thought that bacterial hydrolytic enzymes within the GI tract that are liable for regenerating parent estrogen molecules following first-pass metabolism decreases when it interacts with antimicrobials which interfere with enterohepatic recirculation of estrogen.¹² So it should be used with monitoring which was known by 44% participants. In questionnaire study done by Sharma, et al 43.5% gave correct answer.

Breakdown of alcohol is altered by Metronidazole, tinidazole, benznidazole. Alcohol is contained by many commonly used mouthwashes and aftershaves. Throbbing within the head and neck, irregular heart beat, rapid heart beat, low pressure level, sweating, nausea, and vomiting are caused when alcohol is used either topical or parenteral.¹³ So it should be avoided which was known only by 44% participants. In questionnaire study done by Sharma, et al 85.9% gave correct answer. There are not any interaction in atenolol and ranitidine so it will be taken with none side effects. But it had been found that only 23.1% of participants knew this and most commonly (40.7%) the said to use with monitoring. In questionnaire study done by Sharma, et al 15.3% gave correct answer.

The adverse drug interactions related to the employment of local anesthetics and central system depressants are reported rarely in dentistry.

Process of lidocaine is not done properly when antidepressant and lignocaine is used together. So it should be used with monitoring which was known by only 51.6% participants. In questionnaire study done by Sharma, et al 57.6% gave correct answer.

Imipramine may potentiate the cardiovascular effects of adrenaline which may worsen the cardiac condition. So generally it should be avoided which was known by only 46.2% participants. Another commonest answer was to use with monitoring which was 40.7%. In questionnaire study done by Sharma, et al 17.6% gave correct answer.

Beta-blockers may block the consequences of epinephrine. Taking beta-blockers with epinephrine may cause your pressure level to be increased. The effect of epinephrine on severe sensitivity could also be decreased if patient is additionally taking beta-blockers.¹⁴ Only 49.5% participants answered it correctly which was to avoid both drugs at the identical time. In questionnaire study done by Sharma, et al 91.8% gave correct answer.

The plasma concentration of benzodiazepines is increased immensely when alprazolam and flucanazole is used together. Therefore, it should significantly increase the blood levels and effects of alprazolam in rare cases. This will cause increased drowsiness and breathing difficulties. So it should be used with monitoring which was given by 56% participants. In questionnaire study done by Sharma, et al 16.5% gave correct answer. In a study done by Yu Ko et al in 2009 showed 21.3% correct answer.

Because of additive antidopaminergic effects, the frequency and severity of extrapyramidal reactions may increase when metoclopramide is used with phenothiazines. The danger also increases the longer patient take these medications and therefore the more of every patient takes. As such, treatment with metoclopramide should generally be limited to 12 weeks. So it should be used with monitoring which answer was

given by 62.6% participants. In questionnaire study done by Sharma, et al 31.8% gave correct answer.

Conclusion

The present study, nevertheless, has shed light on what appears to be a sound understanding of various drug-drug interaction by postgraduate students of dental fraternity at designated dental institutes. Drug-drug interaction awareness is particularly strong in interaction of NSAIDs with various drugs. However, it is observed that knowledge of interaction of various antimicrobials was very poor among postgraduate students. It is also seen that participants was not able to detect the interaction between the most commonly used drugs. So it can be inferred that more knowledge is required for dental post graduate student about antibiotics.

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