Antibiotic Resistance - Knowledge, Attitude And Practice Based Survey Amongst Dental Health Care Providers In An Institution

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Αντίσταση στα αντιβιοτικά - Έρευνα γνώσης, στάσης και πρακτικής μεταξύ παρόχων οδοντιατρικής υγείας σε ένα ίδρυμα

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Practitioner Knowledge Survey

SUMMARY: *Introduction:* Antibiotic resistance is definitely one of the most dreaded outcomes of injudicious use of antibiotics in a developing country like India. The prevalence of Over the counter (OTC) availability of antibiotics has also contributed to this bane and burden of antibiotic resistance in our country.
Aim: The aim of this survey based study was to examine the knowledge on antibiotic usage, resistance, attitudes, perceptions and practices among dental health care providers using an online survey.
Methods and Methodology: An Eighteen point online close ended questionnaire based survey was conducted amongst 100 randomly selected postgraduate students in various dental specialities from our institution, whereby their Knowledge, attitude and Practice regarding antibiotic resistance and usage was assessed. The questionnaire was designed to include demographic information of the participants along with questions based on frequency of antibiotic usage, resistance and interest of participants to attend educational seminars as a part of continuing education.
Results: 76.47% participants agreed that antibiotic resistance is a major public health burden in India and globally. Participants who had never attended seminars on antibiotic resistance were 82.35% and 89.41% were willing to attend seminars.
Conclusions: Our survey showed few mis-prescriptions of antibiotics in cases of resistance to penicillin groups of drugs and use of broad versus narrow spectrum antibi-

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ΠΕΡΙΛΗΨΗ: *Εισαγωγή:* Η αντοχή στα αντιβιοτικά είναι σίγουρα ένα από τα πιο σοβαρά αποτελέσματα της επιζήμιας χρήσης αντιβιοτικών σε μια αναπτυσσόμενη χώρα όπως η Ινδία. Η επικράτηση της εμπρός από τον πάγκο (Over the counter, OTC) διαθεσιμότητας αντιβιοτικών έχει επίσης συμβάλει σε αυτό το μειονέκτημα και το βάρος της αντοχής στα αντιβιοτικά στη χώρα μας.
Στόχος: Ο στόχος αυτής της μελέτης που βασίστηκε στην έρευνα με διαδικτυακά ερωτηματολόγια ήταν να εξετάσει τις γνώσεις σχετικά με τη χρήση αντιβιοτικών, την αντίσταση, τη στάση, τις αντιλήψεις και τις πρακτικές μεταξύ των παρόχων οδοντιατρικής περίθαλψης.
Μέθοδοι και μεθοδολογία: Διεξήχθη μια διαδικτυακή έρευνα δεκαοκτώ σημείων με κλειστό ερωτηματολόγιο σε 100 τυχαία επιλεγμένους μεταπτυχιακούς φοιτητές σε διάφορες οδοντιατρικές ειδικότητες από το ίδρυμά μας, βάσει των οποίων αξιολογήθηκε η γνώση, η στάση και η πρακτική τους σχετικά με την αντοχή στα αντιβιοτικά και τη χρήση τους. Το ερωτηματολόγιο σχεδιάστηκε για να περιλαμβάνει δημογραφικές πληροφορίες των συμμετεχόντων μαζί με ερωτήσεις που βασίζονται στη συχνότητα χρήσης αντιβιοτικών, στην μικροβιακή αντίσταση στα αντιβιοτικά και στο ενδιαφέρον των συμμετεχόντων να παρακολουθήσουν εκπαιδευτικά σεμινάρια ως μέρος της συνεχούς εκπαίδευσης.
Αποτελέσματα: Το 76,47% των συμμετεχόντων συμφώνησε ότι η αντοχή στα αντιβιοτικά αποτελεί μείζον βάρος για τη δημόσια υγεία στην Ινδία και παγκοσμίως. Οι συμμετέχοντες που δεν είχαν παρακολουθήσει ποτέ σεμινά-

otics. However, the overall awareness and prescription protocols were appropriate, thereby concluding that post graduates had a good knowledge of antibiotics, their use and risks involved.

KEY WORDS: Antibiotics; Antibiotic resistance; Educational interventions; Dental healthcare providers; Survey; Prescription antibiotics

ρια αντοχής στα αντιβιοτικά ήταν 82,35% και το 89,41% ήταν πρόθυμοι να παρακολουθήσουν σεμινάρια.
Συμπεράσματα: Η έρευνά μας έδειξε λίγες λανθασμένες συνταγές αντιβιοτικών σε περιπτώσεις αντοχής σε ομάδες φαρμάκων πενικιλλίνης και χρήση αντιβιοτικών ευρέως έναντι στενού φάσματος. Ωστόσο, η γενική γνώση και τα πρωτόκολλα συνταγογράφησης ήταν κατάλληλα, καταλήγοντας στο συμπέρασμα ότι οι μεταπτυχιακοί είχαν καλή γνώση των αντιβιοτικών, τη χρήση τους και τους ενδεχόμενους κινδύνους.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ: Αντιβιοτικά, Αντιβιοτική αντίσταση, Εκπαιδευτικές παρεμβάσεις, Πάροχοι οδοντιατρικής περίθαλψης, Ανασκόπηση, Αντιβιοτικά με συνταγή, Οδοντίατροι.

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INTRODUCTION

The pre-penicillin era of medical and dental practice was a hellish nightmare to all health care professionals of the olden days (1). Development of antibiotics was a crucial step in the evolution of treatment of infections of bacterial origin which were earlier left untreated, leading to gross morbidity and mortality in patients(2,3). But irrational use of antibiotics has led to emergence of strains of microbes resistant to even the highest synthetic antibiotics, to what some authors refer to as the "welcome back to the pre-penicillin era" (4).

Antimicrobial resistance may be as a result of several factors like unregulated availability of drugs, procurement of over the counter (OTC) antibiotics, knowledge and experience of physicians, drug history of the patient, self medication etc (5). As a result of this several multidrug resistant infections are reported in literature (6). Evidence in literature suggests rampant misuse of antibiotics by patients and physicians alike.

Controlling the misuse of antibiotics in order to prevent development of resistance can be done using certain strategies like health care provider education, feedback facilities for patients and physicians, ban or restrictions in easy availability of certain OTC antibiotics without prescription and rational use (7). Students at both undergraduate and postgraduate levels can play a pivotal role in reducing the inappropriate usage of antibiotics, which can explain why there are a number of surveys and studies focussed on this subgroup throughout the published literature (8,9). Antimicrobial stewardship programmes that are institution based can also help responsible prescription of antibiotics (1,10).

Young physicians should be given more education during their years of training for appropriate prescribing of antibiotic and other antimicrobial drugs. To bring about a change, it is important to intervene at an early stage of their training. To plan an educational seminar, it is important to understand and assess the existing or baseline KAP of the target population using a sample population. Based on this inspiration we aim to understand the knowledge, attitude and practices regarding antibiotic resistance amongst postgraduates of various dental specialities which could be used as a threshold for development of an institution based antibiotic stewardship programme and effective measures to prevent antibiotic misuse. These kinds of surveys are important in order to develop a general perception about the information gap as well as tailor-made educational interventions in the form of seminars with prime focus on this information deficit.

MATERIALS AND METHODS

The survey constituted 18 close ended questions distributed via a self administered online KAP survey tool, carried out amongst 100 randomly selected postgraduate students of various dental specialities in our institution for a period of three months from October 2019 to December 2019. Simple random sampling method was used to shortlist participants from the directory of admissions for post graduates of our institution. This randomization avoided the bias of selecting the same individual twice that could affect the results negatively. Participants could submit responses to the survey only once using the online platform, which also avoided bias. Relevant demographic data was obtained from the hospital's admissions directory. The questionnaire was designed to include demographic information of the participants for the purpose of cross verification of de-

tails such as name, age, gender and email address. Along with questions based on frequency of antibiotic usage, resistance and interest of participants to attend educational seminars as a part of continuing education. The questionnaire was modified from those used earlier by authors which were relevant to establish the knowledge, attitude and practices of antibiotic prescription and resistance amongst the participants of our survey. Prior to administration of this survey to the sample population, the design, content, and context of the questionnaire was validated by five internal experts in the subject for relevance and reproducibility. Modifications were done based on their expert opinion. Informed consent was obtained to use this data for the purpose of research.

A series of questions to assess the attitude of participants regarding antibiotic resistance was studied using a 5 - point Likert scale, with responses ranging from "strongly agree" to "strongly disagree". Self reported practices and beliefs were also assessed using yes/no responses. The final questionnaire consisted of questions on the knowledge of the participants being tested using close-ended questions on prescription of specific types of antibiotics in minor oral surgical procedures and duration of prescription. The responses were collected online. The data was analysed and tabulated using SPSS version 20 for frequency distribution of responses amongst the selected sample population.

RESULTS

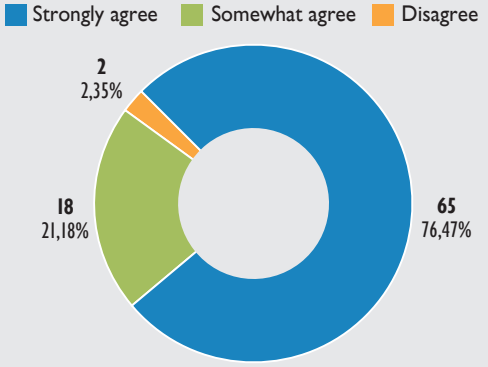
The response rate for our survey was 85% out of the 100 participants included in the study. The remaining 15% post graduates either did not respond or submitted incomplete responses and were removed from the study for the purpose of reducing bias.76.47% participants agreed that antibiotic resistance is a major public health burden in India and globally. Participants who had never attended seminars on antibiotic resistance were 82.35% and 89.41% were willing to attend seminars.

DISCUSSION

To assess the attitude of participants towards antibiotic resistance, a set of four questions were used, which included questions addressing antibiotic resistance as a global and Indian public health care problem. 76.47% (n=65) participants agreed strongly, 21.18% (n=18) participants agreed somewhat and 2.35% (n=2) participants disagreed that antibiotic resistance is a serious global health care issue (Graph 1). These results are similar to the worldwide trend, where practitioners from different parts of the world believe antibiotic resistance to be a concern at a global level (11–13). We also asked participants if they believed antibiotic resistance is a major public health care issue in India, to which 76.47% (n=65) participants agreed strongly and 23.53% (n=20)

Graph 1

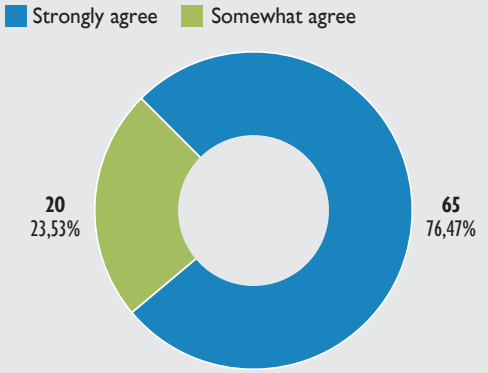
Do you think antibiotic resistance is a serious public health issue worldwide?



Pie chart showing attitude of post graduates in relation to antibiotic resistance being a major public health care issue worldwide.

Graph 2

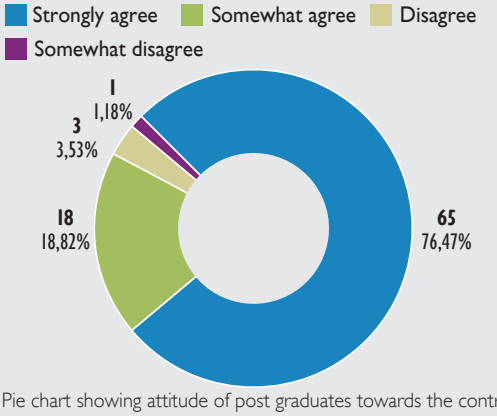
Do you think antibiotic resistance is a serious public health issue in India?



Pie chart showing attitude of post graduates in relation to antibiotic resistance being a major public health care issue in India.

Graph 3

Do you think injudicious use of antibiotics contribute significant towards development of super infections?



Pie chart showing attitude of post graduates towards the contribution of injudicious use of antibiotics towards development of superinfections.

participants somewhat (Graph 2). Surveys conducted in medical colleges in India also agree with our results (13) where participants have agreed to a need for an antimicrobial stewardship programme at the institutional level. We asked participants if injudicious use of antibiotics contributed towards development of superinfections. 76.47% (n=65) participants agreed strongly, 18.82% (n=16) participants agreed somewhat, 3.53% (n=3) disagreed and 1.18% (n=1) participants somewhat disagreed that antimicrobial resistance can be caused by their injudicious use (Graph 3). This disparity is reflective of the gap in education amongst various post graduate students in different dental specialities. It is clearly established in the literature that antimicrobial resistance is a direct result of mutation of the microbes due to injudicious, unsupervised and repeated use of antibiotics by individuals (5).

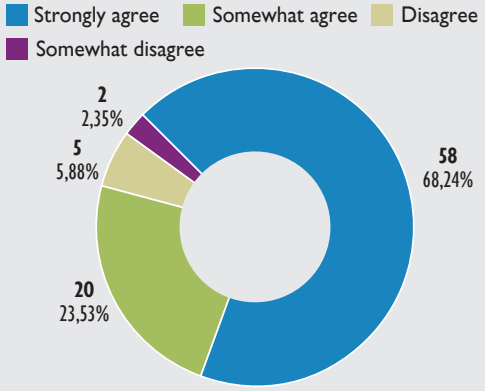
Upon asking the post graduates if skipping doses of antibiotics had any effect towards development of antibiotic resistance, 68.24% (n=58) participants agreed strongly while 23.53% (n=20) participants agreed somewhat, 5.88% (n=5) disagreed and 2.35% (n=2) participants somewhat disagreed that antibiotic resistance can be caused by an inadequate dosage or incomplete courses of antibiotics (Graph 4). This result is indicative that the majority of post graduates are aware of the adverse effects of incomplete antibiotic courses or dosage skipping in development of antibiotic resistance. Amongst the various studies conducted using a sample population of medical or non medical students, there is an incomplete knowledge and perception of antimicrobial resistance (14).

Graph 5 shows 51.76% post graduates prescribe antibiotics after all minor oral surgical procedures while 48.24% participants do not prescribe antibiotics after all minor oral surgical procedures. There are various studies advocating the need to limit usage of antibiotics in cases of dental extractions of non infectious and infectious causes as it is believed that once the nidus of infection is removed, the immune response resolves the remaining infection in surrounding tissues (15). Even in cases of orthognathic surgery, which is a major surgical procedure, there are studies advocating limiting use of antibiotics in patients who are young and not immunocompromised (16,17). According to our clinical experience and even studies available in literature in cases of therapeutic extraction of uninfected premolars and molars, antibiotic prescription can be avoided . It is, however, reported in some studies that patients taking antibiotic prophylaxis post removal of extracted third molars had fewer complications (18). There is a general consensus that patients' general and local health conditions be considered before antibiotic prescription (19).

Graph 6 shows the practice amongst post graduates towards taking a detailed drug history of patients under-

Graph 4

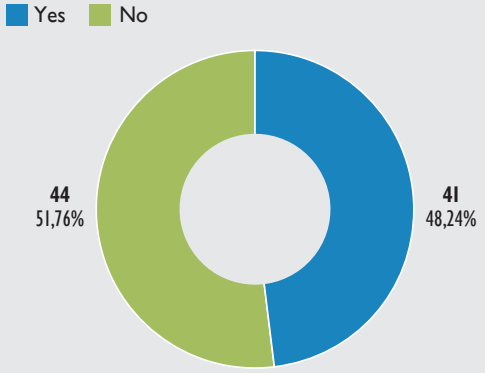
Do you think skipping doses of prescribed antibiotics contributes significantly towards development of antibiotic resistance?



Pie chart showing attitude of post graduates towards the contribution of skipping dosage of antibiotics towards development of antibiotic resistance.

Graph 5

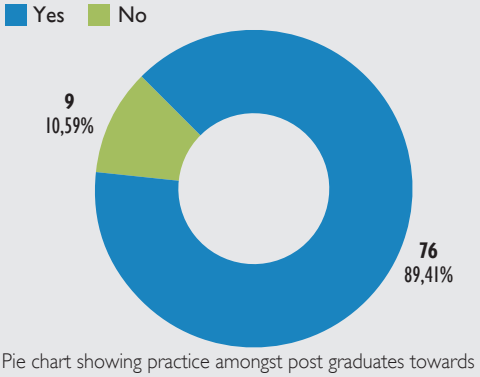
Do you prescribe antibiotics for all patients undergoing minor oral surgical procedures?



Pie chart showing practice of post graduates towards prescribing antibiotics to patients undergoing minor oral surgical procedures.

Graph 6

Do you take a detailed drug history of all patients that visit your practice for extraction?



Pie chart showing practice amongst post graduates towards taking a detailed drug history of patients undergoing extraction of teeth.

going extraction of teeth. 89.41% (n=76) participants responded positively to taking a detailed drug history while 10.59% (n=9) did not take a detailed drug history of patients before extraction of teeth. Drug history is important in order to limit injudicious usage of antibiotics. Most cases of extractions as a result of infection reporting to our center already have antibiotics prescribed, either by a practitioner or a pharmacist. In such cases, it is relevant to know the drug history to avoid misuse of antibiotics and decide the appropriate course. 68.24% (n=58) participants have never treated a case of antibiotic resistance in their years of practice till now while 31.76% (n=27) participants have treated cases of antibiotic resistance in our institution (Graph 7). Though the number of cases of antimicrobial resistance are relatively low in our institution, they are still being encountered by our post graduates.

Graph 8 shows that 61.18% (n=52) participants believe that antibiotic sensitivity plays an important role in treatment of infectious minor oral surgical cases while 38.82% (n=33) do not. Empirical antibiotic therapy is not advocated in the age of increasing cases of refractory infections (20,21). It is important to perform antibiotic sensitivity tests in infectious and known drug resistant cases (22). Ludwig's angina being life threatening is one of the conditions in maxillofacial surgery for which empirical treatment is advocated till a definitive antibiotic sensitivity testing (AST) is obtained (20).

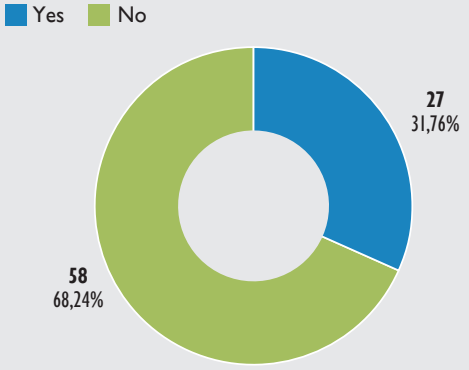
71.76% (n=61) participants prescribed broad spectrum antibiotics whereas 28.24% (n=24) participants prescribed narrow spectrum antibiotics in their daily practice after minor oral surgical procedures (Graph 9). It is however observed that broad spectrum antibiotics are responsible for destruction of commensals of gut and oral cavity, which leads to various complications post operatively like superadded candidal infections, diarrhea, etc (23). Therefore wherever possible narrow spectrum antibiotics should be used to treat odontogenic infections (24–26).

The course of antibiotics after surgical procedures has always been controversial with various studies advocating different numbers of days ranging from 3 to 7 (27–29). In our survey, 55.29% (n=47) of participants prescribed antibiotics for a maximum of 3 days, 42.35% (n=36) for a period of 5 days and 2.35% (n=2) prescribed antibiotics for a period of 7 days postoperatively after minor oral surgical procedures (Graph 10).

In our survey, 29.41% respondents (n=25) would prescribe first generation cephalosporins, 27.06% (n=23) clindamycin, 25.88% (n=22) azithromycin, 11.76% (n=10) doxycycline and 5.88% (n=5) norfloxacin, when asked their choice of drugs if patient is allergic to penicillin groups of drugs (Graph 11). Cephalosporins having a similar mechanism of action as penicillin, had been assumed to mimic them and have cross-reactivity with

Graph 7

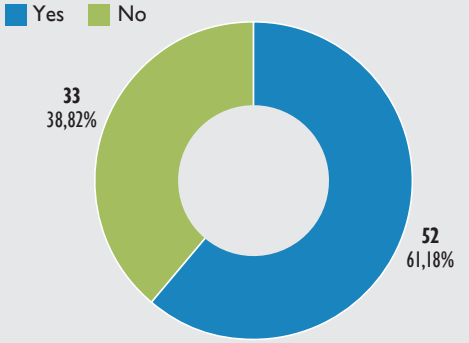
Have you ever treated a case of antibiotics resistance in your practice?



Pie chart showing practice of participants towards treatment of antibiotic resistance cases in their practice.

Graph 8

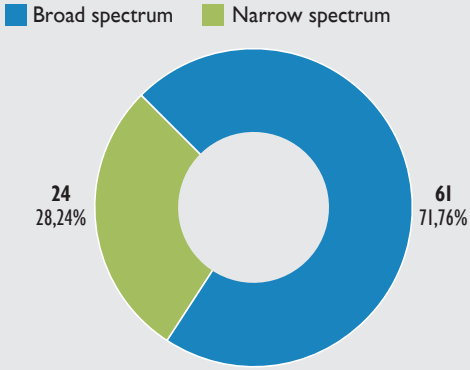
Do you think antibiotic sensitivity testing is an important step in treatment of an infectious minor oral surgical case?



Pie chart showing practice of participants' use of antibiotic sensitivity tests in treatment of infectious minor oral surgical cases.

Graph 9

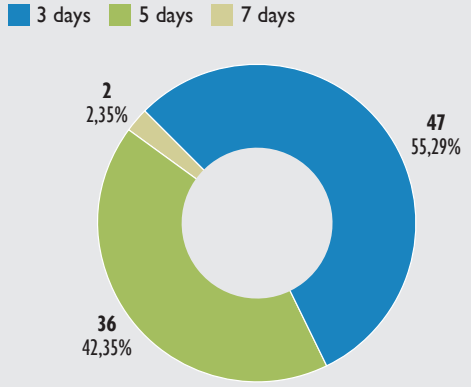
Which category of antibiotics do you prescribe after minor oral surgical procedures?



Pie chart showing knowledge of participants on the use of types of antibiotics after minor oral surgical procedures.

Graph 10

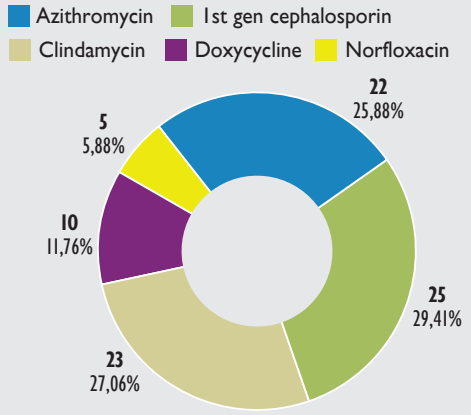
What is your choice of course of antibiotics prescription after minor oral surgical procedures?



Pie chart showing knowledge of participants on the number of days in the course of use of antibiotics after minor oral surgical procedures.

Graph 11

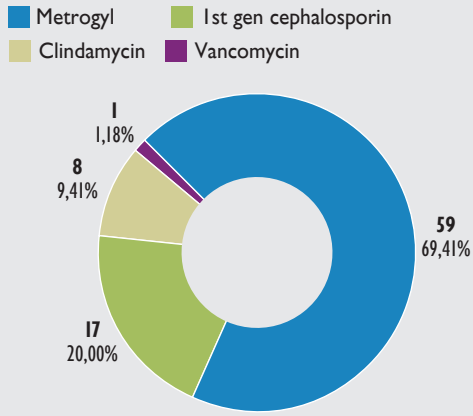
If your patient is allergic to penicillin, which antibiotic would you prescribe instead?



Pie chart showing knowledge of participants on the use of specific antibiotics after minor oral surgical procedures, if patients are allergic to penicillin groups of drugs.

Graph 12

Which narrow spectrum antibiotics do you prefer after a minor oral surgical procedure?



Pie chart showing knowledge of participants on the use of specific narrow spectrum antibiotics after minor oral surgical procedures.

penicillin. Thereby their usage in penicillin allergy has been contradictory. In a retrospective study on 513 patients by Beltran RJ, et al, this myth was disproved(30). Thus, proving cephalosporins can be a safe alternative to penicillin . Hence, the first line of drugs to be considered for use in patients diagnosed with a penicillin allergy are alternative beta lactams like cephalosporins, carbapenems and monobactam groups of drugs after a skin allergy test. 69.41% (n=59) participants reported prescribing metronidazole, 20% (n=17) first generation cephalosporins, 9.41% (n=8) clindamycin and 1.18% (n=1) vancomycin as narrow spectrum antibiotics after minor oral surgical procedures (Graph 12).

A high percentage of participants 82.35% (n=70) had never attended any continuing medical or continuing dental education programme regarding antibiotics, so it is safe to assume their knowledge about antibiotics may be outdated. 89.41% (n=76) participants agreed to the need for seminars on current therapy in antibiotics. Only 17.65% (n=15) participants had attended a seminar on antibiotic resistance previously and 10.59% (n=9) did not want to attend a seminar on antibiotic resistance (Graph 13,14).

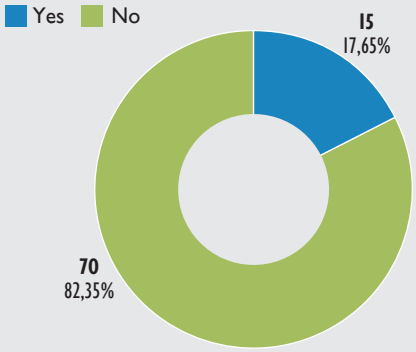
Despite the limitations of being a survey of low sample size within a single institution, this survey provided an important insight into the knowledge, attitude and practice of post graduates regarding antibiotic resistance and gave us a direction forward to develop programmes concentrating on recent advances in antimicrobial therapy for infections of the maxillofacial region.

CONCLUSIONS

Our survey showed few mis-prescriptions of antibiotics in cases of resistance to penicillin groups of drugs and use of broad versus narrow spectrum antibiotics.Thereby highlighting a need for stringent institution based antibiotic stewardship programs to overlook the misuse of antibiotics at a grass root level. However, the overall awareness and prescription protocols were appropriate, thereby concluding that post graduates had a good knowledge of antibiotics, their use and risks involved.

Graph 13

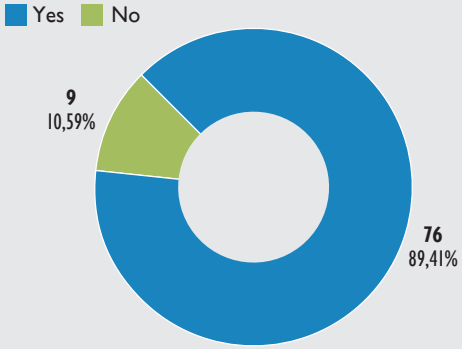
Have you ever attended an antibiotic resistance CDE/CME?



Pie chart showing the prevalence of attending seminars on antibiotic resistance amongst post graduates of various specialities of dentistry.

Graph 14

Would you like to attend a CME/CDE on antibiotics resistance awarenees?



Pie chart showing the willingness amongst post graduates of various dental specialities in attending seminars on antibiotic resistance.

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