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RESEARCH ARTICLE

ANTIMICROBIAL RESISTANCE: IS IT IN THE MIND OF HEALTH PROFESSIONALS? – A CROSS SECTIONAL STUDY

***Dr. Anuridhi Choudhary, Dr. Akansha Budakoti, Dr. Manmeet Kour and Dr. Kirti Raina**

I.T.S Centre for Dental Studies and Research, Ghaziabad

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ABSTRACT

Introduction: Antibiotics are among the commonly prescribed drug in the hospital settings. Dentists prescribe antibiotics therapeutically and prophylactically to manage dental and oral infections. Antimicrobial resistance (AMR) was recently stated by the World Health Organization to be one of the greatest threats to human health. Rate of antimicrobial resistance are growing worldwide, threatening public health and increasing morbidity, mortality and healthcare costs. Thus there is need to understand the perception, knowledge and attitude about antibiotics misuse, antibiotics resistance and its causes amongst the budding doctors and various specialists. Aim - With this background the aim of the study is to assess the perception, knowledge and attitude about antibiotics misuse, antibiotics resistance and its causes amongst the budding doctors and various specialists. **Method:** A cross-sectional survey was conducted using a self-administered questionnaire, amongst oral health care professionals, on the correct knowledge, attitude and practice about the usage of antibiotics. **Result:** When the results were compared it was found that the P-value was statistically significant when the practice and attitude of the dental professionals was compared whereas it was statistically not significant for the knowledge of dental professionals. **Conclusion:** We found poor attitude, knowledge and practice regarding antimicrobial use in dentistry thereby increasing the risk of antimicrobial resistance.

Key words: Antibiotic, Antimicrobial Resistance, Attitude, Knowledge, Practice.

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INTRODUCTION

Antibiotics are widely used for prophylactic and therapeutic purposes to deal with diagnosed as well as suspected infections (Gowri, 2015). In dentistry, antibiotics are prescribed for managing various oral conditions, mainly orofacial infections (Dar-Odeh et al., 2010). Antibiotics should be prescribed wisely after thorough study of the medical condition; else it may even present a risk to the patient (Longmana, 2000). Rate of antimicrobial resistance is growing worldwide, which is becoming a threat to the public health and also increasing the morbidity, mortality and healthcare costs (Teixeira Rodrigues, 2015). The misuse and abuse of antibiotic is the dominant factor behind the increase in resistance at a population and individual level (Gonzalez-Gonzalez et al., 2015). The results of ecological studies have shown that the overuse of antibiotics at the population leads to resistance (Marra, 2016). It is a known phenomenon across the globe, including India. But the challenges that surround the restrictive antibiotic resistance, particularly in India, are many and multifaceted (Global Antibiotic Resistance Partnership, 2011).

Corresponding author: **Dr. Anuridhi Choudhary,**
I.T.S Centre for Dental Studies and Research, Ghaziabad.

Due to rising global problem of antibitotic resistance various efforts are being undertaken to prevent resistance. The WHO theme on world Health Day 2011 has stated "Combat Antimicrobial Resistance: No Action Today, No Cure Tomorrow (Gowri, 2015). The WHO Global Strategy defines the suitable use of antimicrobials as the cost-effective use of antimicrobials which maximizes clinical therapeutic effect while minimizing both drug-related toxicity and the development of antimicrobial resistance (WHO, 2001). It is the duty of every dentist to arrive at the correct diagnosis in order to avoid indispensible use of antibiotics (Gowri, 2015). As the worldwide problem of antimicrobial resistance and the threat to public health is increasing, there is a need to rationalize the prescribing of antibiotics (Palmer, 2001). The reason for injudicious use of antibiotics are lack of knowledge and careless attitude of physicians. Hence, this study sought to assess the practice, attitude and knowledge of antimicrobial drugs use and its causes amongst the prescribing dentists.

MATERIALS AND METHODS

A cross sectional survey using a structured validated questionnaire was done to assess the knowledge, attitude, and practice of antibiotic use. All the dental practitioners who were willing to participate in the study were included and were confirmed that their identity won't be disclosed.

The study was conducted after obtaining approval from the Institutional Ethics Committee. A total of 325 participants comprising of practicing dentists, postgraduate students and interns participated in the study. The questionnaire included 9 questions to assess the practice of antimicrobial drug use and 18 questions to assess the attitude and knowledge of antimicrobial drug use. The questionnaire used a simple format of multiple choice questions and the participants were requested to tick the relevant choices. They were given 15 minutes to fill the questionnaire without consultation with anyone. The first part of the questionnaire investigated the practice to assess the situations where antibiotics are prescribed, the second part assessed the clinical conditions/ situations in which the antibiotics are prescribed and the third part assessed the pharmacological and clinical knowledge of antibiotics and their use. Statistical analysis was done by using SPSS version 19.

RESULTS

The practice, attitude and knowledge of dental professionals were assessed of 325 participants, out of which, 82 were dental practitioners, 72 were interns and 171 were post-graduates. Most of the participants were prescribing antibiotics when patient did not want or could not afford a test. Out of the three groups the 74.3% of post graduates were doing antibiotic abuse by prescribing antibiotics in these conditions. Similarly, 86.5% of post graduates, 73.6% of interns and 64.2% of practitioners were prescribing antibiotics just for speedy recovery of their patients. Antibiotics were not prescribed by 97.6% practitioners, 93.6% post graduates and 87.4% interns when patients insisted on it. However, there was variation in results when the participants were asked whether they were prescribing an antibiotic in situations in which it is impossible for them to conduct a systematic follow-up of the patient as more than 50% of interns and graduates were prescribing antibiotic in such situations.

In case of doubt as to whether a disease is of bacterial etiology or not; 55.65% interns, 47.4% post graduates and 34.1% practitioners, thought that it is preferable to prescribe an antibiotic to be on a safer side. 73.6% of interns and 81.9% of postgraduates think that is preferable to use a wide spectrum antibiotic to ensure that the patient is cured of an infection. Most common antibiotic prescribed by the participants was Amoxicillin followed by Metronidazole and Augmentin. As far as the cause of antibiotic resistance is concerned, 78.2% of participants believed that self-medication is the main cause of appearance of antibiotic resistance whereas 28.8% of all the participants thought misuse by the clinicians to be the main cause of antimicrobial resistance. Almost all the participants strongly agreed that dispensing antibiotics without a prescription should be more closely controlled. The results in three groups regarding prescription of antibiotics for different clinical entities were also observed. 87.8% of practitioners, 86.1% of interns and 87.1% of post graduates were prescribing antibiotics for acute periapical abscess; 70.7% of practitioners, 87.5% of interns and 83.0% of post graduates were prescribing antibiotics for chronic periapical abscess; practitioners (81.7% and 63.4%), interns (79.2% and 80.6%) and post graduates (88.3% and 77.1%) were prescribing antibiotics for acute periodontal abscess and chronic periodontal abscess respectively. 52.4% of practitioners were not prescribing antibiotics for extraction whereas on the contrary, 87.5% of interns and 82.5% of post graduates were prescribing antibiotics for extraction; practitioners (91.5%), interns (95.8%) and post graduates (95.9%) were prescribing antibiotics for surgical extraction. 68.9 % of participants were not prescribing antibiotics for chronic generalized periodontitis. Practitioners (79.3%), Interns and post graduates (88.9%) were prescribing antibiotics for aggressive periodontitis. Around 58.5% of practitioners, 79.2% of interns and 78.9% of post graduates were prescribing antibiotics for dental trauma. Practitioners (98.8%), interns (91.7%) and post graduates (94.7%) strongly agreed in prescribing antibiotics for cellulitis. When the knowledge was evaluated 63.4% of participants believed that the methicillin resistant staphylococcus aureus is also resistant to cephalosporins (practitioners- 72%, post graduates- 62.6% and interns- 55.6%). 84.6% of participants said that the metronidazole is indicated for anaerobes and 61.5% of participants were not prescribing gentamycin to patients with renal failure. 91.4% of participants believed that combination therapy is more effective in treating infections. 54.8% of the participants were prescribing antibiotics for 3 days, 32.6% for 5 days followed by 11.4% for 7 days and 1.2% for more than 7 days. The percentage mean error in the practice of dental professional, interns and post graduates was 30.09 ± 2.02, 47.92 ± 2.79 and 47.14 ± 1.49 respectively. The percentage mean error in the attitude of dental professional, interns and post graduates was 44.02 ± 1.90, 53.47 ± 2.79 and 47.14 ± 1.49 respectively. The percentage mean error in the knowledge of dental professional, interns and post graduates was 50.60 ± 2.71, 49.53 ± 1.77 and 44.73 ± 1.21 respectively. When the results were compared it was found that the P-value was statistically significant when the practice and attitude of the dental professionals was compared whereas it was statistically not significant for the knowledge of dental professionals.

DISCUSSION

Antibiotic resistance has posed a worldwide problem by becoming a threat to public health. Evidence suggest that inappropriate antibiotic prescribing practices by the dental practitioners has been on the rise from past few years which could lead to the issue of antibiotic resistance (Supreetha, 2016). Assessing knowledge and attitude regarding antibiotic prescribing is an essential step to keep a check on the growing problem of antimicrobial resistance worldwide. Several scales have been developed to measure the factors associated with antibiotic misuse but most of them have not been fully validated (Teixeira Rodrigues, 2016). The results in present study indicate that fear of complications, complacency with patients, and insufficient knowledge are the factors related with the prescribing of antibiotics by general practitioners whereas in a study by Palmer et al in 2000, lack of time and uncertainties of diagnosis were cited as reasons for antibiotic prescribing (Palmer, 2000). In a study was by Rodrigues AT et al in 2016, to assess physicians attitudes and knowledge of antibiotic prescribing, antibiotic use and resistance, and the usefulness of different sources of knowledge used in clinical practice were assessed and intraclass correlation coefficients (ICCs) for primary-care and hospital-care physicians were evaluated. The p- value was < 0.001 amongst the two groups when they were asked whether in case of doubt, it is preferable to use a wide-spectrum antibiotic to ensure that the patient is cured of an infection. The similar results were found by Gonzalez C.G et al in 2015 (Gonzalez-Gonzalez et al., 2015). In the present study, majority of the participants believed self-medication to be the main cause of antibiotic resistance.

	DENTAL PRACTITIONERS (n=82)	INTERNS (n=72)	POST-GRADUATES (n=171)	P-VALUE
PRACTICE	30.09 ± 2.02	47.92 ± 2.79	47.14 ± 1.49	< 0.001*
ATTITUDE	44.02 ± 1.90	53.47 ± 1.42	47.88 ± 1.01	< 0.001*
KNOWLEDGE	50.60 ± 2.71	49.53 ± 1.77	44.73 ± 1.21	< 0.03

Similar results were reported by Grigoryan et al in 2006, who found that self-medication was the main factor involved in the development of antibiotic resistance (Larissa Grigoryan, 2006). According to Balamurugan E et al in 2011 and Lal V et al in 2007 the prevalence of self-medication among those who had suffered some illness episode in the last 1 month was 71% and 31.3% in Puducherry and urban Delhi respectively (Kalaiselvi Selvaraj, 2014). In a study by Vessal et al. in 2011, more than 40% of dentists responding to a questionnaire would inappropriately prescribe antibiotics in conditions for which antibiotics are not required according to good practice guidelines, and in which treatment via local measures would be adequate. The present study evaluated the knowledge and the attitude in prescribing the antibiotics for odontogenic infections. A considerable percentage of dental pain is a result of acute and chronic infections of pulpal origin, which necessitates operative intervention, rather than antibiotics. Infection, malaise, temperature elevation and lymphadenitis are the indications for antibiotics use in acute dentoalveolar infections (Palmer, 2000). Though the antibiotics are not indicated for acute pulpitis (Palmer, 2000) but in present study 87.1 % of the antibiotics were prescribed in the patients having acute periapical abscess. In 2013, Fedorowicz et al. conducted a systematic review which concluded that a pulpectomy or incision and drainage is indicated to drain the periapical abscess and no added benefit was observed when the antibiotics were used in such cases to manage pain or infection (Marra, 2016). Antibiotics may be prescribed to patients who present with acute necrotising ulcerative gingivitis; severe pericoronitis, rapidly progressing diffuse swelling involving fascial spaces, severe trismus (<20mm) and jaw osteomyelitis (Antibiotic Resistance).

Facial cellulitis that may or may not be associated with dysphagia is a serious disease that should be treated by antibiotics promptly because of the possibility of infection spread via lymph and blood circulation with development of septicemia (Dar-Odeh, 2010). Another aspect of antibiotic resistance is prescribing based on non-clinical factors. Patient's expectation of an antibiotic prescription convenience and demand necessitated by the social background of the patients are considered as the main unscientific reasons for antibiotic prescription (Dar-Odeh, 2010). In the present study, 63.4% dental professionals knew that methicillin resistant Staphylococcus aureus is also resistant to cephalosporins. In a study by Jacobson, J. J. et al in 1997, staphylococci from the oral cavity were all found to be susceptible to cephalosporins whereas Rossi et al in 1995 reported the presence of methicillin-resistant S. aureus in the oral cavity (Sweeney, 2014). In our study, Amoxicillin was most commonly prescribed antibiotic followed by Metronidazole and Augmentin. This explains that the majority of the participants used particular antibiotics to treat specific infections. Although 91.4% of the participants preferred broad spectrum antibiotics instead of narrow spectrum which is in contraindication to the above mentioned result which stated Amoxicillin was most commonly prescribed. This is similar to the results of a previous study by Palmer et al. who reported 78% of the prescriptions issued by a large population of National Health Service GDPs in England were of amoxicillin and metronidazole. Lewis et al have shown that only 5% of the main isolates from dental abscesses are resistant to amoxicillin/clavulinic acid (Dar-Odeh, 2010). The duration of prescribing antibiotics has never been described precisely. In our study, 54.8% of dental professionals were prescribing antibiotics for 3 days, followed by 32.6% for 7 days and 11.45% for 5 days. A survey in Canada found that the average duration of antibiotic use prescribed by dentists is 6.92 days. Another survey in the USA found that endodontists prescribe antibiotic use for an average of 7.58 days (Dar-Odeh et al., 2010). The most effective use of prophylactic antibiotics is in short term, high dosage regimens that are active against the common pathogens (Longmana et al., 2000). However, in recent years, short courses have been given more attention. According to Rubenstein short-course antibiotic therapy requires those antibiotics which have certain characteristics, such as: rapid onset of action, bactericidal activity, lack of propensity to induce resistant mutants, easy penetrability into tissues, activity against non-dividing bacteria, not being affected by adverse infection conditions (low pH, anaerobiasis, presence of pus, etc.), administration at an optimal dose, and optimal dosing regimen (Rubinstein, 2007). WHO guidelines state that antibiotics such as amoxicillin 500 mg should be prescribed twice daily for at least 5 days and metronidazole 500-750 mg three times daily for 7 days (WHO, 1979). According to the British National Formulary (Ahmed-Jushuf et al., 2009), co-amoxiclav 250 mg every 8 hours should be prescribed, which is doubled for severe dental infections or dental infection not responding to first-line antibacterial treatment and 125 mg every 8 hours for children up to 10 years which is doubled in severe infections (Manasa, 2013). The relatively relaxed regulation on antibiotics without prescription worsens the scenario. In addition to the proper dosing regimens and professionally responsible prescribing practice, the general public needs to be educated about the importance of restricting the use of antibiotics to only cases of severe infection (Supreetha, 2016). Indian Network for Surveillance of AMR which was started in 2009 which includes policy makers and planners, Pharma industry, Pharmacists and dispensers, Physicians and prescribers, Public patient/civil society and media (Ghafur). Dental patients not only pressurize their dentists to get an antibiotic prescription, they also self-medicate, which is found alarmingly high in some developing countries (Supreetha, 2016).

Conclusion

It can be concluded that increase in the number of antimicrobial resistance cases in dentistry can be attributed to the lack of knowledge or practice and careless attitude of the prescriber. Practitioners need to be educated well about the fundamentals of antibiotics and should prescribe these drugs with caution with in the scope of recommended guidelines.

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