Research Article

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Evaluation of Antibiotic Prescription Pattern Among General Dental Practitioners and Specialists for Mandibular Third Molars

Priyanka Nath[1*] KV Ramana Reddy[2] Sukhvinder Bindra[3] G Madhusudhan Rao[4] Sadam Srinivasa Rao[5] Md Ahtesham Aleem[6]

[1]Senior Lecturer, Department of Oral and Maxillofacial Surgery, Army College of Dental Sciences, Secunderabad, Telangana, India.
[2]Professor and Head, Department of Oral and Maxillofacial Surgery, Army College of Dental Sciences, Secunderabad, Telangana, India.
[3]Reader, Department of Oral and Maxillofacial Surgery, Army College of Dental Sciences, Secunderabad, Telangana, India.
[4]Reader, Department of Oral and Maxillofacial Surgery, Kamineni institute of dental Sciences, Narketpalli, Telangana, India.
[5]Professor, Department of Oral and Maxillofacial Surgery, Army College of Dental Sciences, Secunderabad, Telangana, India.
[6]Private Consultant, Department of Oral and Maxillofacial Surgery, Life Prime Dental Hospital. Hyderabad, Telangana, India.

ABSTRACT

Background: Background: Prescription of antibiotics for third molar surgeries is a common practice by general dental practitioners and oral and maxillofacial surgeons, without any standard regimen.

Aims and Objectives: The present study was aimed to determine the knowledge of antibiotic usage and prescription by general dental practitioners and oral and maxillofacial surgeons for mandibular third molar surgeries and to rationalize prescribing to a defined standard.

Materials and Methods: The study consisted of 347 registered general dental practitioners and 303 oral and maxillofacial surgeons in and around Hyderabad. A structured questionnaire was designed and distributed to the dentists and filled forms were analyzed.

Results: It was found that general dental practitioners prescribe more antibiotics when compared to oral and maxillofacial surgeons for both healthy patients and patients with risk factors.

Conclusion: Prescription of antibiotics is not uniformly done and we suggest for formulation of proper guidelines and its strict implementation.

Keywords: Amoxycillin, dry socket, clindamycin, metronidazole, space infections.

INTRODUCTION

Prescribing antibiotics prior to and after dental surgical treatments to reduce post surgical complications is very commonly practiced by General Dental Practitioners (GDP's) and Oral and Maxillo Facial Surgeons (OMFS). It is always advised to use these antibiotics rationally[1]. Studies have shown that in approximately 1 to 5 % dental cases like removal of third molars, complications like bleeding, dry socket and space infections were noted[2].

Microbiological studies in these infections have shown that organisms were primarily streptococci and anaerobic gram positive cocci and gram negative rods[3]. Most common drugs prescribed by the dentists throughout the world are antibiotics (7 to 11%)[4]. Previously penicillin and metronidazole were given as main antibiotics after dental procedures, in recent times due to increased

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*Correspondence Dr. Priyanka Nath.
Department of Oral and Maxillofacial Surgery, Army College of Dental Sciences, Secunderabad, Telangana, India.
Email: sarasana190@gmail.com

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resistance to these organisms, amoxicillin with clavulanic acid is prescribed[5].

WHO considers resistance to antibiotics as the major peril to humans as most of the antibiotics prescribed in outpatient care were found to be needless and avoidable[6]. Various factors contribute to unwanted antibiotic treatment like improper diagnosis, incorrect dosage, wrong route of administration, patient demands and self prescription. This problem has to be avoided so as to prevent consequences like increased morbidity and mortality due to antibiotic resistance. But still this inappropriate prescribing of antibiotics and its consequence antibiotic resistance is not taken seriously worldwide especially in developing countries like us. It is immensely imperative to appraise outpatient (like dental therapies) antibiotic prescription patterns regularly and formulate a tough system in order to prevent this threat to human life[7]. Our study was carried out to find out antibiotic prescription patterns by general dental practitioners (GDP's) and oral and maxillofacial surgeons (OMFS) for mandibular third molar surgeries.

AIMS AND OBJECTIVES

1. To determine the knowledge of antibiotic usage and prescription among GDP's and OMFS for mandibular third molar surgeries.
2. To determine if the antibiotic prescription patterns were in accordance with current best practice.
3. To rationalize prescribing to a defined standard (with the avoidance where possibility of higher end antibiotics are used).

MATERIALS AND METHODS

The cross-sectional study sample consisted of 350 registered GDP's and 100 OMFS in and around Hyderabad. A structured questionnaire was designed and every participant was asked to specify the antibiotic type, dose, treatment duration and alternate antibiotic in case of allergy to the first antibiotic. The questionnaire was anonymous; the only personal data required was age, years of professional practice, and the city or location of practice.

Criteria for the Selection of Sample:

The subjects were selected for the present study based on the following criteria.

Inclusion criteria:

1. Registered GDP's in and around Hyderabad.
2. Registered OMFS in and around Hyderabad.

Exclusion criteria

1. Undergraduate students.
2. Internees.
3. Postgraduate students.

RESULTS

1. The total number of respondents constituted 74% males and 26% females.
2. 76% were private dental practitioners and 24% were working in colleges.
3. 63% had 5-10 years experience, 15% had 10-15 years experience and 22% had less than 5 years experience.

Prescription of Antibiotics Preoperatively (Fig.1)**:**

A. For extraction of non infected third molars: 45% GDP's and 17% OMFS prescribe antibiotics.

B. For extraction of infected third molars: 96% GDP's and 67% OMFS prescribe antibiotics.

Preferred Antibiotic and dosage (Fig.2)**:**

The common antibiotics administered preoperatively were

1. Amoxicillin 500 mg (by 34% OMFS and 29% GDP's).
2. Amoxicillin with clavulinic acid 625mg (by 16% OMFS and 22% GDP's).
3. Amoxicillin 500mg with metrogyl 400mg (by 41% OMFS and 7% GDP's).
4. Ofloxacin 400mg (by 9% OMFS and 32% GDP's).
5. Cephalexin 500mg (by 10% GDP's).

Route of administration: All the respondents preferred the oral route of preoperative antibiotic administration.

Duration of preoperative antibiotics:

1. 48% GDP's and 68% OMFS prescribed one day preoperatively.
2. 32% GDP's and 16% OMFS prescribed two days preoperatively.
3. 20% GDP's and 16% OMFS prescribed three days preoperatively.

Prescription of Antibiotic Postoperatively (Fig.3)**:**

For non infected third molar extractions: 58% of GDP's and 34% of OMFS advise post operative antibiotics for non infected third molar extractions in healthy patients.

For infected third molar extractions: All the respondents (100%) prescribe post operative antibiotics for infected third molar extractions.

Preferred Antibiotic and dosage postoperatively (Fig. 4)

The common antibiotics administered were

1. Amoxicillin 500 mg (by 22% OMFS and none (0%) of GDP's).
2. Amoxicillin with Clavulinic acid 625mg (by 21% OMFS and 22% GDP's).
3. Amoxicillin 500 mg with Metrogyl 400mg (by 40% OMFS and 37% GDP's).
4. Ofloxacin 400 mg (by 6% OMFS and 31% GDP's).
5. Cephalexin 500 mg (by 11% OMFS and 9% GDP's)
6. Ciprofloxacin 500 mg (by 1% GDP's and none of OMFS).

Duration of postoperative antibiotics:

1. 45% GDP's and 11% OMFS prescribed antibiotics for 3 days postoperatively.
2. 20% GDP's and 7% OMFS prescribed antibiotics for 4 days postoperatively.
3. 35% GDP's and 82% OMFS prescribed antibiotics for 5 days postoperatively.

Administration of antibiotics for forceps extraction in patients without risk factors (Fig 5)**:**

Preoperative antibiotics: 53% of total respondents, 70% of GDP's, 33% of total OMFS advise preoperative antibiotics.

Postoperative antibiotics: 90% of total respondents, all GDP's (100%) and 78% of OMFS advise preoperative antibiotics.

Administration of antibiotics for surgical extraction without risk factors

Preoperative antibiotics (Fig.6): 90% of total respondents, all GDP's (100%) and 78% of OMFS advise preoperative antibiotics.

Postoperative antibiotics: All the respondents (100%) advise post operative antibiotics in patients with and without risk factors for surgical extraction of non infected third molars.

Administration of prophylactic antibiotics in patients with prosthetic heart valves: All the respondents (100%) advise prophylactic antibiotics for extraction of third molars in a patients with prosthetic heart valves and preferred antibiotic was amoxicillin for 3-5 days.

DISCUSSION

Antibiotics are used to treat bacterial infections, but misuse or over use of them is causing a major health danger in individuals causing antibiotic resistance worldwide. Apart from infections many factors like prevalence of disease, cultural background, education background, cost factor, patient demand and preference etc play role in prescribing antibiotics. Various complications of indiscriminate use of antibiotics include development of bacterial resistance, secondary infections, toxic and allergic reactions and increase of cost to patients. Studies have been carried out in the past about prescription of antibiotics for third molars removal by GDP's. Keeping in view the ill effects of usage of antibiotics, this study was carried out to find about the knowledge of prescribing antibiotics among GDP's and OMFS in and around Hyderabad, Telangana state, especially after removal of mandibular third molars. We have selected mandibular third molars as these are the most common teeth causing pain and swelling and patients seek dentists advise[8].

In spite of prescribing antibiotics since many decades for third molar removal, studies have not been carried to find out to compare their usage by GDP's and OMFS. Still there is no consensus about the use of antibiotics for third molar

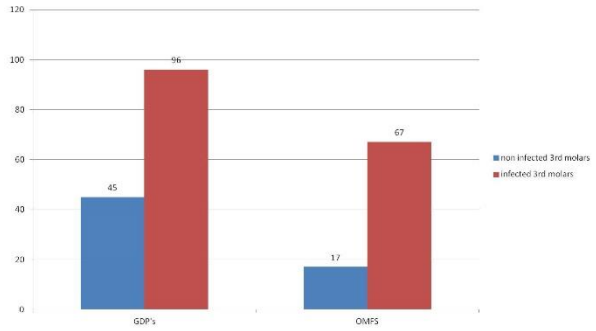

Fig 1: Prescription of Antibiotics Preoperatively (%).

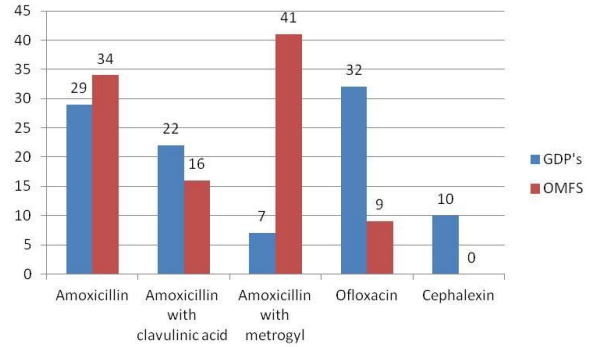

Fig 2: Preferred Antibiotic preoperatively (%).

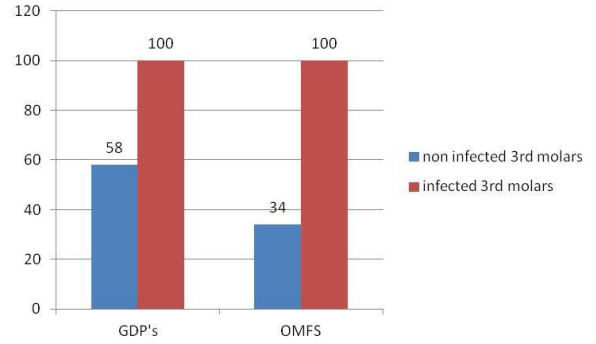

Fig 3: Prescription of Antibiotic Postoperatively (%).

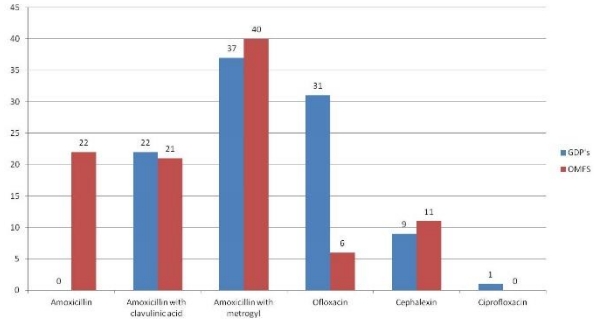

Fig 4: Preferred Antibiotic postoperatively (%).

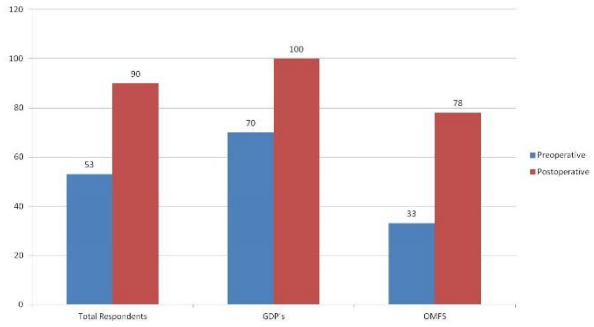

Fig 5: Administration of antibiotics for forceps extraction in patients without risk factors (%).

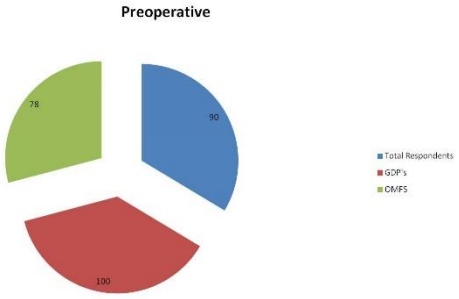

Fig 6: Administration of antibiotics for surgical extraction without risk factors preoperatively (%).

surgeries, whether their usage reduces or prevents postoperative complications[9].

In the present study, 45% of GDP's and 17% of OMFS prescribed preoperative antibiotics even in healthy patients for non infected third molars. This clearly indicates indiscriminate prescription of antibiotics in patients who are healthy. Our results coincide with studies done by WHO (2001) and European Parliament Directorate General for Internal Policies of the Union (2006). The reason why GDP's prescribe antibiotics more than OMFS may be due to lack of adequate knowledge about adverse effects of indiscriminate usage of antibiotics, which specialist OMFS may acquire during their post graduation studies. Hence we suggest for laying out comprehensive guidelines in prescribing antibiotics constituted by various medical and dental specialists and these guidelines should be made easily available to refer and strict laws should be made[10, 11].

Chuang SK et al suggested to assess the presence of risk factors in patients for planning treatment and prescribing antibiotics. They categorized risk factors as intrinsic factors like type

of extraction, degree of ostectomy and extrinsic factors like habits and systemic factors. In our study, 96% of GDP's prescribed preoperative antibiotics in patients with risk factors, whereas 67% of OMFS prescribed antibiotics in such patients. Our findings are in accordance with Chuang SK et al. They found that factors like preexisting infection or pathology, level of impaction caused postoperative inflammatory complications following third molar surgery and suggested to use antibiotics preoperatively in patients with risk factors. Whereas, others did not found significant differences in occurrence of postoperative complications among healthy patients and patients with risk factors[12-14].

Amoxycillin was found to be effective against flora that may cause postoperative infections. In the present study, 29% of GDP's and 34% of OMFS prescribe amoxicillin. However recent studies suggest that due to the increasing surfacing of β-lactamase producing bacteria, amoxycillin is becoming less effective in odontogenic infections. Hence β-lactamase inhibitors like clavulanic acid are added to. In our study, 22% of GDP's and 16% of OMFS prescribed amoxicillin combined with clavulinic acid etc. Our study suggests that GDP's usually prescribe antibiotics illogically may be due to lack of awareness about the pathogenesis and bacterial interrelationships resulting in post extraction infections[15].

Regarding duration of antibiotic administration, literature suggests that preoperatively a single dose orally is sufficient and it should not exceed 24 hours prior to the procedure, otherwise complications like bacterial resistance, drug reactions etc might take place. The present study reveal that most clinicians prescribe preoperative antibiotic orally for 1 to 3 days. Only 68% of OMFS and 48% of GDP's prescribe preoperative antibiotics 24 hours prior to the procedure as suggested by Siddiqia, J, Peterson LJ[2, 16].

Peterson suggests taking the following factors in to consideration before administering antibiotics

1. Surgical procedure must have a considerable risk of infection.
2. Appropriate antibiotic for correct time (shortest possible) for the surgical procedure must be chosen.
3. Antibiotic level should be sufficiently high[2, 16].

Numerous reviews showed only 1% to 5.8% of postoperative complications after third molar surgeries. Hence, the customary administration of antibiotics post operatively for non infected teeth is debatable. In the present study, 58% of GDP's and 34% of OMFS prescribe antibiotics postoperatively after extracting a non infected third molar in a healthy patient. Bortoluzzi MC et al in their studies point out that oral antibiotic treatment after third molars removal did not showed any significant changes regarding wound healing, pain, or mouth opening, hence should not be recommended routinely. Our study results indicate the lack of proper knowledge among practioners regarding antibiotic prescription in third molar surgeries[6].

All the respondents prescribed antibiotics postoperatively after extracting third molars in patients with risk factors. This is in accordance with few studies. This might be due to the fact that antibiotic therapy in these risk patients may prevent infections postoperatively[5, 6].

Regarding duration of antibiotic prescription postoperatively, most of practitioners prescribed for 3-5 days, which is in accordance with British National Formulary (BNF). In contrast to non odontogenic infections, dental cases need postoperative antibiotic usage for lesser time (2-3 days) as we can either lessen or eliminate the source of infection by procedures like extraction, incision and drainage[17].

In the present study, amoxicillin 500 mg thrice daily for 5 days and metronidazole 400 mg thrice daily for 5 days were prescribed after the removal of mandibular third molars by 37% GDP's and 40% OMFS. This is in accordance with the antibiotic protocol suggested by Monaco G, Staffolani C et al. In recent times narrow spectrum drugs which are active only against causative pathogens are used such as anaerobicidal, metronidazole following third molar surgeries since anaerobes are considered to play a key role in dentoalveolar infections[18]. However, studies by

Happonen et al and Curran et al did not find any advantage in patients using penicillin and tinidazole when compared to those who used placebo tablets suggesting lack of clear justification for using regular antibiotics for third molar surgeries[19].

The second most common antibiotic prescribed was the combination of amoxicillin and clavulinic acid with 21% GDP's and 22% OMFS prescribing this drug, as recommended by the BNF. Moreover, studies have shown that this combination for 2-3 days was effective against the most commonly isolated oral pathogens in orofacial infections[20].

In this study apart from amoxicillin and its combinations, other higher end antibiotics like ofloxacin 400mg (by 6% OMFS and 31% GDP's), cephalexin 500mg (by 9% GDP's and 11% OMFS), ciprofloxacin 500 mg (by 1% GDP's) were prescribed. This can be due to lack of proper guidelines in prescribing specific antibiotics for specific infections thereby resulting in incorrect prescription. Studies have been done to formulate standard drugs for specific infections for appropriate duration. For dental infections amoxicillin is recommended in doses ranging from 250 mg to 500 mg, every 8 hours [18].

Studies have shown that postoperative complications following third molar surgeries depend on factors like duration of surgery, extractions needing osteoctomy, angulation of molars etc. Addy et al suggested for usage of antibiotics in only difficult extraction cases. In the present study, 70% of the GDP's and 33% of OMFS prescribed preoperative antibiotics for forceps extraction of third molars and 90% of all the participants prescribe post operative antibiotics after the forceps extraction of fully erupted third molars. But studies warrant use of antibiotics in third molar extractions by forceps as the procedure is usually atraumatic[11].

All the respondents in this study prescribe therapeutic antibiotics for third molars undergoing surgical extraction as suggested by many studies. Many adverse effects were noted after antibiotic usage such as skin reactions (82% of reported cases), gastrointestinal problems (7%), and hematologic complications (1%).

American Heart Association (2007 guidelines) and Canadian Dental Association (CDA) recommends that "only those at greatest risk of developing infective endocarditis should take antibiotics". CDA, American Dental Association and American Academy of Orthopedic Surgeons, recommend antibiotic prophylaxis for those "undergoing dental procedures that are at a higher risk of producing a bacteraemia" like immunocompromised patients and those within their first two years following joint replacement. Antibiotic prophylaxis not recommended for patients with mitral valve prolapse, bicuspid valve disease, rheumatic heart disease, certain congenital heart conditions (e.g. atrial septal defect, ventricular septal defect, hypertropic cardiomyopathy) and calcified aortic stenosis. The guidelines recommend that antibiotic prophylaxis prior to dental procedures be administered to patients with previous Infective endocarditis (IE), prosthetic heart valve, cardiac transplantation recipients with cardiac valvulopathy and some patients with congenital heart disease[18-20].

AHA considers procedures that involve gingiva, periapical areas have chances of getting IE and are high risk procedures and require antibiotic prophylaxis. They suggest procedures like taking radiographs; orthodontic and prosthodontic appliances have low risk of bacteraemia and do not require antibiotic prophylaxis. In the present study 100% of the respondents prescribed prophylactic antibiotics for immunocompromised patients and patients with prosthetic heart valves as suggested in literature. Whereas the British Society for Antimicrobial Chemotherapy (BSAC in 2006) revised these guidelines and stated that there is no association between dental treatment and development of IE and hence antibiotic prophylaxis should not be given for dental procedures. But they later revised guidelines and suggested use of antibiotics in cardiac patients who underwent valve replacement surgery and those with history of previous IE. BSAC recommends 3 gm amoxicillin orally one hour prior to the procedures involving gingival manipulation, whereas AHA recommends 2 gm of amoxicillin orally 30–60 min prior to the procedure[15-18].

In our study, amoxicillin 1gm is prescribed by 13% OMFS and 24% GDP's, amoxicillin 2gm by 41%

OMFS and 16% GDP's. While 24% GDP's and 24% OMFS prescribed prophylactic antibiotics half an hour prior to the procedure; 59% GDP's and 57% OMFS prescribed one hour prior to the procedure; 19% GDP's and 18% OMFS prescribed prophylactic antibiotics two hours prior to the procedure. This again shows a lack of awareness among practioners regarding the latest guidelines proposed by the AHA. If patients are allergic to penicillin, alternate drugs like erythromycin 500mg (by 41% OMFS and 18% GDP's), clindamycin 600mg (by 33% OMFS and 50% GDP's), azithromycin 500mg (by 13% OMFS and 24% GDP's), cephalexin 500mg (by 13% of OMFS) were prescribed.

It is important to assert that to assess the efficacy of antibiotic prophylaxis accurately in medically compromised patients; prospective placebo-controlled, double-blind studies examining the efficacy of antibiotic prophylaxis during procedures involving bacteraemia would have to be performed. Also accurate scientific proof is lacking to support the assumption that dental procedures may possibly cause IE in patients with predisposing cardiac conditions. However it is suggested that consideration must be given to improvement and maintenance of oral health and hygiene and improved access to dental care for patients with predisposing cardiac conditions[20].

Shortcoming's of the Study

1. Small sample size
2. Non inclusion of other dental specialties and procedures.

CONCLUSION

Our study has shown that there is no consensus in prescribing antibiotics for third molar surgeries among GDP's and OMFS. We suggest more such clinical studies on a large sample to be conducted to know about knowledge regarding antibiotic prophylaxis and also suggest that there should be strict guidelines and audit for prescribing antibiotics in order to prevent development of antibiotic resistance.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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