

Microbiological Profile with Antibiotic Sensitivity Pattern of Orofacial Abscess of Odontogenic Origin from Patients Attending Dental O.P.D at RIMS, Ranchi

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ABSTRACT

Objectives: Orofacial infections are common reasons for dental consultations worldwide. The purpose of this study is to assess the causative microorganisms responsible for orofacial infections of odontogenic origin and evaluate the sensitivity and resistance of antibiotics used in the treatment of these infections.

Materials and Methods: 180 patients with orofacial space infections were considered between the period of Oct. 2015 to Sept. 2016. Pus samples were collected with aseptic precautions and examined in the department of microbiology for culture and antibiotic sensitivity.

Results: There were 85 male (47.3%) and 95 (52.7%) female patients. The submandibular space was the most frequent location for a single space abscess (50.5%), followed by the buccal space (36.6%). A total of 210 bacterial strains were isolated from 180 patients. Gram positive cocci were isolated 77.2% of specimens and gram negative rods were isolated in 22.8% of cultures. There were 132 aerobes (62.8%) and 78 anaerobes (37.2%) isolated. The most common bacteria isolated were Viridans streptococci among aerobes and Peptostreptococcus among anaerobes. Culture and sensitivities were reviewed on all patients.

Conclusion: This study confirms that the microbiological flora

of odontogenic infections consists of complex mixture of aerobic and anaerobic bacteria. The antibiotic susceptibility test results shows that there was an increasing resistance towards penicillin groups of drug and quinolones group of drugs. Amoxiclav still possesses powerful antimicrobial activity against major pathogens in orofacial odontogenic infections.

Keywords: Odontogenic Infections, Streptococcus Viridians, Amoxiclav, Orofacial Space Infection.

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INTRODUCTION

The oral cavity has various fundamental functions besides playing an important role in ingesting, speaking and breathing; it is an entry from external environment to the gastrointestinal tract and the human immune system. In healthy person, oral microorganisms and the host immune system are in ecological equilibrium, which is a premise for sustaining a barrier against ingested pathogens.

Odontogenic infections can spread either locally causing cellulites and abscess formation or by dissemination causing distant site infections. Disease of the pulp and periodontium such as dental caries, endodontic infections, dental abscess, periodontitis and pericoronitis which constitute the vast proportion of odontogenic infections are mainly caused by the endogenous bacterial microflora in the oral cavity.¹ There are more than 500 distinct bacterial species which have been known to constitute the normal

oral microflora. The major etiological factor for odontogenic infection is the normal bacterial flora in the plaque.

The first line of treatment for majority of orofacial infections is debridement and or incision and drainage but in some cases extraction of the offending tooth is also required. Most of the microorganisms causing orofacial infections are treated by using drugs like β -lactum antibiotics, cephalosporins, fluoroquinolone, aminoglycosides, macrolides & other broad spectrum antibiotics.²

MATERIALS AND METHODS

A prospective study was conducted between the period of October 2015 to September 2016. The study was conducted in Department of Microbiology at Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, India. 180 patients diagnosed for having orofacial infections of odontogenic origin

were selected randomly from the Department of Dentistry, RIMS, Ranchi after obtaining ethical clearance. Patients with isolated or multiple orofacial infections of all age groups and gender were included in the study. After taking detailed history, each patient was thoroughly examined. The pus was collected from the involved space.

Pus was collected by aspirating abscess using sterile 18 gauge disposable needles with 5 ml disposable syringes intraorally or extraorally maintaining asepsis. Sample was also collected on swab sticks, following all the aseptic precautions including irrigation with 0.2% chlorhexidine for intraoral sites and the skin cleaned with Povidone iodine 5% solution and alcohol for extraoral sites. The samples were brought to the Department of Microbiology, RIMS; laboratory at the earliest (within 1 hr). The pus sample received was divided into two parts. One part was inoculated into glucose broth medium for aerobic bacteria and second part was inoculated into Robertson's cooked meat broth

medium or using gas pack for anaerobic bacteria. The pus sample obtained was subjected to gram staining, aerobic culture, anaerobic culture and antimicrobial susceptibility testing (if the culture was positive).

For aerobic culture, the samples were inoculated on Mac-Conkeys agar and Blood agar and incubated at 37°C for 18-24 hrs. Growth was identified using appropriate biochemical tests. If growth does not occur after 48hrs of incubation, then it was considered as sterile. For anaerobic culture, sample was inoculated into plain blood agar, Mac-Conkey's agar and Nutrient agar and incubated anaerobically at 37°C, using gas pack, in anaerobic jar for 48-72 hrs. Strains of *Pseudomonas aeruginosa* were kept in anaerobic jar as a control. If growth does not occur after 72hrs of incubation, then it was considered as sterile.

The antimicrobial susceptibility testing of all isolates was done by the standard disc diffusion method (Kirby Bauer method, 1966) using commercial discs.

Table 1: Age wise distribution of patients

Age in years	Numbers	Frequency
5 – 10	2	1.1
11 – 20	16	8.8
21 – 30	74	41.1
31 – 40	44	24.4
41 – 50	24	13.3
51 – 60	14	7.7
61 – 70	4	2.2
71 – 75	2	1.1

Table 2: Various bacteria found in the positive culture

Name of organism	Number	%
Aerobic organism		
<i>Strepto. viridians</i>	48	22.8
<i>Pseudomonas aeruginosa</i>	28	13.3
<i>Staph. aureus</i>	22	10.4
<i>Klebsiella spp</i>	20	9.5
CONS (Coagulase Negative <i>Staphylococcus</i>)	14	6.6
Anaerobic organism		
<i>Peptostreptococcus</i>	78	37.2

Table 3: Antibiotic susceptibility pattern among Gram positive aerobic organism

S No.	Antibiotics	Sensitive	%	Resistant	%
1	Amoxycillin	72	85.7	12	14.2
2	Amoxyclav	84	100	0	0
3	Cefoxitin	84	100	0	0
4	Chloramphenicol	80	95.2	4	4.7
5	Clindamycin	81	96.4	3	3.5
6	Erythromycin	78	92.8	6	7.1
7	Levofloxacin	75	89.2	9	10.7
8	Linezolid	84	100	0	0
9	Vancomycin	84	100	0	0
10	HLAR (High Level Aminoglycoside Resistance)	84	100	0	0

Table 4: Antibiotic susceptibility pattern among Gram negative aerobic organism

S. No.	Antibiotics	Sensitive	%	Resistant	%
1	Amikacin	40	87.5	8	12.5
2	Amoxiclav	48	100	0	0
3	Colistin	48	100	0	0
4	Cefoperaxone	48	100	0	0
5	Ceftazidime	45	93.7	3	6.3
6	Gentamicin	44	91.6	4	8.3
7	Ciprofloxacin	42	83.3	6	16.6
8	Imipenem	48	100	0	0
9	Piperacillin+Tazobactam	48	100	0	0

Table 5: Antibiotic susceptibility pattern among Anaerobic organism

S. no	Antibiotics	Sensitive	%	Resistance	%
1	Ampicillin	70	89.7	8	10.2
2	Amoxiclav	78	100	0	0
3	Clindamycin	74	94.8	4	5.1
4	Imipenem	78	100	0	0
5	Metronidazole	78	100	0	0
6	Piperacillin+Tazobactam	78	100	0	0

Figure 1: Sex wise distribution of patient

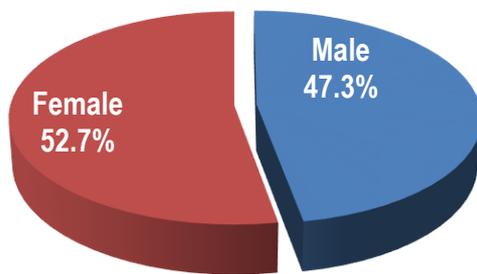


Figure 2: Organism Isolated

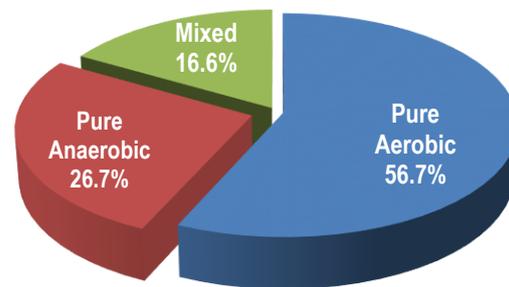


Figure 3: Frequency of chief complain of patient with odontogenic infection

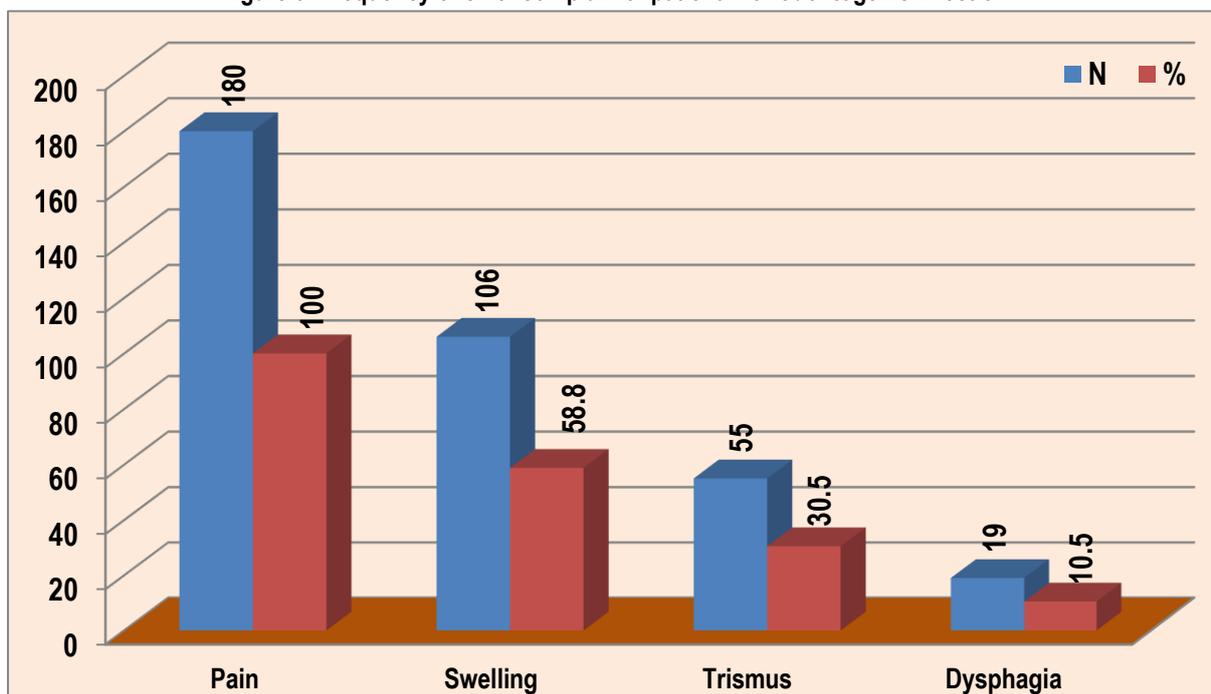
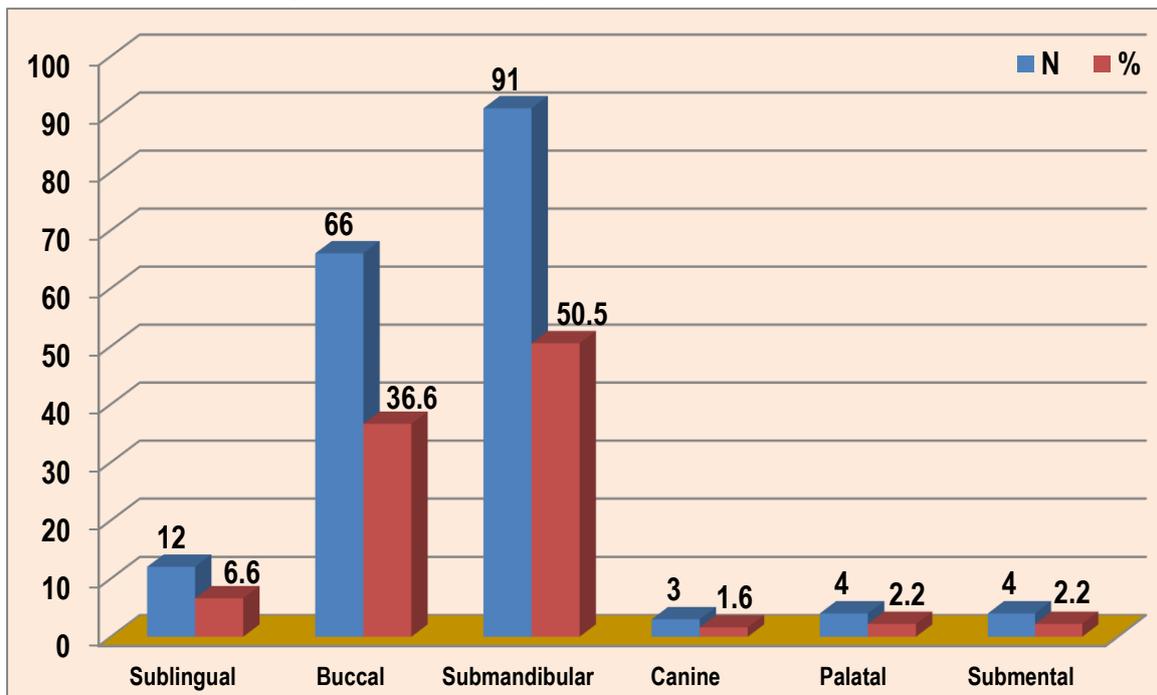


Figure 4: Distribution of space involved in orofacial infection



RESULTS

In this study 180 patients with orofacial infection of odontogenic origin were considered. The minimum age of male patients was 8 yrs. and maximum age was 75 yrs. The minimum age of female was 15 yrs. and maximum age was 75 yrs. The most common age group involved was 21-30 yrs. in both male and female. The most frequent source of infection was infected mandibular third molar (48.2%) followed by maxillary third molar (29.4%). Submandibular space was most commonly involved in 91 cases followed by Buccal space in 66 cases. Pain was the most common symptoms in all the cases (100%) followed by swelling (58.8%), trismus (30.5) and dysphagia (10.5%). *Streptococcus viridians* (22.8%) were the most frequent aerobic bacterial isolate and among anaerobes *Peptostreptococcus* were the major pathogen isolated. All aerobic gram positive microorganisms were highly sensitive (100%) to Amoxyclav, Cefoxitin, Linezolid, Vancomycin and HLAR. Resistance was maximum to Amoxicillin (14.2%) followed by Levofloxacin (10.7%). All the Gram negative aerobic isolates were completely susceptible (100%) to Amoxiclav, Colistin, Cefoperaxone, Imipenem and Piperacillin+Tazobactam. Maximum resistance was seen to Ciprofloxacin (16.6%) followed by amikacin (12.5%). All the anaerobic organism were 100% sensitive to Amoxiclav, Imipenem, Metronidazole, Piperacillin + Tazobactam. Maximum resistance was seen to Ampicillin (10.2%).

DISCUSSION

Maximum number of cases of orofacial infection of odontogenic origin were seen in the age group of 21-30 yrs. 41.1% (74/180) followed by 24.4% (44/180) of cases belong to the age group of 31-40 yrs. Our study correlates with the study done by Patankar et al³ who have reported 21-30 yrs. of age group as the most commonly affected age group. In the present study pain was more or less consistently present in all cases of orofacial infection of odontogenic origin which was consistent with the finding of G.C. Mathew et al⁴ who reported pain to be 97.1%.

In the present study, 210 microorganisms were isolated in all 180 pus samples. Out of 210 isolates, Gram positive cocci were found in 162 (77.2%) isolates and Gram negative bacilli were found in 48 (22.8%) isolates which correlates with studies of Mahalle et al⁵, Fating NS et al⁶, and Rega AJ et al.⁷

In our study total 132 strains of aerobic bacteria were isolated. The most predominant isolate was *Strepto. viridans* (36.36%). This finding was in concordances with the study carried out by Santosh et al (36.4%)⁸ and R. Bahl et al (45%).⁹ The percentage of isolation of *Strepto. viridans* was less in our study as compare to the studies done by N S Fating et al (70%)(6) and Chunduri et al (64%).¹⁰

A total of 78 strains of anaerobic bacteria were isolated in our study. Among anaerobes *Peptostreptococcus* was the predominant strain isolated (37.2%). This finding was in concordances with the studies of Santosh et al (41.1%)⁸, Patankar et al (48%)³ and Chundurie et al (26%).¹⁰

In the present study Mandibular 3rd Molar tooth (48.2%) was the most commonly affected tooth which was also reported by R. Bahl et al⁹, NS Fating et al⁶, and V. Yuvaraj et al.¹¹

In the present study the most common site of orofacial odontogenic infection was submandibular space (50.5%) followed by Buccal space (36.6%) which correlated with the study of G. C. Mathew et al⁴ who reported submandibular space infection in 69.3% of cases and buccal space infection in 31.4% of cases.

All strains of Gram Positive cocci were 100% sensitive to Amoxyclav, Cefoxitin, Linezolid, Vancomycin, HLAR (High Level Aminoglycoside resistances). All strains of gram negative isolates were 100% sensitive to Amoxiclav, Colistin, Cefoperazone, Imipenem and Piperacillin + Tazobactam, 93.7% were sensitive to Ceftazidime and 91.6% were sensitive to Gentamicin. All the anaerobic organism were 100% sensitive to Amoxiclav, Imipenem, Metronidazole and Piperacillin + Tazobactam. All these findings correlates with the findings of Mahalle et al.⁵

CONCLUSION

Infections originating from teeth or their supporting structures known as odontogenic infections have been one of the most common diseases in the oral and maxillofacial region especially in developing countries. The purpose of this study was to identify microbial flora present in orofacial space infection of odontogenic origin and thereby provide better perspective in management of odontogenic infection.

The antibiotic susceptibility test results shows that there was an increasing resistance towards penicillin groups of drug and quinolones group of drugs. Amoxiclav, Imipenem and cephalosporins was found to have excellent in-vitro activity against both Gram positive and Gram negative organisms. Therefore with odontogenic infections it is always appropriate to begin with the empiric antibiotic regimen with correlation to clinical presentation thinking of the most likely suspected microorganisms involved in the infections, which are usually the normal flora of the region, without forgetting the importance of early surgical intervention to reduce morbidity and complications.

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