RETROSPECTIVE STUDY ON BROAD SPECTRUM ANTIBIOTICS USED FOR DIABETIC AND NON DIABETICS PATIENTS

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ABSTRACT

Orofacial infections of odontogenic origin have long plagued mankind. The discovery of the miracle drug by fleming in the year 1928 and the routine use of penicillin after the landmark discovery of the powder form of the antibiotic by florey and chain leading to significant change in the management of odontogenic infection .The spread of infection is governed by factors such as impaired host defence, the virulence of microorganism, functional abnormalities of the host and a lack of or delayed treatment. the microbiology of odontogenic infections in diabetic and non-diabetic individuals has been found to be variable. Though the effects of diabetes can affect infection severity , length of hospital stay, susceptibility to antibiotics and outcome of treatment is unassured . Differentiation in antibiotics prescribed is also observed.The aim of the study was to analyse the prevalence of the use of antibiotics among diabetic and non-diabetic patients in a south indian dental university clinic . The list of all diabetics and non diabetics patients treated for pain, dental infections , swelling were retrieved by reviewing 86000 patient records who have visited the hospital during the study periods from june 2019 to march 2020 from the university database.Data tabulation was carried out in Excel. The data was imported and transcribed in Statistical Package for Social sciences version 16(SPSS,IBM corporation). Descriptive analysis was carried out.A total of 9128 patients were included in the study based on treatment done of which 580 patients(6.3%) had diabetes mellitus. Only 3.5 % of the male population and 2.8% of the female population has diabetes.Amoxicillin 93.2% was found to be the most frequently prescribed antibiotics among non-diabetic patients and diabetics patients 1.6% .A combination of metronidazole and amoxicillin was prescribed to 0.5% of the whole study population .A combination clavulanic acid and amoxicillin(augmentin)was prescribed to 4 % of the total diabetic study population and 0.4% of the non-diabetic study population that is about.The relation between the diabetic status of a patient and the antibiotic prescribed showed a significant statistical relationship in a Pearson's Chi square test with p value of $0.001(p<0.005)$.The prescribing practises in dental offices can be improved by increasing awareness among dental practitioners about the recommended guidelines for prescribing antibiotics . The most commonly prescribed antibiotics among diabetic patients was Augmentin (4.08%) and for non diabetics it was amoxicillin (93.25%). .

KEYWORDS

Prevalence; Diabetes mellitus ; odontogenic infection ; south indian population

INTRODUCTION

Diabetes mellitus is one of the most common comorbid conditions among patients hospitalised for acute bacterial dental infections. It is a metabolic syndrome characterised by absolute or relative insulin deficiency. Also recurrent infections continue to be a systematic complication of diabetes and are thought to occur as a result of unpaired host defence.(Kamat *et al.*, 2015)Orofacial infections of odontogenic origin have long plagued mankind. The discovery of the miracle drug by fleming in the year 1928 and the routine use of penicillin after the landmark discovery of the powder form of the antibiotic by florey and chain leading to significant change in the management of odontogenic infection.(Fating *et al.*, 2014)

In this era of ever improving use of antimicrobial therapy , odontogenic infections continue to be the most commonly encountered challenge by a maxillofacial surgeon. The spread of infection is governed by factors such as impaired host defence, the virulence of microorganism, functional abnormalities of the host and a lack of or delayed treatment. the microbiology of odontogenic infections in diabetic and non-diabetic individuals has been found to be variable. Though the effects of diabetes can affect infection severity , length of hospital stay, susceptibility to antibiotics and outcome of treatment is unassured . Differentiation in antibiotics prescribed is also observed. Lower production of interleukins in response to infection,reduced chemo taxes and phagocytic activity, immobilisation of polymorphonuclear leukocytes and dysfunction in neutrophils bactericidal function, cellular immunity and complement activation.(Rosenthal and Tan, 2010) For this reason, diabetic patients tend to have higher incidence and increases severity of infection than their counterparts.

The quest for an ideal antibiotic is still a dilemma for the clinician. Knowledge of the potential bacterial spectrum of pathogens, as well as regional resistance is important for rational therapeutics.(Aderhold, Knothe and Frenkel, 1981)A review of literature suggests that the microbial flora in cases of odontogenic infections is of mixed origin.(Stefanopoulos and Kolokotronis, 2004) The antimicrobial therapy prescribed depends upon the severity of infection, number of spaces involved, general health status, associated systemic comorbidities. Previously , other studies focussing severity of infection , effectiveness of treatment , efficiency of the antibiotics ,various treatment modalities , KAP studies(Mp, 2017; Rahman and Mp, 2017) (Kumar and Snena, 2016; Patturaja and Pradeep, 2016; Mp and Rahman, 2017; Packiri, Gurunathan and Selvarasu, 2017; Marimuthu *et al.*, 2018; Abhinav *et al.*, 2019; Sweta, Abhinav and Ramesh, 2019) and clinical trials and reports(Jesudasan, Wahab and Sekhar, 2015; Christabel *et al.*, 2016; Patil *et al.*, 2017; Rao and Kumar, 2018; Jain *et al.*, 2019) published by researchers from our institution conducted in the past are letting us focus on epidemiological studies.The aim of the study was to analyse the prevalence of the use of antibiotics among diabetic and non-diabetic patients in a south indian dental university clinic .

MATERIALS AND METHODS

The is a retrospective clinical study that is performed to assess the prevalence of use of different broad spectrum antibiotics among diabetic and non diabetics patients in a university dental hospital . The study population consists of a predominantly South Indian population. After obtaining approval from the ethical review board of Saveetha institute of medical and technical sciences , the list of all diabetics and non diabetics patients treated for pain, dental infections , swelling were retrieved by reviewing 86000 patient records who have visited the hospital during the study periods from June 2019 to March 2020 from the university database, based on the following criteria .

Inclusion criteria :

Patients above the age of 18

Patients who underwent treatment for dental infections , pericoronitis , space infection between the june 2019 and march 2020

Records with complete data and photographs present and blood reports(RBS) .
Patients with diabetes mellitus

Exclusion criteria:
Patients with other comorbidities excluding diabetes mellitus
Records with incomplete data of clinical examination and blood reports

The search resulted with 9128 in total of patients who underwent one of the following treatments for severe dental infections, pericoronitis , space infections that are extractions and incision and drainage respectively . The age range of the patients included in this study was 18- 68 years of age. Internal validity of the study was maximised with cross verification by patient and department along with the photographic evidence. The results of the study can be applied to the South Indian population for epidemiological inferences and is therefore externally valid . The incomplete data was verified by the department and or the patient which if couldn't be verified as a possibility of bias was excluded from the study.Data tabulation was carried out in Excel. The data is imported and transcribed in Statistical Package for Social sciences version 16(SPSS,IBM corporation). Descriptive analysis was based on quantitative variables and frequencies for categorical variables. P less than or equal to 0.005 was considered statistically significant with a confidence interval of 95% .

Results and Discussion :
A total of 9128 patients were included in the study based on treatment done of which 580 patients(6.4%) had diabetes mellitus. Only 3.5 % of the male population and 2.8% of the female population has diabetes.Amoxicillin (93.2%) was found to be the most frequently prescribed antibiotics among non-diabetic patients and a combinations of amoxicillin and clavulanic acid(augmentin), 4% was frequently prescribed to diabetic patient . A combination of metronidazole and amoxicillin was prescribed to 0.5% of the whole study population .A combination clavulanic acid and amoxicillin was prescribed to 4 % of the total diabetic study population and 0.4% of the non-diabetic study population .The relation between the diabetic status of a patient and the antibiotic prescribed showed a significant statistical relationship in a Pearson's Chi square test with p value of 0.001($p<0.005$).

Diabetic patients are a major part of the dentist's s workload.(Bodenheimer, Wagner and Grumbach, 2002) As it is factually proved, the microbial flora in diabetic and non-diabetic patients is composed of different bacterial species , added to the growing issue of drug resistance is a problem that needs to be placed at the forefront of one's mind while prescribing antibiotics for odontogenic infections. Antibiotics are prescribed by a dentist for treatment as well as prevention of infection .Literature provides evidence however of many inadequacies in prescribing practises among dentists due to a number of factors ranging from inadequate knowledge to social factors.

In our study we analyse the pattern of antibiotics prescribed in the University dental clinic in South India , Chennai. In the study,Amoxicillin 93.2% was found to be the most frequently prescribed antibiotics among non- diabetic patients and was prescribed to 1.6% of diabetics patients .A combination of metronidazole and amoxicillin was prescribed to 0.5% of the whole study population .A combination clavulanic acid and amoxicillin(Augmentin) was prescribed to 4 % of the total diabetic study population and 0.4% of the non-diabetic study population. Supporting the results found, a study conducted in the UK reported that most commonly prescribed antibiotics are penicillin among which amoxicillin is the most popular(Palmer *et al.*, 2001) Although the frequency of prescribing is usually mentioned in known sources for antibiotic prescribing, the duration of treatment is not.(Liu *et al.*, 2004)The recommendations in therapeutic guidelines is most commonly based on expert opinion. A survey in Canada found average duration antibiotics are prescribed to be 6.92 days, in contradiction our results show a duration of an

average of 3 days . In recent years, more attention has been given to short course antibiotics.Also (Escalante, Rubenstein and Rolston, 1997) explains the short course antibiotics must have certain features such as rapid onset of action, bactericidal activity, easy tissue penetration, optional dosage regimen. Supporting our study , antibiotics that can be prescribed for 2 to 3 days have been advocated for the treatment of acute dento-alveolar infections as recommended by the british national formulary .(Tally *et al.*, 1975) Several authors refer to a combination of amoxicillin and metronidazole as the most effective therapy for dental infection treatment and prevention among diabetic patients.(Sartor, 2004; Fating *et al.*, 2014) Contradicting this the combination of metronidazole and amoxicillin was prescribed to 0.5% of the whole study population .A study in Sweden reported metronidazole to be effective as a single dose to prevent dry socket post-treatment.(Silva *et al.*, 2011).Whereas according to our data metronidazole was always found to used in a combination with amoxicillin (graph 2).It must be clearly remembered that prescribing patterns in different parts of the world may differ due various reasons such as genetic background , local drug resistance , local bacterial spectrum most commonly seen , socio-economic status, patient compliance , host efficiency, severity of infection ,medical status .

Dentists are not only pressured by the patient for an antibiotic prescription, they also self medicate . self medication is alarmingly high in developing countries.(Al-Azzam *et al.*, 2007) In light of this proper dosing regimens and professionally responsible prescribing practices must be implemented the general public must also be aware of restricting the use of antibiotics for only cases of severe infection**.**

CONCLUSION :
The prescribing practises in dental offices can be improved by increasing awareness among dental practitioners about recommended guidelines.The most commonly prescribed antibiotics among diabetic patients was Augmentin (4.08%) and for non diabetics it was amoxicillin (93.25%). Finally we must highlight that the management protocol for diabetic and non diabetic patients still remains the same, that is source control, drainage and adjunctive antimicrobial therapy.

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AUTHORS CONTRIBUTION
Author 1 (Amina Mehrin Bano) carried out the retrospective study by collecting data and drafting the manuscript after performing the necessary statistical analysis . Author 2(Dr. Hemavathy O.R) aided in conception of the topic , has participated in the study design , statistical analysis and has supervised in preparation of the manuscript . All authors discussed the results and contributed to the final manuscript.

CONFLICT OF INTEREST
The researcher claims no conflict of interest

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Tables and graphs :

Medical status

		Number of patients	Percentage	Valid Percent	Cumulative Percent
Valid	diabetic patients	580	6.4	6.4	6.4
	non-diabetic patients	8548	93.6	93.6	100.0
	Total	9128	100.0	100.0	

Table 1:Table showing the percentage of the population with diabetes mellitus , 580 patients with DM 6.4% of the total study population of 9128 patients who underwent treatment for dental infections , space infections ,pericoronitis.

Antibiotics prescribed

		Number of patients	Percentage	Valid Percent	Cumulative Percent
Valid	Amoxicillin	8662	94.9	94.9	94.9
	Metronidazole	47	.5	.5	95.4
	Augmentin	411	4.5	4.5	99.9
	Amoxicillin , metronidazole	5	.1	.1	100.0

|				
Total	9125	100.0	100.0	
Total	9128	100.0		

 Table 2 : Table showing the frequency of various antibiotics prescribed to the study population. the most commonly prescribed antibiotics among both diabetic and non diabetics patients is amoxicillin 94.9% followed by a combination of amoxicillin and clavulanic acid (Augmentin) 4.5% , metronidazole 0.5% , combination of Amoxicillin and metronidazole 0.1% .

Chi-Square test

		medical status	antibiotics prescribed
medical status	Pearson Correlation	1	-.794[**]
	Sig. (2-tailed)		.001
	N	9128	9125
antibiotics prescribed	Pearson Correlation	-.794[**]	1
	Sig. (2-tailed)	.001	
	N	9125	9125

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 : The table shows the relation between the diabetic status of a patient and the antibiotic prescribed showed a significant statistical relationship in a Pearson's Chi square test with p value of 0.001(p<0.005).
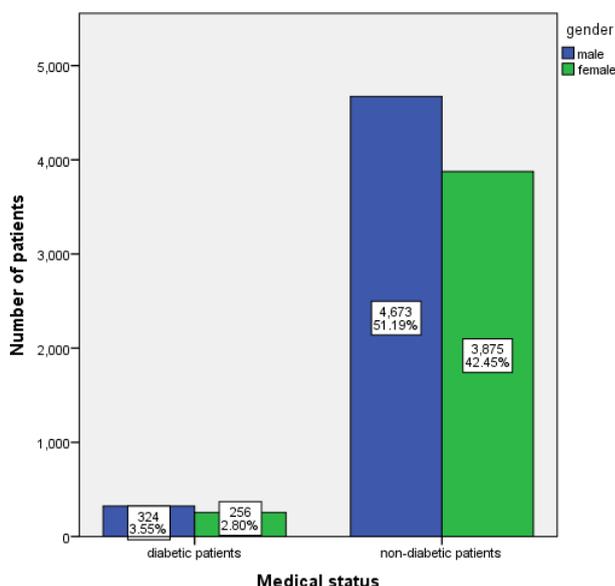
Graph 1 :The graph depicts the gender distinction among the study population based on the presence of diabetes mellitus . Only 3.5 % of the male population(blue) and 2.8% of the female population(green)has diabetes . The majority of the male(blue) study population 51.1% and 39.2% of the female study population (green) have no associated comorbidities (.p=0.013)
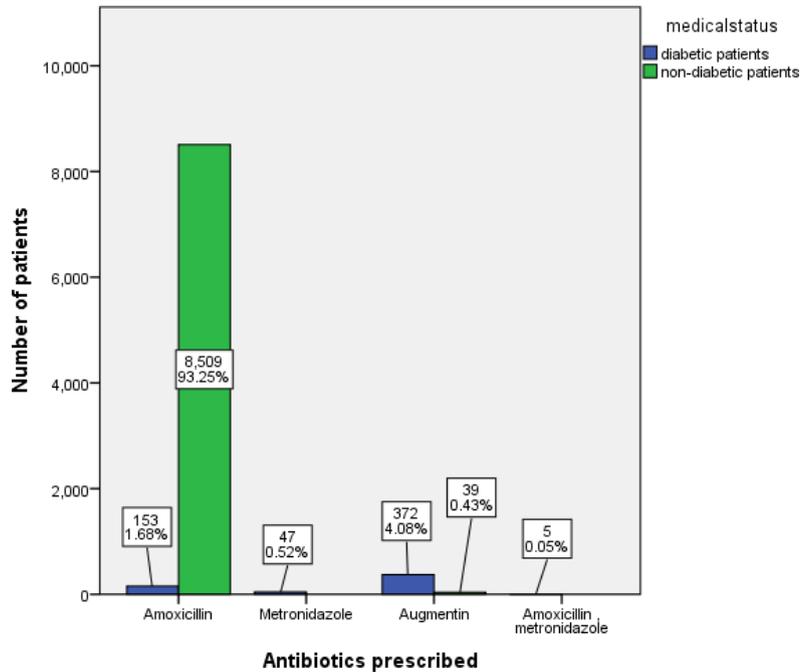
Graph 2 :Table depicting different antibiotics prescribed based on medical status .Amoxicillin (93.2%) was found to be the most frequently prescribed antibiotics among non- diabetic(green) patients . The most common antibiotic prescribed for diabetes was Augmentin (4.08%). A combination of metronidazole and amoxicillin was prescribed to 0.5% of the whole study population .A combination clavulanic acid and amoxicillin (Augmentin) was prescribed to 4 % of the total diabetic study population(blue) and 0.4% of the non-diabetic study population that is about.p=0.001 making it statistically significant .