



## Antibiotic Regime Followed in Periodontal Therapy: A Retrospective Study

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### ABSTRACT

The choice of antibiotics to be prescribed by a doctor is subjective and primarily based on his clinical skill of the operator and the years of experience of the individual in managing inflammatory conditions using medications. Doctors also have a selection bias while prescribing certain medications which they are more comfortable towards and prescribe routinely. The aim of this study was to assess the antibiotics prescribed by the students as an adjunct to periodontal therapy. The current retrospective study was performed as a single centered university based design. Patient records from the Department of Periodontology, Saveetha Dental College and Hospitals, Chennai were assessed. The data retrieved were tabulated and analysed using SPSS. A total of 2120 cases were prescribed Amoxicillin, 22 cases Amoxicillin LB, 229 cases Amoxicillin and Flagyl, 27 cases Amoxicillin LB and Flagyl, 189 cases Amoxicillin and clavulanic acid and 12 cases were prescribed Doxycycline. In this study, we observed that Amoxicillin 500mg was the most prescribed medication among both surgical and non-surgical periodontal therapy thrice daily for a course of three days. Among all the drugs used in non surgical and surgical periodontal therapy the most commonly prescribed ones include Amoxicillin (88.7%) followed by Amoxicillin with Metronidazole(4.06%) and Amoxicillin combined with Clavulanic acid (4.6).

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### INTRODUCTION

Medicine routinely involves the use of newer chemotherapeutic agents in order to manage, control or treat infectious diseases. Periodontitis is one such chronic inflammatory disease involving periodontal tissues like cementum, periodontal ligament, alveolar bone and gingiva.[1] These structures include a combination of two hard tissues, one of which is vital and two vital soft tissues.

Modern advances in periodontal therapy and revolve around the use of newer biomaterials like prf, prp and possible role of stem cells in the close

future.[2-5] These therapies however require antibiotic agents to be dispensed in form of tablets, oral suspensions or parenterally as vials, topical agents to reduce bacterial load during surgical procedures.[6] However antibiotics are one of the most commonly prescribed drugs in all fields of medicine irrelevant of speciality including periodontology where its application is advised as an adjunctive agent. Christerson and Slots were one of the earliest authors to suggest periodontal disease to be tissue invasive in nature, suggesting the meticulous mechanical removal of calculus and plaque alone was not enough to treat it.[7,8]

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The initial rationale behind the use of antibiotics was to prevent transient bacteraemia induced during non surgical periodontal therapy as scaling and root planing.[9,10] On the other hand post periodontal flap surgery antibiotics are routinely prescribed as a means of reducing bacterial burden of the involved site after surgical incisions while simultaneously preventing infection into the bloodstream by bacteria.[11] The latter was brought into effect since the use of carbolic acid to disinfect surgical instruments first introduced by Dr. Joseph Lister.[12,13]

Available periodontal literature revolves around the commonly prescribed antibiotics with their sensitivity towards different bacteria with newer fronts in the field of local drug delivery agents.[14–16] However no practical guidelines have been formulated advising which antibiotic to be used in which clinical scenario based on treatment done with one of the few practical guidelines given by Eickholz et al.[17] This creates a lacunae in available literature which leads to the rationale behind the present study. Previously we have focused our research on various invitro and invivo studies. [18–37] We have currently shifted our focus to this retrospective analysis. The aim of this study was to assess the most common antibiotics prescribed by the students as an adjunct to periodontal therapy.

## MATERIALS AND METHODOLOGY

The current study was performed as a single centered retrospective university based design, using patient records for the comparison of the patient outflow from the Department of Periodontology, Saveetha Dental College and Hospitals, Chennai over a period of 9 months. (1st June 2019 till 1st March 2020) Data was screened by two blinded investigators, where interexaminer agreement was reached prior to inclusion of individuals into the study. The segregation of data was initiated after ethical approval from Saveetha University scientific review board.

The included patients were individuals with clinical inflammation of gingiva, chronic localised/generalised periodontitis (as per classification of periodontal diseases by Armitage 1999) who received treatment in the form of non-surgical periodontal therapy (Scaling using woodpecker scalers with universal tips, root planing using Gracey's Hu friedy curettes) and surgical periodontal therapy (flap surgery for periodontal pockets reduction or elimination with clinical attachment levels of 5mm after non surgical periodontal therapy, full mouth surgical gingivectomy for patients under orthodontic therapy, chronic inflammatory gingival enlargement after non surgical therapy, drug induced gingival overgrowth).

Included patients were then subdivided into different age groups for analysis and interpretation into group A (15-25 years), group B (26-40 years), groups C (41-60 years) and group D (above 60 years). While treatments done included scaling, root planing, flap surgery, full mouth surgical gingivectomy. Individuals excluded from this study were based on (i)pregnancy or lactating mothers, (ii) patients currently smoking, (iii) patients already under antimicrobial therapy, (iv) patients with uncontrolled systemic disease or complication involving kidney and liver, (v) patients with metabolic disorders.

The parameters assessed in this study included frequency of antibiotics prescribed, age group of patients treated, periodontal treatment done like scaling, root planing, flap surgery and full mouth surgical gingivectomy.

Antibiotics prescribed after treatment were as per Indian pharmacopoeia with doses of Amoxicillin 500mg prescribed thrice daily for 3 days, Amoxicillin LB prescribed thrice daily for 3 or 5 days, Flagyl (Metronidazole) prescribed 400mg prescribed twice daily for 5 days, Augmentin (500mg Amoxicillin+125mg Clauvalinic acid) prescribed twice daily for 3 days, Doxycycline 100mg prescribed once daily for 7 daily with a initial double dose (loading dose).

## STATISTICAL SIGNIFICANCE

All values collected were analysed using SPSS version 23 (Statistical Package for the Social Sciences). Statistical significance with p value less than 0.05 was considered to be statistically significant.

## RESULTS AND DISCUSSION

A total of 8,734 patients records were screened, while only two thousand five hundred and ninety nine patients were prescribed antibiotics after non surgical and surgical periodontal therapy included in the present study. A total of 2120 cases were prescribed Amoxicillin, 22 cases Amoxicillin LB, 229 cases Amoxicillin and Flagyl, 27 cases Amoxicillin LB and Flagyl, 189 cases Amoxicillin and clavulanic acid and 12 cases were prescribed Doxycycline. (Table 1) In this study, we observed that Amoxicillin 500mg was the most prescribed medication among both surgical and non-surgical periodontal therapy thrice daily for a course of three days while doxycycline was prescribed in barely 12 cases. (Table 2) Among included patients 1487 were males and 1112 were females (figure 2) which were subdivided into different age groups for analysis and interpretation into group A (15-25 years), group B (26-40 years), groups C (41-60 years) and group D (above 60 years). (Table 1, figure 1)

Antibiotic prescription regimen that followed after non-surgical and surgical periodontal therapy was obtained from the present single centered retrospective study. After nonsurgical periodontal therapy (scaling and root planing only) 21.1% of the cases were prescribed antibiotics with first prescribed drug of choice as Amoxicillin (88.7%) followed by Amoxicillin and Clavulanic acid (4.9%) and Amoxicillin and Metronidazole (4.06%). After surgical periodontal therapy antibiotics were always prescribed with the first prescribed drug of choice as Amoxicillin (64.1%) followed by Amoxicillin and Metronidazole (20.39%) and Amoxicillin and Clavulanic acid (12.98%). (Table 3) Among all the drugs used in non surgical and surgical periodontal therapy the most commonly prescribed ones include amoxicillin followed by amoxicillin with metronidazole and amoxicillin combined with clavulanic acid. Amoxicillin LB was most commonly prescribed between the age group of 26 to 40 years of age among patients undergoing subgingival scaling, while between the age group of 26 to 60 years it was prescribed for patients undergoing flap surgery. (figure 1) Amoxicillin on the other hand was prescribed for patients between age groups ranging from 15 years to 60 years undergoing a treatment of subgingival scaling, root planing, flap surgery and full mouth surgical gingivectomy with no trend in prescription. There were no specific trends seen while prescription of amoxicillin combined with metronidazole and amoxicillin combined with clavulanic acid.

The choice of antibiotics to be prescribed by a doctor is subjective and primarily based on his clinical skill of the operator and the years of experience of the individual in managing inflammatory conditions using medications. [38,39] Apart from this doctors also have a selection bias while prescribing certain medications which they are more comfortable towards such as Augmentin was one of the most commonly prescribed antibiotics in case of extensive soft tissue invasive procedures, while Amoxicillin was most commonly prescribed antibiotic for most other medical conditions due to its preference over Ampicillin in case of gastrointestinal complications. [40,41] Similar findings were seen as part of the ABPARO trial where the clinical benefits of administering systemic amoxicillin/ metronidazole was found to depend on periodontitis severity and patients age with new attachment loss seen in patients < 55 years (5.2%), or with a mean attachment level > 5 mm (5.2%). [17]

Amoxicillin is the most commonly prescribed antibiotic in the present study due to drug common knowledge among doctors along with regimes followed in hospital based centers to reduce chance of bacterial resistance or nosocomial infections where alternative antibiotic courses are prescribed

including adjunctive therapy like natural herbal products. [42,43] Considering Doxycycline is one of the drugs of the tetracycline family which has 4x higher concentration in saliva and gingival crevicular effect than plasma, it is still prescribed less frequently in the present single centered study. Such a finding could be due to its restricted use among patients with Diabetes mellitus as a systemic factor modifying periodontal disease or cases diagnosed as Aggressive periodontitis. [44,45] Studies with similar findings were observed with a 7-day and 3-days regime of adjunctive systemic metronidazole and amoxicillin were found to significantly improve the short-term clinical outcomes of full-mouth non-surgical periodontal debridement in subjects with Generalised chronic periodontitis. [46,47]

Apart from the treatment modalities included in the present study cases which require extensive full mouth rehabilitation using dental implants or extensive esthetic procedures also require antibiotic covers, provided adequate distance from underlying vital structures. [48-50] Simultaneously care must also be taken while prescribing antibiotics to patients with underlying medical conditions linked to periodontitis in periodontal medicine. [50-52]

A possible limitation of the present study could include the absence of molecular markers used to associate the effect of systemic antibiotics in reduction of clinical inflammation or wound healing such as endothelin 1, salivary tumour necrosis factor, interleukin 21. [53-56] Future scope in the present study would include clinical trials assessing individuals of different age groups treated using different treatment modalities with and without a control using systemic antibiotics.

## CONCLUSION

Among all the drugs used in non surgical and surgical periodontal therapy the most commonly prescribed ones include Amoxicillin (88.7%) followed by Amoxicillin with Metronidazole (4.06%) and Amoxicillin combined with Clavulanic acid (4.6%).

## AUTHORS CONTRIBUTION

Siddharth Narayan carried out the retrospective study, participated in the sequence alignment, statistical analysis and drafted the manuscript. Dr. Arvina Rajasekar conceived the study, participated in its design and coordinated and provided guidance to draft the manuscript. All authors read and approved the manuscript.

## CONFLICT OF INTEREST

There were no conflicts of interest as defined by the authors.

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Self.

**ETHICAL CLEARANCE**

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320)

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**Table 1: Frequency of prescription of antibiotics, demographic data of age groups and gender; Chi square with a p value of 0.002, (p < 0.05) Considered statistically significant**

Antibiotics Prescribed		Frequency (percentage)
	Amoxicillin	2120 (81.5%)
	Amoxicillin LB	22 (0.84%)
	Amoxicillin+Flagyl	229 (8.8%)
	Amoxicillin LB+Flagyl	27 (0.10%)
	Augmentin	189 (6.5%)
	Doxycycline	12 (7.2%)
	Total	2599
Age group	15-25 years	414 (15.9%)
	26-40 years	1115 (42.9%)
	41-60 years	909 (34.9%)
	Above 60 years	161 (6.1%)
Gender	Male	1487 (57.2%)
	Female	1112 (42.7)

**Table 2: Antibiotics prescribed and treatment done; Chi square test with p value 0.00 (p<0.05), considered statistically significant.**

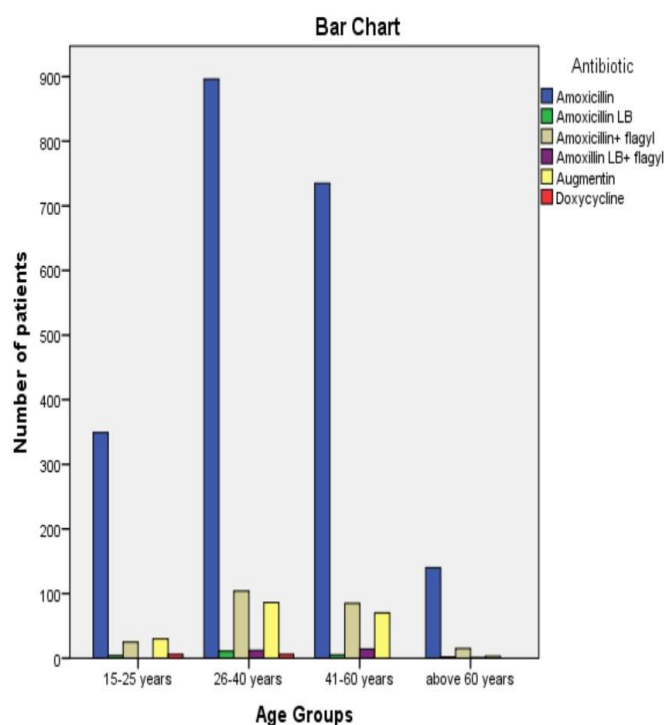
Antibiotics	Subgingival Scaling	Root Planing	Flap surgery	Full mouth gingivectomy	Total	X <sup>2</sup> value
Amoxicillin	913	723	429	55	2120	Comparing antibiotics prescribed and treatment done 324.319
Amoxicillin LB	13	7	2	0	22	
Amoxicillin + Flagyl	32	43	152	2	229	
Augmentin	36	55	96	2	189	
Doxycycline	3	8	1	0	12	

### Antibiotic Regime Followed in Periodontal Therapy

Amoxicillin LB +Flagyl	10	1	16	0	27
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**Table 3: Tabular illustration of most common antibiotic regime after different periodontal procedures**

Treatment done		Treated with Antibiotics	First Prescribed drug of choice (Amoxicillin )	Second prescribed drug of choice (Amoxicillin + Clavulanic acid)	Third most commonly prescribed drug of choice (Amoxicillin + Metronidazole)
<b>Nonsurgical periodontal therapy</b>	<b>Scaling</b>	1007	913	36	32
	<b>Root planing</b>	837	723	55	43
	<b>Total</b>	1844 ( 21.1%)	1636 (88.7%)	91 (4.9%)	75 (4.06%)
<b>Surgical periodontal therapy</b>	<b>Flap surgery</b>	696	429	96	152
	<b>Full Mouth gingivectomy</b>	59	55	2	2
	<b>Total</b>	755 (100%)	483 (64.1%)	98 (12.98%)	154 (20.39%)



**Figure 1: Bar graph depicts association between antibiotics prescribed used and the age groups; X axis:depicts age groups of patients. Y axis depicts the number of patients. The most commonly prescribed drug was found to be Amoxicillin (blue) among all age groups. Chi square test with a  $X^2$  value of 34.690, p value of 0.003 ( $p < 0.05$ ), considered statistically significant.**



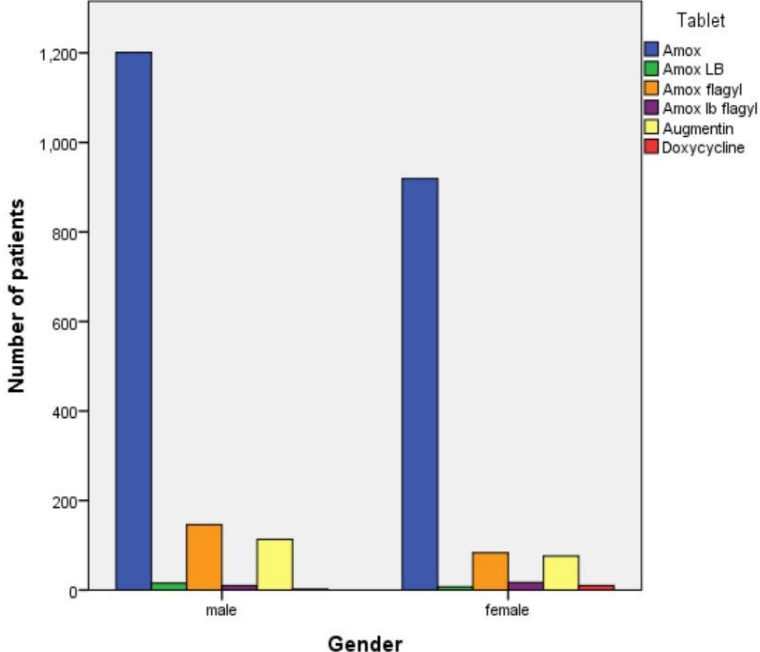


Figure 2: Bar graph depicts association between antibiotics prescribed and the gender of patients; X axis:depicts gender of patients male and female; Y axis depicts the number of patients. Amoxicillin (blue) was the most prescribed drug irrespective of the gender of the patients. Chi square test with X2 value of 18.420, p value of 0.002 ( $p < 0.05$ ), considered statistically significant.