

CURRENT TRENDS IN ANTIBIOTIC PRESCRIPTION FOR VARIOUS PERIODONTAL FLAP SURGICAL PROCEDURE - A HOSPITAL BASED ANALYSIS

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ABSTRACT:

The aim of the present study is to assess the current trends in antibiotic prescription for various periodontal flap surgical procedures among periodontists in Chennai. Retrospective data collection was conducted from June 2019 to March 2020 on patients who visited the outpatient department of Periodontics for multitude of flap surgical procedures. The type of flap surgery done and the antibiotic regimen prescribed were recorded. The data was tabulated using excel and SPSS software version 23.0 (Statistical Package For The Social Sciences) was used for descriptive statistics. The distribution of antibiotics after flap surgical procedure among the above mentioned groups were expressed in terms of percentage. Chi square test was done to assess the association between the study variables. Based on this hospital based assessment, it was found that the most commonly prescribed antibiotic was amoxicillin 500mg, followed by a combination of amoxicillin and metronidazole for flap surgical procedures like Open flap debridement, Resective osseous surgery and regenerative osseous surgery. The least preferred antibiotics were azithromycin and doxycycline. There was statistically significant association between gender and type of antibiotic given, with a higher percentage of males receiving a combination of amoxicillin and metronidazole than females. There was no significant difference between the antibiotics prescribed for patients who underwent Resective or regenerative flap surgery. Thus Amoxicillin is the most preferred, cost-effective and less toxic drug which acts against both aerobic and anaerobic microorganisms. However care must be taken in administering antibiotics in order to avoid misuse and overuse of antibiotics.

KEY WORDS : Amoxicillin; Antibiotics; Flap surgery; Periodontitis; Regeneration

INTRODUCTION :

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth which is caused by specific microorganism or a group of specific microorganism, which result in progressive destruction of the periodontal ligament and alveolar bone with formation of periodontal pocket, gingival recession or both. (Newman *et al.*, 2006; Khalid *et al.*, 2016, 2017; Avinash, Malaippan and Dooraiswamy, 2017; Priyanka *et al.*, 2017; Kavarthapu and Thamaraiselvan, 2018)

Dental plaque represents a classic example of both biofilm and microbial colony or community which are ubiquitous in nature and are usually attached to the spatially arranged biofilm (Marsh, 2006; Panda *et al.*,

2014; Moothaet al., 2016; Ramesh, SheejaSaji Varghese, et al., 2016; Ramesh, Sheeja S. Varghese, et al., 2016; Ramamurthy and Mg, 2018). Bacteria are the primary etiological agent in periodontal disease and it is estimated that more than 500 different bacterial species can colonise the adult mouth (MooreL and Moore, 1994; Thamaraiselvanet al., 2015; Varghese et al., 2015; Ramesh, Ravi and Kaarthikeyan, 2017; Ravi et al., 2017; Ramesh et al., 2019). Some of the most common microorganism associated with periodontal diseases are Porphyromonasgingivalis,Prevotellaintermedia, Bacteroides forsythia, Campylobacter rectum ,Actinobacillusactinomycetemcomitans(Ezzo and Cutler, 2003).

Most of the periodontal pathogens are anaerobes and the key to successful periodontal therapy depends on complete elimination and reduction of pathogenic bacteria from the periodontal pocket (Popova, Dosseva-Panova and Panov, 2013). Although conventional mechanical debridement remains the gold standard for periodontal therapy, the tissue invasiveness of certain periodontal pathogens necessitates the need for antimicrobial therapy for the management of periodontitis. Various antibiotics and dosing regimens are available under use on the basis of evidence and guidelines for the periodontal surgical procedures (Slots and Ting, 2002).

Therapeutic success of an antimicrobial agent depends on the activity of the antimicrobial agent against the infecting organisms. Periodontitis is a mixed microbial infection making the choice of antibiotic regimen difficult. Each antibiotic agent targets specific parts of the subgingival biofilm. For example, metronidazole targets the gram-negative strict anaerobes from the red and orange complexes such as Fusobacteriumnucleatum, Tannerella forsythia, Porphyromonasgingivalis whereas Streptococcus and Capnocytophaga are minimally affected by metronidazole. Amoxicillin has a broader spectrum of action and lowers the counts of gram negative anaerobes as well as decreasing the counts and proportions of Actinomyces species.

The choice of antibiotics are selected based on the patient's medical and dental status, current medications, and also based on the results of microbial analysis. Despite various guidelines being available for antibiotic prescription,there is no consensus as to the ideal antibiotic, dose, duration and timing of antibiotics is concerned.Slots et al. described a series of steps using anti-infective agents for enhancing regenerative healing. They recommend starting antibiotics 1-2 days before surgery and continuing for a total of at least 8 days (Van Winkelhoff, Rams and Slots, 1996).The use of systemically administered adjunctive antibiotics with and without scaling and root planing or surgery appeared to provide a greater clinical improvement in Attachment level than therapies not employing antibiotics.(Haffajee, Socransky and Gunsolley, 2003)

Although systemic antibiotic therapy can be considered as an adjunct to comprehensive periodontal treatment plan, the prevalence of postoperative infections following periodontal surgery is less than one percent. This low risk does not justify the routine use of systemic antimicrobials just to prevent infections. Hence the use of antibiotics should be based on procedural outcomes and should not be generalized to all procedures.(Oswal et al., 2014)Thus the present study is undertaken to evaluate the current trends in prescribing antibiotics among periodontists for various types of flap surgical procedures.

MATERIALS AND METHODS :

The study was a retrospective study to assess the trends in antibiotic prescription among periodontists for various flap surgical procedures done from June 2019 to March 2020 at Saveetha dental college and hospital.The study design was reviewed by the institutional review board of Saveetha Institute Of Medical and Technical Sciences (SIMATS).

A total of 8536 case sheets were analysed and data from 562 patients who underwent periodontal flap surgery at the Department of Periodontics were assessed in the study. Demographic details including Patient identity number,age,sex and medical status were recorded. The type of antibiotic prescribed for the study subjects was recorded. All patients who underwent periodontal flap surgical procedure were

included in the study. Case sheets with incomplete data were excluded from the study. The patients were categorised under three major groups. Those who underwent open flap debridement, those who underwent resective flap surgery and those who underwent regenerative flap surgical procedure. Patients who underwent regenerative surgery were further sub classified into those with bone graft and those with bone graft along with guided tissue regeneration membrane (GTR). Differential and inferential statistics were done for data summarization and presentation.

The data was tabulated using excel and SPSS software version 23.0 (Statistical Package For The Social Sciences) was used for descriptive statistics. The mean age of the patients was calculated and the distribution of antibiotics after flap surgical procedure among the above mentioned groups were expressed in terms of percentage. Chi square test was done to assess the association between the study variables.

RESULTS:

In this hospital based analysis, a total of 562 patients were included in the study, of which 60 percent were males and 40 percent were females. (Figure 1) The patients were divided into three age groups. There were more patients who underwent flap surgery in the age group of 20-35 years and 36-50 years. (Figure 2) From the present study results, Open flap debridement was the most common procedure done (46.09%) followed by Resective osseous surgery (26.68%) Regenerative flap surgery with bone graft (21.83%) and Regenerative flap surgery with Guided tissue regeneration membrane and bone graft (5.39%). (Figure 3) Among the three hundred and sixty three patients who underwent only open flap debridement the most common drug prescribed was amoxicillin 500mg which accounts for (60.33%) followed by metronidazole (20.94%). Moxikind was the third most preferred drug with (13.22%) among periodontists. No antibiotics were prescribed for (5.51%) of the cases. (Figure:4) A total of ninety eight patients underwent resective osseous surgery. It was seen that (59.18%) of the patients were administered with amoxicillin 500 mg followed by a combination of amoxicillin and metronidazole (33.67%) and the least preferred was moxikind (7.14%) (Figure :5).

A total of eight one patients underwent regenerative flap surgery in which bone grafts were placed. It was observed that (64.20%) of practitioners preferred amoxicillin 500mg followed by a combination of amoxicillin and metronidazole (17.28%). Moxikind (Amoxicillin with potassium clavulanate) was the third most preferred drug constituting about (17.28%) of cases. Doxycycline was the least preferred with (1.23%) among all the antibiotics. (Figure 6) Twenty patients had undergone regenerative flap surgery with the placement of both bone graft and GTR membrane following the debridement of intra bony defects. After placement of bone graft and GTR, practitioners preferred a combination of amoxicillin and metronidazole (40.00%), Amoxicillin per se (40.00%) and (10.00%) preferred moxikind. The least preferred antibiotic in this category was Augmentin and azithromycin each with 5 percent of preference among practitioners. (Figure 7).

The association between antibiotics and the type of flap surgical procedures was found to be statistically significant (Pearson's Chi square value: 29.390, p value is 0.001). Though the preference for the type of antibiotics given to patients for various flap surgical procedures varies, Amoxicillin remains the predominant drug prescribed followed by Amoxicillin + Metronidazole and Moxikind. (Figure 8). The association between the Antibiotic and resective / regenerative flap surgery done was not statistically significant (Pearson's Chi square value is 8.357 and p value is 0.79). Thus there is no significant difference between the antibiotics prescribed for patients who underwent Resective or regenerative flap surgery. It was seen that amoxicillin is the most preferred drug in both Resective flap and regenerative flap surgery groups. Also a higher percentage of Moxikind was preferred in regenerative flap surgical procedures than resective flap surgeries. (Figure 9).

Chi square test was done to assess the relationship between age and antibiotic prescribed. The results were statistically significant (Chi square value -61.536, p value 0.01). It is seen that the preference of drug varies as the age increases, though amoxicillin being the most preferred drug in all the three age groups analysed (20-35, 36-50, 50 and above); it was seen that amoxicillin + metronidazole was the most preferred

in age group 36-50(12.28%) whereas it was (7.30%) in age group 20-35 and in age group 51 and above it was observed that drugs like augmentin, azithromycin and doxycycline was prescribed along with preference to drug like Moxikind which was accounted for 5.34%. (Figure 10) To assess the association between the antibiotic prescribed and the gender Pearson's Chi square test was done (chi square value- 65.586 p value-0.001). There was statistically significant association between gender and type of antibiotic given, with a higher percentage of males receiving a combination of amoxicillin and metronidazole than females. (Figure 11)

DISCUSSION:

In our current study, the most preferred antibiotic drug following periodontal flap surgery was amoxicillin 500mg. However Ong et al concluded that Azithromycin was the most commonly prescribed system of antibiotic for the management of all periodontal conditions followed by amoxicillin and metronidazole. (Onget al., 2019)

They also mentioned that post flap surgical procedure the drug of choice was Amoxicillin which is in agreement with the results of our study wherein amoxicillin was the most preferred drug after periodontal flap surgery.

In a study done by Handoun et al regarding antibiotics prescription for aggressive periodontitis patients, it was found that a combination drug of amoxicillin and metronidazole was preferred which is not in agreement with the results of our study (Hamdoun, Chala and Ennibi, 2019). Abbasi et al reported that standalone drug Amoxicillin was the most common drug of choice followed by a combination of amoxicillin like moxclav or amoxicillin with metronidazole (Abazi and Mihani, 2018). This is in accordance to the present study results, where the commonly prescribed drug was Amoxicillin 500mg followed by a combination of Amoxicillin and metronidazole.

In a KAP study done by Esamhalboub et al in Saudi Arabia they found that the most commonly preferred drug was a combination drug of amoxicillin with clavulanic acid followed by amoxicillin standalone (Halboubet al., 2016). Whereas in our study the trend was more towards referring to standalone drug amoxicillin followed by combination drug amoxicillin and metronidazole.

In a study done by Hai et al it was found that practitioners preferred prescribing antibiotics after using bone graft to avoid post operative infection which might affect the regenerative potential of the graft material (Haiet al., 2020). It was seen that combination regimen was preferred among periodontists rather than standalone drugs. Because they reduce adverse effects of single drugs and the effect of the standalone drug was minimal and short term. (Heitz-Mayfield, 2009)

Various guidelines for prescription of drugs such as Grading of Recommendation Assessment, Development and Evaluation (GRADE) are available. Though these guidelines are not specific to periodontal surgery as such, practitioners should make use of these guidelines while prescribing drugs. The American Academy of Periodontology published a position paper in 2004 outlining the efficacy and practical aspects of antibiotics in periodontal therapy. This position paper on systemic antibiotics in periodontics suggests that antibiotics may be prescribed on the basis of the clinical need, findings of microbiological testing, and the medical status and current medications of the patient.

According to the present study, amoxicillin 500 mg was preferred over other drugs and literature suggest that amoxicillin has been used in the treatment of periodontal disease because of its considerable activity against several periodontal pathogens. (Kapooret al., 2012) It has excellent activity against gram positive and negative bacteria, but long-term usage of single drugs may lead to development of drug resistance. Antibiotic resistance can be more prevalent where antibiotic consumption is found to be higher and the antibiotic resistance is accelerated by the misuse and overuse of antibiotics. Development of some resistance is almost certainly an inevitable consequence of the clinical use of antimicrobial drugs. Feres et

al in their demonstrated that a large number of bacterial strains of subgingival plaque belonging to various species were resistant to amoxicillin and metronidazole (Fereset *et al.*, 2002).

Hence it is important to consider the benefits and disadvantages of antibiotic drugs so that appropriate use of antibiotics can lead to decreased rate of drug resistance. Further longitudinal and interventional studies assessing different types of antibiotics for various periodontal surgical procedures can be performed to evaluate the role of antibiotics for the success of periodontal therapy.

CONCLUSION:

Based on this hospital based assessment, it was found that the most commonly prescribed antibiotic was amoxicillin 500mg, followed by a combination of amoxicillin and metronidazole for flap surgical procedures like Open flap debridement, Resective osseous surgery and regenerative osseous surgery. The least preferred antibiotics were azithromycin and doxycycline. There was statistically significant association between gender and type of antibiotic given, with a higher percentage of males receiving a combination of amoxicillin and metronidazole than females. There was no significant difference between the antibiotics prescribed for patients who underwent Resective or regenerative flap surgery. Thus Amoxicillin is the most preferred, cost-effective and less toxic drug which acts against both aerobic and anaerobic microorganisms. Care must be taken in administering antibiotics since they tend to develop drug resistance on use for longer time and larger bases.

AUTHORS CONTRIBUTION:

Niveda Rajeshwaran carried out the retrospective study, participated in the sequence alignment, statistical analysis and drafted the manuscript. Dr. Priyalochana Gajendran and Dr. Gurumoorthy Kaarthikeyan 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.

REFERENCES:

- [1] Abazi, B. and Mihani, J. (2018) 'Prescription of Antibiotics for Periodontal Disease among Dentists in the Region of Tirana', Open access Macedonian journal of medical sciences, 6(8), pp. 1486–1491. doi: 10.3889/oamjms.2018.300.
- [2] Avinash, K., Malaippan, S. and Dooraiswamy, J. N. (2017) 'Methods of Isolation and Characterization of Stem Cells from Different Regions of Oral Cavity Using Markers: A Systematic Review', International journal of stem cells, 10(1), pp. 12–20. doi: 10.15283/ijsc17010.
- [3] Ezzo, P. J. and Cutler, C. W. (2003) 'Microorganisms as risk indicators for periodontal disease', Periodontology 2000, 32, pp. 24–35. doi: 10.1046/j.0906-6713.2003.03203.x.
- [4] Feres, M. et al. (2002) 'Antibiotic resistance of subgingival species during and after antibiotic therapy', Journal of Clinical Periodontology, pp. 724–735. doi: 10.1034/j.1600-051x.2002.290809.x.
- [5] Haffajee, A. D., Socransky, S. S. and Gunsolley, J. C. (2003) 'Systemic anti-infective periodontal therapy. A systematic review', Annals of periodontology / the American Academy of Periodontology. Wiley Online Library, 8(1), pp. 115–181. Available at: <https://aap.onlinelibrary.wiley.com/doi/abs/10.1902/annals.2003.8.1.115>.
- [6] Hai, J. H. et al. (2020) 'Antibiotic prescribing practices in periodontal surgeries with and without bone grafting', Journal of periodontology, 91(4), pp. 508–515. doi: 10.1002/JPER.19-0195.

- [7] Halboub, E. et al. (2016) 'Antibiotic Prescription Knowledge of Dentists in Kingdom of Saudi Arabia: An Online, Country-wide Survey', *The journal of contemporary dental practice*, 17(3), pp. 198–204. doi: 10.5005/jp-journals-10024-1827.
- [8] Hamdoun, R., Chala, S. and Ennibi, O. K. (2019) 'Knowledge, attitude, and practice of dental practitioners regarding antibiotic prescribing for aggressive periodontitis in Morocco', *Journal of International Oral Health*. Medknow Publications and Media Pvt. Ltd., 11(3), p. 141. doi: 10.4103/jioh.jioh_73_19.
- [9] Heitz-Mayfield, L. J. A. (2009) 'Systemic antibiotics in periodontal therapy', *Australian Dental Journal*, pp. S96–S101. doi: 10.1111/j.1834-7819.2009.01147.x.
- [10] Kapoor, A. et al. (2012) 'Systemic antibiotic therapy in periodontics', *Dental Research Journal*, p. 505. doi: 10.4103/1735-3327.104866.
- [11] Kavarthapu, A. and Thamaraiselvan, M. (2018) 'Assessing the variation in course and position of inferior alveolar nerve among south Indian population: A cone beam computed tomographic study', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 29(4), pp. 405–409. doi: 10.4103/ijdr.IJDR_418_17.
- [12] Khalid, W. et al. (2016) 'Role of endothelin-1 in periodontal diseases: A structured review', *Indian Journal of Dental Research*, p. 323. doi: 10.4103/0970-9290.186247.
- [13] Khalid, W. et al. (2017) 'Comparison of Serum Levels of Endothelin-1 in Chronic Periodontitis Patients Before and After Treatment', *Journal of clinical and diagnostic research: JCDR*, 11(4), pp. ZC78–ZC81. doi: 10.7860/JCDR/2017/24518.9698.
- [14] Marsh, P. D. (2006) 'Dental plaque as a biofilm and a microbial community--implications for health and disease', in *BMC Oral health*. BioMed Central, p. S14. Available at: <https://bmcoralhealth.biomedcentral.com/articles/10.1186/1472-6831-6-S1-S14>.
- [15] MooreL, W. E. C. and Moore, V. H. (1994) 'The bacteria of periodontal disease', *Periodontology* 2000, 5(1), pp. 66–77.
- [16] Mootha, A. et al. (2016) 'The Effect of Periodontitis on Expression of Interleukin-21: A Systematic Review', *International journal of inflammation*. Hindawi, 2016. doi: 10.1155/2016/3507503.
- [17] Newman, M. G. et al. (2006) 'Carranzas clinical Periodontology book'. USA: Elsevier Health Sciences.
- [18] Ong, A. et al. (2019) 'Prescribing trends of systemic antibiotics by periodontists in Australia', *Journal of periodontology*, 90(9), pp. 982–992. doi: 10.1002/JPER.18-0586.
- [19] Oswal, S. et al. (2014) 'Antibiotics in periodontal surgeries: A prospective randomised cross over clinical trial', *Journal of Indian Society of Periodontology*, 18(5), pp. 570–574. doi: 10.4103/0972-124X.142443.
- [20] Panda, S. et al. (2014) 'Platelet rich fibrin and xenograft in treatment of intrabony defect', *Contemporary clinical dentistry*, 5(4), pp. 550–554. doi: 10.4103/0976-237X.142830.
- [21] Popova, C., Dosseva-Panova, V. and Panov, V. (2013) 'Microbiology of Periodontal Diseases. A Review', *Biotechnology, biotechnological equipment*. Taylor & Francis, 27(3), pp. 3754–3759. doi: 10.5504/BBEQ.2013.0027.
- [22] Priyanka, S. et al. (2017) 'Detection of cytomegalovirus, Epstein-Barr virus, and Torque Teno virus in subgingival and atheromatous plaques of cardiac patients with chronic periodontitis', *Journal of Indian Society of Periodontology*, 21(6), pp. 456–460. doi: 10.4103/jisp.jisp_205_17.
- [23] Ramamurthy, J. and Mg, V. (2018) 'COMPARISON OF EFFECT OF HIORA MOUTHWASH VERSUS CHLORHEXIDINE MOUTHWASH IN GINGIVITIS PATIENTS: A CLINICAL TRIAL', *Asian J Pharm Clin Res*, 11(7), pp. 84–88. Available at: <https://pdfs.semanticscholar.org/1c22/6e98fc99e9fb99bc749ae5d553024fa93052.pdf>.

- [24] Ramesh, A., Varghese, S. S., et al. (2016) 'Chronic obstructive pulmonary disease and periodontitis – unwinding their linking mechanisms', *Journal of Oral Biosciences*, pp. 23–26. doi: 10.1016/j.job.2015.09.001.
- [25] Ramesh, A., Varghese, S. S., et al. (2016) 'Herbs as an antioxidant arsenal for periodontal diseases', *Journal of intercultural ethnopharmacology*, 5(1), pp. 92–96. doi: 10.5455/jice.20160122065556.
- [26] Ramesh, A. et al. (2019) 'Esthetic lip repositioning: A cosmetic approach for correction of gummy smile - A case series', *Journal of Indian Society of Periodontology*, 23(3), pp. 290–294. doi: 10.4103/jisp.jisp_548_18.
- [27] Ramesh, A., Ravi, S. and Kaarthikeyan, G. (2017) 'Comprehensive rehabilitation using dental implants in generalized aggressive periodontitis', *Journal of Indian Society of Periodontology*, 21(2), pp. 160–163. doi: 10.4103/jisp.jisp_213_17.
- [28] Ravi, S. et al. (2017) 'Additive Effect of Plasma Rich in Growth Factors With Guided Tissue Regeneration in Treatment of Intrabony Defects in Patients With Chronic Periodontitis: A Split-Mouth Randomized Controlled Clinical Trial', *Journal of Periodontology*, pp. 839–845. doi: 10.1902/jop.2017.160824.
- [29] Slots, J. and Ting, M. (2002) 'Systemic antibiotics in the treatment of periodontal disease', *Periodontology 2000*, pp. 106–176. doi: 10.1034/j.1600-0757.2002.280106.x.
- [30] Thamaraiselvan, M. et al. (2015) 'Comparative clinical evaluation of coronally advanced flap with or without platelet rich fibrin membrane in the treatment of isolated gingival recession', *Journal of Indian Society of Periodontology*, 19(1), pp. 66–71. doi: 10.4103/0972-124X.145790.
- [31] Van Winkelhoff, A. J., Rams, T. E. and Slots, J. (1996) 'Systemic antibiotic therapy in periodontics', *Periodontology 2000*, pp. 45–78. doi: 10.1111/j.1600-0757.1996.tb00068.x.
- [32] Varghese, S. S. et al. (2015) 'Estimation of salivary tumor necrosis factor-alpha in chronic and aggressive periodontitis patients', *Contemporary clinical dentistry*, 6(Suppl 1), pp. S152–6. doi: 10.4103/0976-237X.166816.

FIGURES:

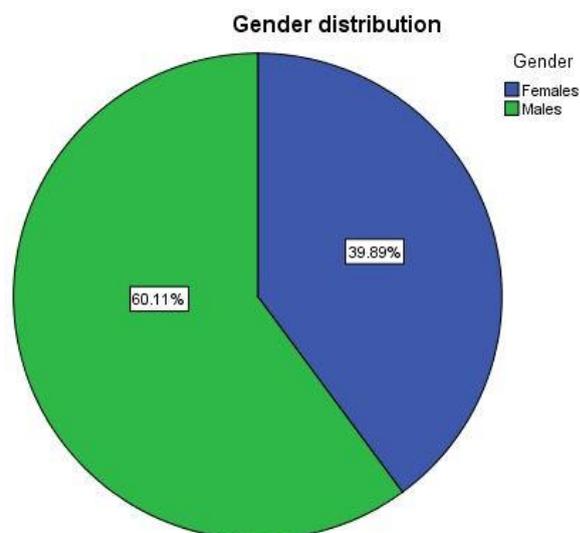


Figure 1 : Pie chart representing gender distribution among the study population. 60.11% were males (green) and 39.89% were females (blue). A higher number of males had undergone periodontal flap surgical procedures than females.

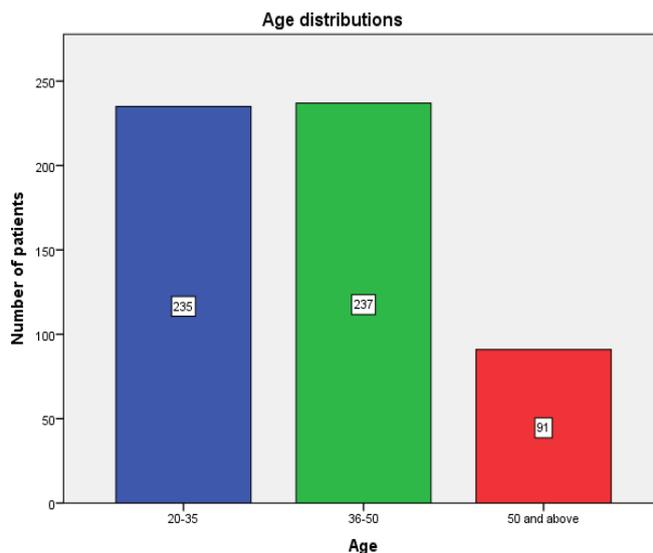


Figure 2: The bar graph represents the age distribution of the participants of the study . The colour blue represents the patients who belonged to the age group (20-35) , the colour green represents the patients who belonged to the age group (36-50) and the color red represents the patients who belonged to the age group (50 and above). There were more patients who underwent flap surgery in the age group of 20-35 years and 36-50 years.

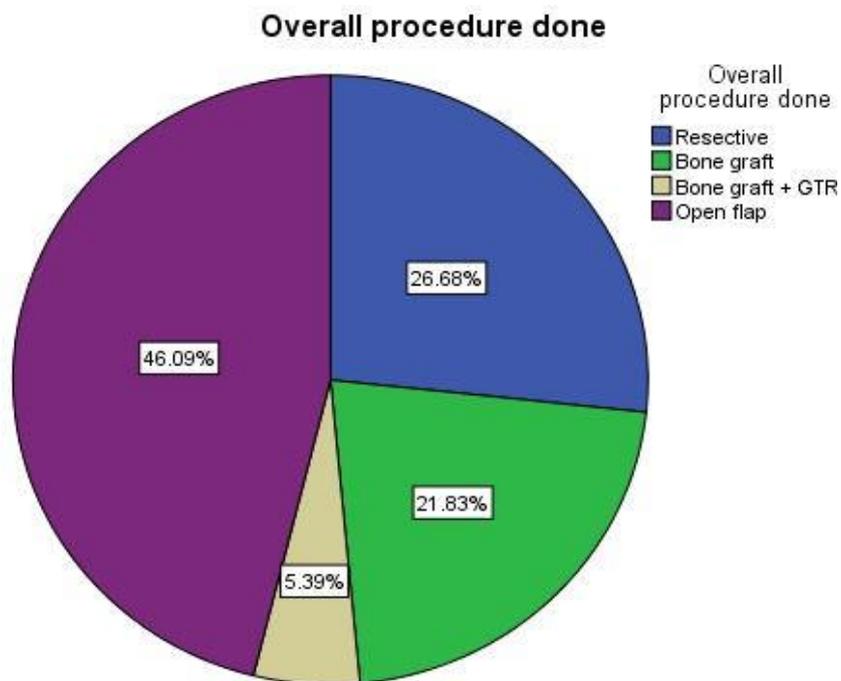


Figure 3: Pie chart representing the distribution of various types of periodontal flap surgical procedures performed. The most commonly done procedure was open flap debridement 46.09% (purple), followed by resective osseous surgery 26.68% (blue), regenerative surgery with bone graft 21.83% (green) and regenerative surgery using both bone graft and GTR membrane 5.39% (brown).

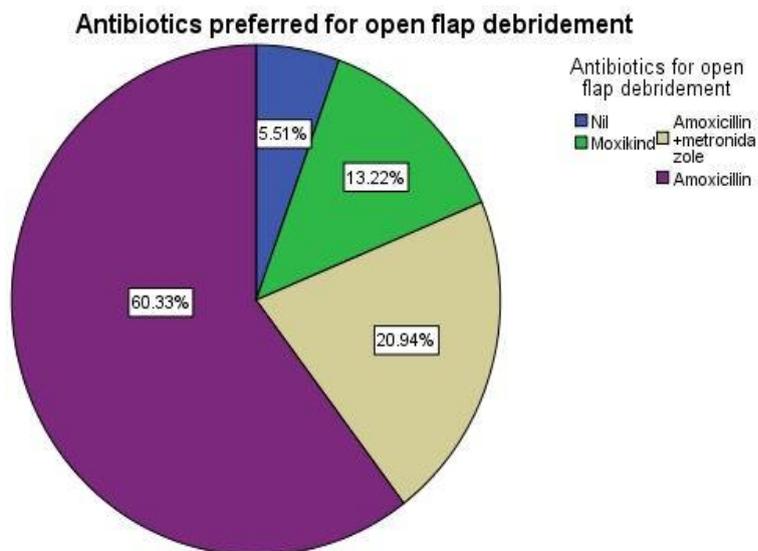


Figure 4 : Pie chart representing the type antibiotics prescribed after open flap debridement. Purple denotes Amoxicillin which accounts for 60.33%, brown denotes combination of Amoxicillin+metronidazole .From this figure we infer that Amoxicillin is the most preferred drug post open flap debridement and smaller percentage of patients were not prescribed any antibiotic following open flap debridement.

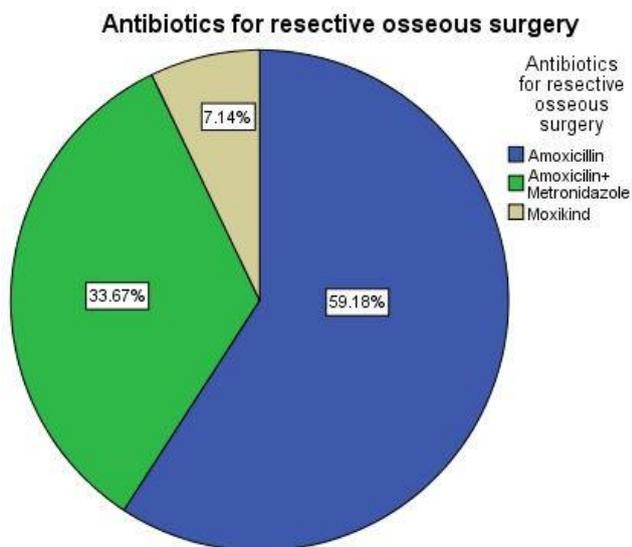


Figure 5: Pie chart representing the type of antibiotic prescribed for Resective osseous surgery .Blue colour denotes amoxicillin which accounts for about 59.18%,greencolour denotes the combination of amoxicillin+metronidazole 33.67%,brown colour denotes moxikind 7.14%. Amoxicillin is the drug of choice after resective osseous surgery, followed by amoxicillin with metronidazole and Moxikind.

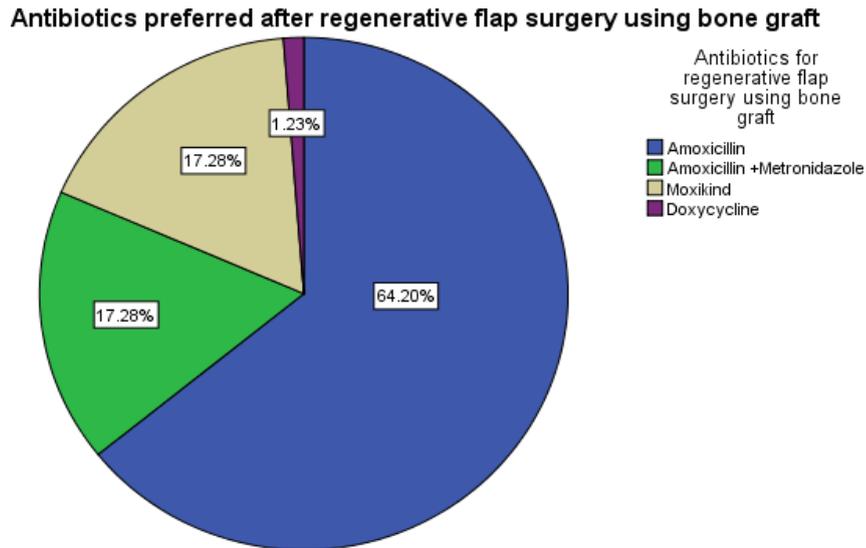


Figure 6 : Pie chart representing type of antibiotics prescribed after placement of bone graft for regenerative flap surgical procedure. Blue colour represents Amoxicillin which accounts for 64.20% green colour represents combination of amoxicillin + metronidazole 17.28% and brown colour represents Moxikind which accounts for 17.28% and the colour purple represents doxycycline which accounts for 1.23%. The most preferred was amoxicillin and the least prescribed was doxycycline.

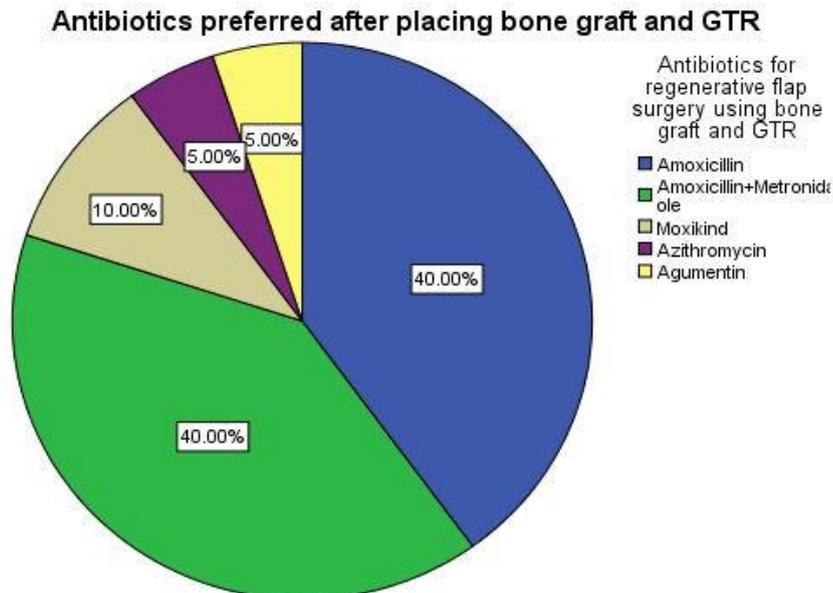


Figure 7 : Pie chart representing the type of antibiotic prescribed after placement of bone graft and GTR. Blue colour represents amoxicillin which accounts for 40.00% and green colour represents combination of amoxicillin + metronidazole which accounts for 40.00%, brown colour represents Moxikind which accounts for 10% ,purple colour represents azithromycin 5% and yellow colour represents Augmentin 5%. Amoxicillin and a combination of amoxicillin and metronidazole were mostly equally preferred in guided tissue regeneration cases and the least preferred was azithromycin.

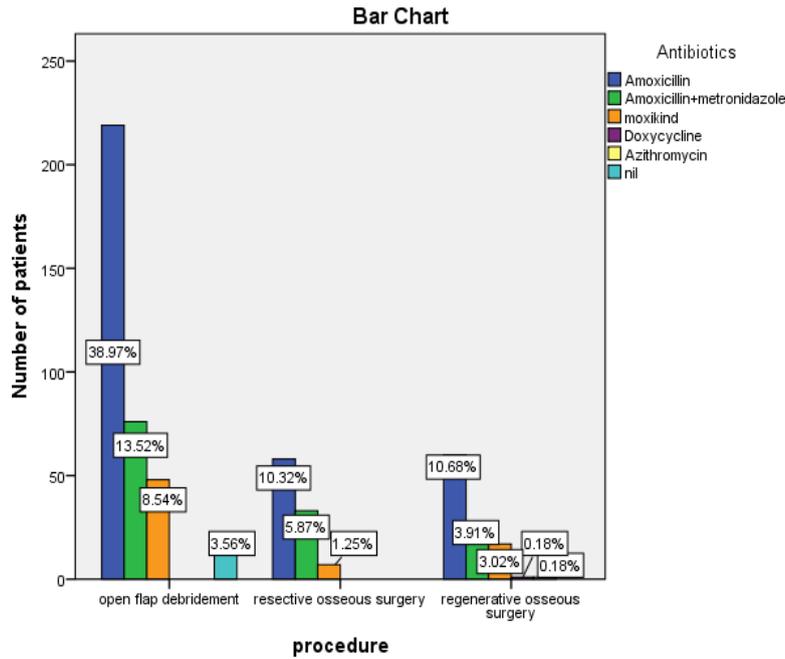


Figure 8: Bar graph depicting the relationship between the antibiotics prescribed and the procedure done. X axis represents the type of procedure done and Y axis represents the number of patients who underwent flap surgical procedure. Pearson's Chi Square test was done and there was a statistically significant association between antibiotics prescribed and type of flap surgical procedure done. (Pearson's Chi square value: 29.390, p value -0.001). Hence the preference for the type of antibiotics given to patients for various flap surgical procedures varies, though Amoxicillin (blue) remains the predominant drug followed by Amoxicillin + Metronidazole (green) for open flap debridement cases.

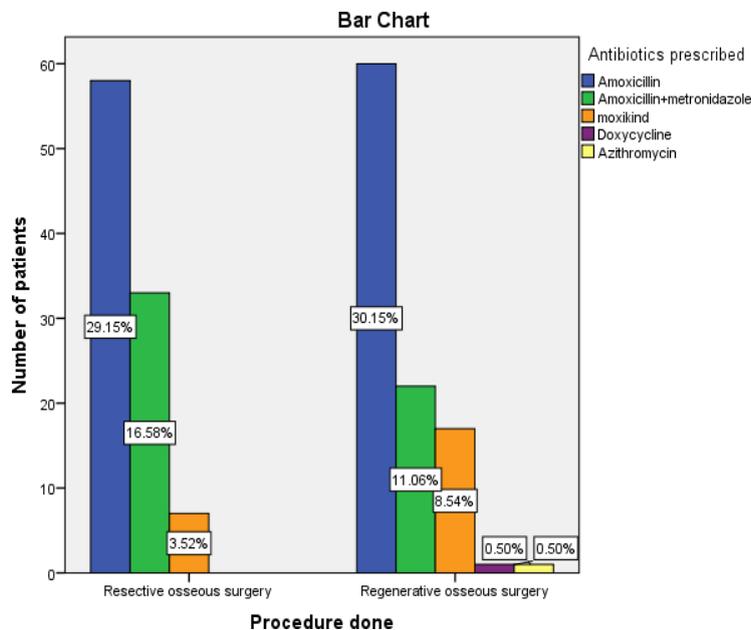


Figure 9: Bar graph depicting the relationship between the antibiotics prescribed and the type procedure done. X axis represents the type of procedure done and Y axis represents the number of patients. Pearson's Chi Square test was done and the association between the Antibiotics and type of flap surgery done was not statistically significant (Pearson's Chi square value is 8.375 and p value is 0.79). Thus there is no significant difference between the antibiotics prescribed for patients who underwent Resective or

regenerative flap surgery. It was seen that amoxicillin(blue) is the most preferred drug in both Resective flap and regenerative flap surgery groups. Also a higher percentage of Moxikind(orange) was preferred in regenerative flap surgical procedures than resective flap surgeries.

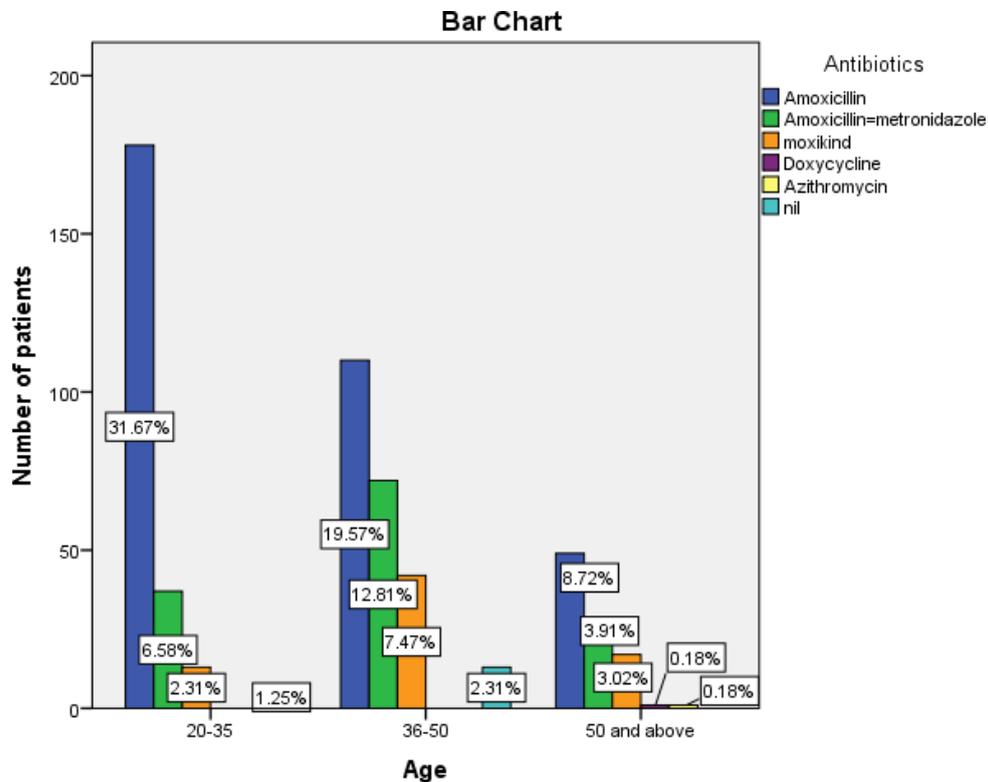


Figure 10: The depicts the relationship between age and the antibiotic drug prescribed, the age of the patients were categorised as 20-35,3-50 and 51and above in the X axis.The Y axis represents the number of patients. Pearson’s Chi square test was done and the association between age and the type antibiotic prescribed was statistically significant(Chi square value 61.536, p value -0.01). It was seen that Amoxicillin (blue)and combination of Amoxicillin with metronidazole(green) were the preferred type of drugs in the age groups of 20 -35 years and 36-50 years when compared with the older age group.

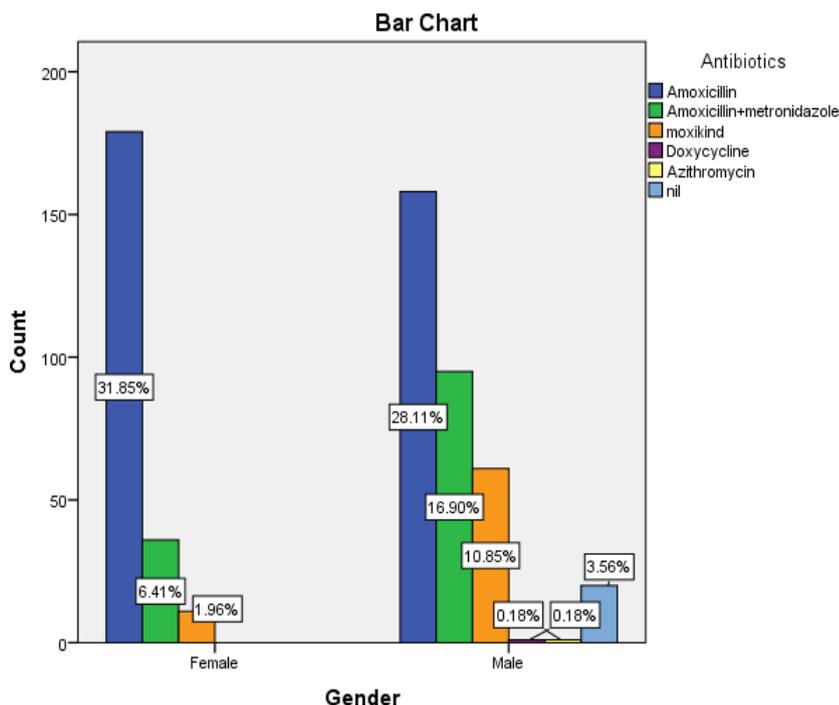


Figure 11: The graph represents the relationship between gender and the antibiotic drug prescribed, the X axis represents the gender distribution and the Y axis represents the number of patients. To assess the association between the antibiotic prescribed and the gender Pearson's Chi square test was done (chi square value- 65.586, p value-0.001). There was statistically significant association between gender and type of antibiotic given, with a higher percentage of males receiving a combination of amoxicillin and metronidazole (green) than females.