



Prescription Pattern of Antibiotics and Analgesics in Endodontic Treatments

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ABSTRACT

This study is to assess the proper use of antibiotics and analgesics by studying the prescription patterns in endodontic treatments. This Prospective observational study was conducted in Vivekanandha Medical Care Hospital, Elayampalayam for 6 months. All the patients prescribed with antibiotics and analgesics were analyzed for their prescription patterns. The collected data was analyzed with MS Excel and SPSS software with descriptive statistics to determine relationships between prescription patterns with age and gender. The age of study population was found between 10-80 years of age. The prevalence of endodontic infections was higher in females than in males. Most of the patients diagnosed with endodontic infections were of the age group 21-30 years followed by 31-40. Total number of antibiotics prescribed were 333. Amoxicillin was the highly prescribed drug with 95% followed by Metronidazole 15%. The prescription of other drugs were found in lesser percentages as 0.3% of cefixime. Among the total 300 analgesics prescribed in endodontic infections, 50.7% Aceclofenac and Paracetamol were higher followed by 46.7% of Diclofenac and Paracetamol and 2.7% of the population was not prescribed with any Analgesic. These study confirms that most of the drugs are prescribed rationally. In addition an interprofessional educational site was developed by incorporating pharmacists in the dental clinic and the patients were educated about the oral hygiene and the post-operative care of Root Canal Treatment and also the preventive measures for endodontic infections.

Keywords: Antibiotics, Analgesics, Pain management, Root canal treatment, Interprofessional, Endodontic, Dental.

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INTRODUCTION

Endodontics is the branch of dentistry which deals with diseases of dental pulp and peri-radicular tissues. Endodontics is a branch of dentistry which deals with morphology, physiology, and pathology of human pulp and peri-radicular tissues. Study of endodontics involves concepts of pulp biology, etiology, diagnosis, treatment, and prevention of the diseases and injuries of the pulp and associated peri-radicular tissues [1].

Endodontic Procedures:

In majority of cases, your tooth can be saved with endodontic treatment. Root canal treatment was designed to eliminate bacteria from the infected root canal and prevent reinfection of the pulpal origin and save the natural tooth [2].

Antibiotics used in endodontic treatments:

Antibiotics should also be considered as adjunctive in severe infections. The choice of antibiotic agent should be done on the knowledge of microorganisms associated with the endodontic infections.

Antibiotics are among the most important medications available and are indispensable in the battle against infectious diseases. Currently, however, many bacterial pathogens are partly resistant to an antibiotic [4]. Common Antibiotic Prophylaxis shown in Table-1.

TABLE:1- Common Antibiotic Prophylaxis

SITUATION	ANTIBIOTIC	REGIMEN
Standard Prophylaxis	Amoxicillin	Adult, 2.0g; children, 50 mg/kg orally 1h before procedure.
Standard Prophylaxis	Ampicillin	Adults, 2.0g IM or IV; children, 50 mg/kg IM or IV within 30min before procedure
Allergic to Penicillin	Clindamycin	Adult, 600mg; children, 20 mg/kg orally 1h before procedure.
	Cephalexin or Cefadroxil	Adult, 2.0g; Children, 50 mg/kg orally 1h before procedure.
	Azithromycin or Clarithromycin	Adults, 500mg; children, 15 mg/kg orally 1h before procedure.
Allergic to Penicillin and unable to take oral medications	Clindamycin	Adult, 600mg; children, 15 mg/kg IV 1h before procedure.
	Cefazolin	Adult, 1.0g; children, 25 mg/kg IM or IV within 30 min before procedure.

Antibiotic resistance: One of the most urgent public health issues in the world:

Antibiotic resistance occurs when bacteria learn to resist the medications meant to kill them. That implies that the bacteria survive and develop [18]. Because the bacteria reproduce swiftly, resistance features can be passed on to new generations of bacteria very quickly [6].

Reasons for the development of antimicrobial resistance fall into two broad categories:

- Over - prescription by health-care providers
- Improper use by patients [6].

CDC's recommendations for appropriate antibiotic use for health care providers:

- Only use antibiotics when the patient is likely to benefit from them.
- Utilize a pathogen-targeting agent.
- Use the antibiotic as directed regarding dosage and time.
- It is the responsibility of healthcare professionals to inform patients of the advantages and hazards of appropriate antibiotic use.

Additional information to convey to patients includes

- When the doctor decides an antibiotic isn't necessary, don't insist on getting one.
- Complete every prescription. If the patient doesn't finish the course of treatment, certain bacteria may still survive and reproduce long after the symptoms of an illness have subsided.
- Never use antibiotics that have been left over or that were prescribed for someone else. These antibiotics may be inappropriate for the current infection, and taking the wrong medicine could delay getting appropriate treatment and allow bacteria to multiply [6].

The role of the pharmacist in promoting responsible use of antibiotics

Providing information on the proper use of antibiotic medications (such as when and for how long), side effects, adverse reactions and interactions, and resistance issues vocally (in a patient-friendly message) and/or in writing (in a legible, intelligible message).

- Supply of amenities that encourage patients to seek help, like a display of AMR flyers and posters.]
- Telephone follow-up with patients to check on adherence.
- Patients and their family are given information about storage, equipment for handling, and trash disposal.
- Maintain and enhance performance on the profession [7].

Analgesics used in endodontic treatment:

Patients visit dental clinic due to pain of Endodontic origin. In certain cases, antibiotics and/or analgesics are indicated as adjuncts to conventional endodontic procedures [3]. Pain is a complex experience consisting of a specific sensation and the reactions evoked by that sensation⁸. Pain is a main reason for which dental care is sought by patients [5]. Pain management is an important aspect in endodontics. Analgesics or anti-inflammatory drugs are usually prescribed during root canal therapy; most of the cases can be managed by using non-narcotic analgesics such as NSAIDs [9]. A number of medications and medication combinations, including formulations containing opioids, may be taken into consideration for

the management of acute dental pain[10]. Dental professionals (regular dentists and dental specialists) are legally permitted to recommend, provide, and administer a wide range of medications. These medications are partially funded by Pharmaceutical Benefits Schedule (PBS). Antibiotics and analgesics are the two main types of these medications[11].

Nonopioid analgesics - The non-opioid analgesics include acetaminophen (APAP) and the non-steroidal anti-inflammatory drugs (NSAIDs). Non-opioids interrupt prostaglandin synthesis, thereby resembling aspirin in action[8]. NSAIDs are very helpful for initial inflammatory pain and offer outstanding analgesia for mild to moderate pain[3].

Paracetamol is widely used in dental pain as an antipyretic analgesic along with nonsteroidal anti-inflammatory medications (NSAIDs).

Aspirin and Non steroidal anti-inflammatory drugs (NSAIDS) are most common drugs. It irreversibly binds the enzyme cyclooxygenase, and blocks the arachidonic acid pathway and thus inhibits prostaglandins, which are the mediators of inflammation[5].

Opioid analgesics – For treatment of extreme dental pain, opioid analgesics are often rarely used[8].

Codeine is a methyl- morphine derivative which is a naturally acting opium alkaloid. It is given by the endodontists in moderate to severe pain.

Tramadol is centrally acting synthetic opium alkaloid used to treat medium intensity short lasting pain.

Propoxyphene exerts a similar action to codeine. It has been used as a mild oral analgesic as a substitute of codeine with aspirin and paracetamol[3].

Management of post-operative pain:

Step 1 regimens generally are adequate for mild and most cases of moderate dental pain. They should be prescribed continuously, not PRN. Effective patient education is absolutely essential if this is to be accomplished. They must take the medicine even when they are NOT having pain.

Step 2 regimens can be added but should not replace those in Step 1[8]. The steps are shown in table-2.

TABLE:2- Management of post-operative pain

Step 1	Ibuprofen 400-800 mg tid/qid or equivalent NSAID and/or Acetaminophen (APAP) 500-1000 mg qid
Step 2	Add any of the following to Step 1 regimen: Oxycodone 5-10 mg or Morphine 15 mg 1 or 2 tabs q4h PRN or Pentazocine/NX 50 mg or Tramadol 50 mg 1tab q4h PRN or Use combinations, provided no APAP included in Step1 HC/APAP 5-10/5001 or 2 tabs q4h PRN or OC/APAP 5-10/5001 or 2 tabs q4h PRN or Pentazocine/APAP 1 or 2 tabs q4h PRN or Tramadol/APAP 1 or 2 tabs q4h PRN

Interprofessionalism between dentists and pharmacists:

Pharmacists have served the health care community in many ways, thereby serving the needs of the community more effectively [12].

Collaboration between dentists and pharmacists provides patient-benefitting opportunities and innovative ways for improving health outcomes related to dental medicine [13].

Need of interprofessionalism:

Dental patients often have comorbidities and take multiple medications, some of which could impact their dental health and treatment. Pharmacists in a dental clinic can conduct dental patient’s medication history interview as and serve in their overall health.

Pharmacists in the dental clinic setting can identify potential interactions and adverse effects, provide dentists and staff with updates on evidence based guidelines [14].

Challenges:

The pharmacy team encountered several challenges in establishing services and performing patient care duties. Many of these are unique to a dental clinic setting.

- 1. Acceptance of the interprofessional role:** A lack of knowledge and understanding about a pharmacist's potential contributions to optimizing dental care is a great challenge for the pharmacists[14].
- 2. Physical space:** Due to the prior organization and space constraints of the dental clinic building, there can be inadequate infrastructure to accommodate a dedicated pharmacy counselling space or pharmacy-specific computers [14].
- 3. Lack of interaction:** The most common barrier to providing oral health services included lack of interaction among pharmacists and dentists. This calls for establishing better professional relationships between dentists and pharmacists [15].
- 4. Lack of oral hygiene knowledge:** It is imperative that continuing education opportunities should be provided to practicing pharmacists to better benefit the patients seeking oral health advice [15].

Outcome of inter-professionalism:

An inter professional education site can be successfully developed. The pharmacy team can plan to alter/expand their patient population focus[14].

Ethical Approval

Ethical approval was obtained from the vivekanandha medical care hospital and all the participants gave written informed consent before participating. Ref no: SVCP/IEC/SEP/2022/08.

MATERIALS AND METHODS

This was a prospective observational study to investigate antibiotic and analgesic prescription patterns for pain of endodontic origin and infection management. A sample of 300 was selected to provide a 95% confidence interval. This level of precision was regarded as sufficient for the study. Participants signed an informed consent form. Collection of prescription from the month of February to July written by dentists in endodontic department. Information present on the prescription was transferred to the data collection form. The patient demographics like age, gender, complaints and past medical/medication history were collected. Types of drugs prescribed were analyzed to identify the most commonly used antibiotics and analgesics and to assess its effectiveness in the endodontic treatment. Patient information leaflets were prepared and the patients were counselled about the antibiotic use and the effect of antibiotic resistance. Data was analyzed with SPSS software and Descriptive statistics. It was presented with frequency distribution tables with percentage and counts. Descriptive statistics of the sociodemographic characteristics of the participants were prepared. Numerical data were expressed as means \pm standard deviation or percentage, as appropriate. The test for associations between the diagnosis condition and the choice of the antibiotic and the analgesic was done using χ^2 statistical measurements. The χ^2 test was also used to measure possible significant effects of gender and age on the prescription of analgesics for dental pain management.

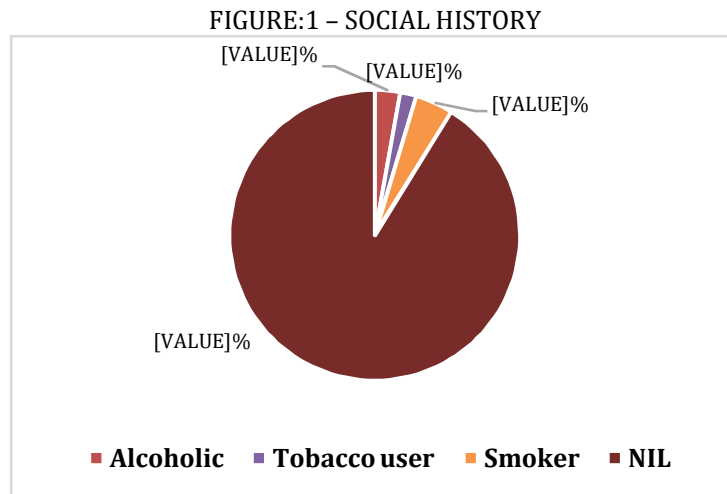
RESULTS

Out of all 300 patients 38.3% males and 61.7% females are included. Participants (n=300) with endodontic infection were aged between 1 to 80 years of age group were shown in Table-3.

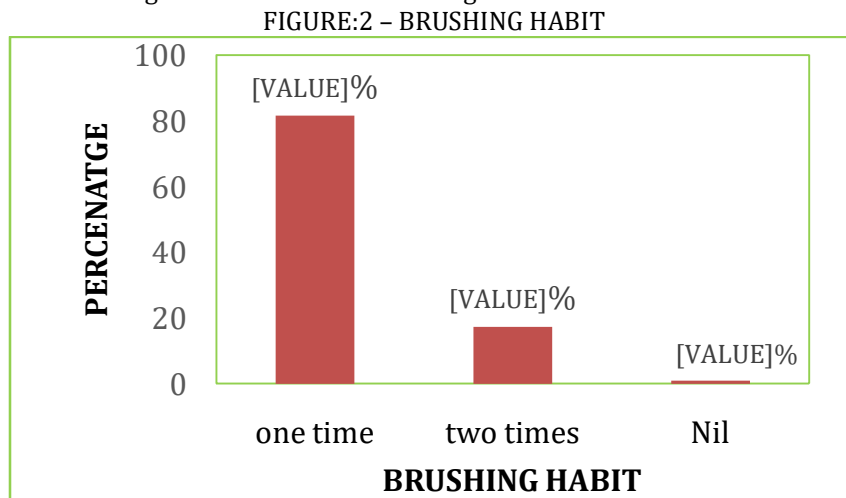
TABLE: 3-AGE OF THE PATIENTS

AGE	NUMBER OF PATIENTS	PERCENTAGE (%)
1-10	2	0.7
11-20	69	23.0
21-30	73	24.3
31-40	72	24.0
41-50	52	17.3
51-60	22	7.3
61-70	7	2.3
71-80	3	1.0

Figure 1 illustrates 25 patients out of 300 who already had alcohol or tobacco addiction.



The daily brushing routine of the patients were 17.3% patients brushes twice daily. Three patients were not clean their teeth on a regular basis were shown in fig-2.



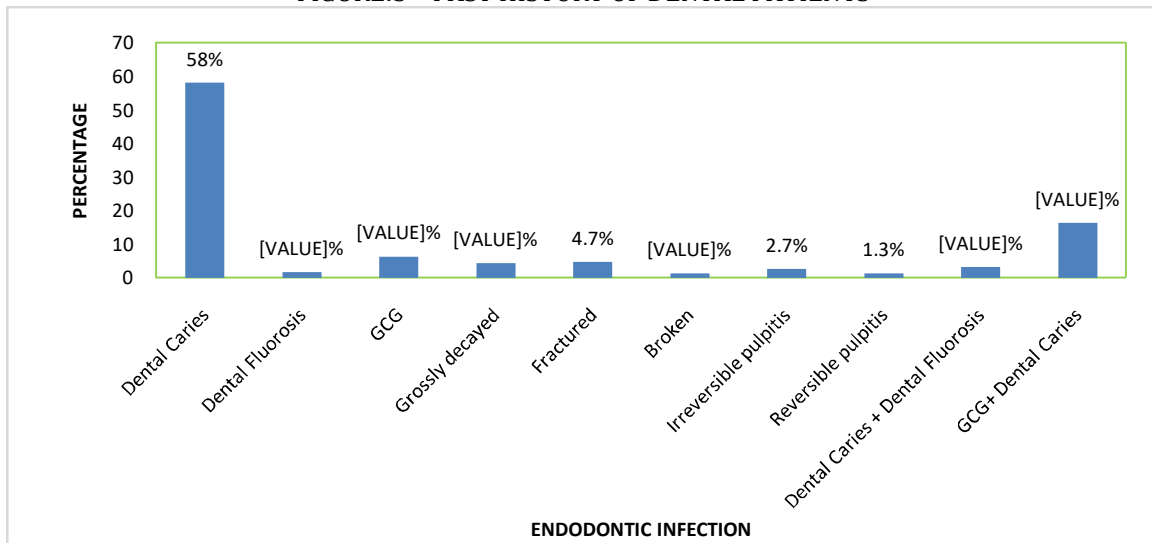
The patient’s dental histories were described in Table 4 based on the findings.

TABLE:4-DENTAL HISTORY OF THE PATIENTS

	NUMBER OF PATIENTS	PERCENTAGE (%)
First Dental Visit	113	37.7
Restoration	70	23.3
Root canal treatment	9	3.0
Extraction	81	27.0
Scaling	13	4.3
Oral Prophylaxis	8	2.7
Dental Caries	1	0.3

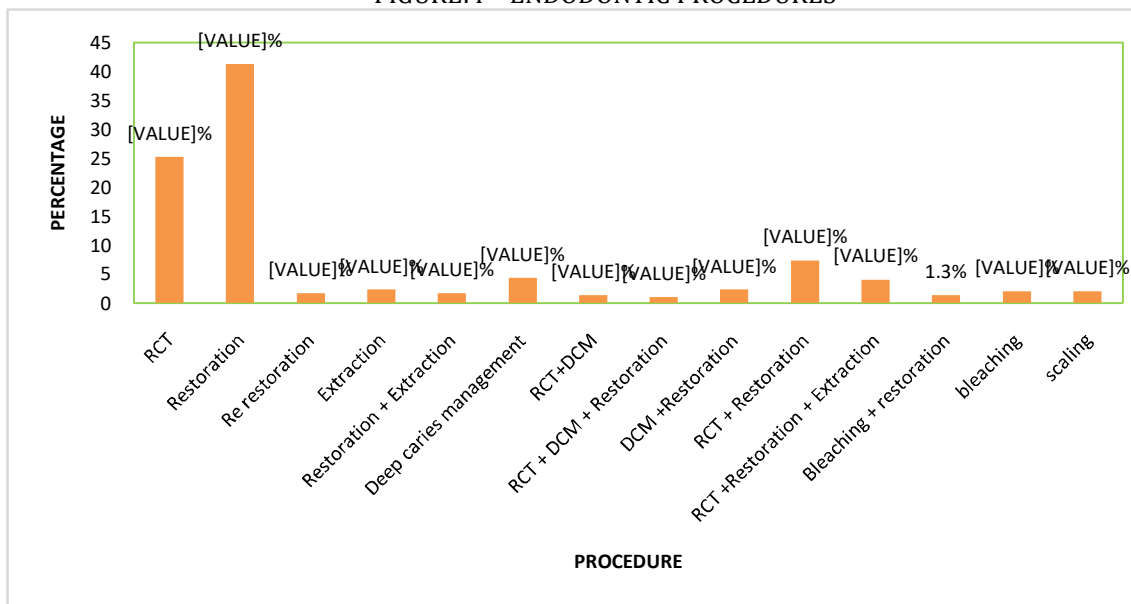
The results show that 174 (58%) patients had dental caries were the majority of those who received a diagnosis at the study site, followed by 49 patients with GCG+ dental caries (16.3%), 19 patients with GCG (6.3%), a 14 patients with fractured teeth (4.75%), (4.3%) patients with grossly decayed, 3.3% patients with Dental caries plus Dental Fluorosis, 2.7% patients had Irreversible Pulpitis, 1.7% patients had Dental Fluorosis, and 1.3% patients had Broken tooth and Reversible Pulpitis were shown in fig-3.

FIGURE:3 – PAST HISTORY OF DENTAL PATIENTS



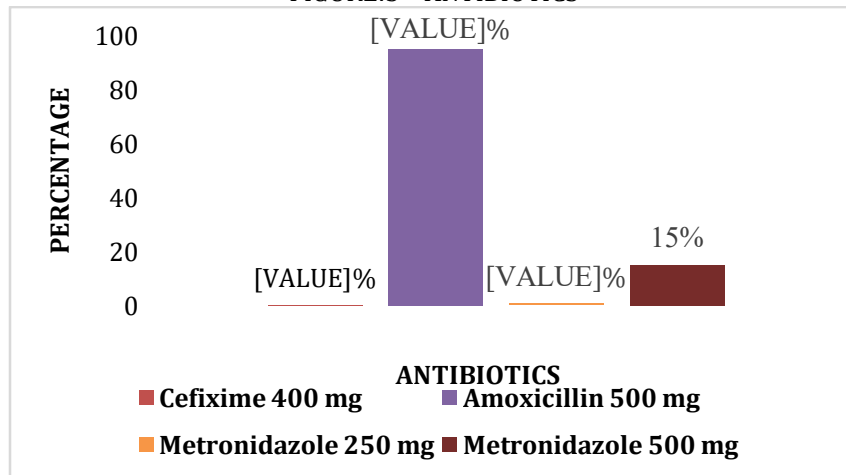
As a result of the findings, the endodontic treatment done to the patients. Restoration was carried out on 41.3% followed by Root Canal Treatment (RCT) 25.3%. RCT plus Restoration on 7.3% patients, 4.3% Deep Caries Management patients, etc., were shown in fig-4.

FIGURE:4 – ENDODONTIC PROCEDURES



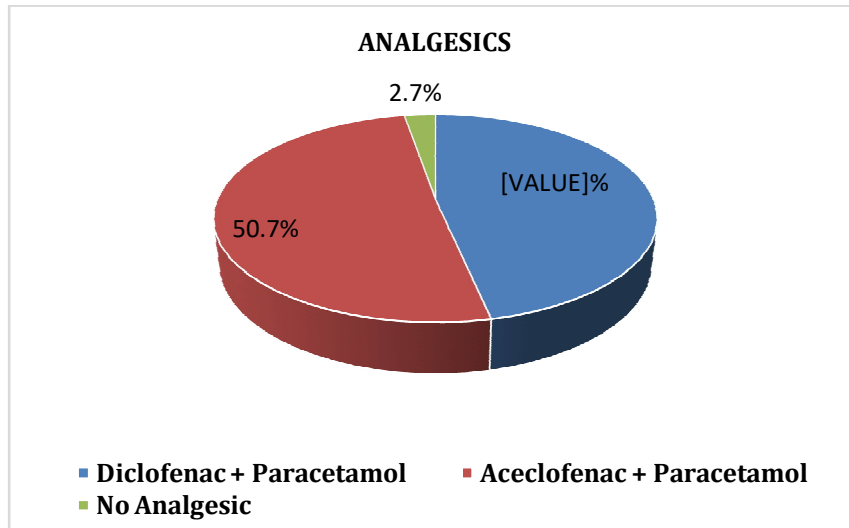
Most of the physician chose amoxicillin in non-allergic patients alone. Amoxicillin was prescribed as the first-choice antibiotic for 285 (95%) patients, which is appropriate for oral infection. For penicillin allergic patient cefixime was prescribed as the drug of choice for 1 (0.3%) patients, Metronidazole 500mg for 45 (15%) patients and metronidazole 250mg for 2 (0.7%) were prescribed for patients complaints on swelling and infection. The antibiotic were prescribed for 3 days. As for the duration of antibiotic prescription, physician prescribed antibiotics for 3 days were shown in fig-5.

FIGURE:5 – ANTIBIOTICS



The most commonly prescribed analgesics were Acelcofenac and Paracetamol (50mg plus 500 mg), and Diclofenac and Paracetamol (50mg plus 500mg). The Acelcofenac and Paracetamol was prescribed to 152 (50.7%) patients and Diclofenac plus Paracetamol was prescribed to 140 (46.7%). 8 (2.7%) were not prescribed with analgesics were shown in fig-6.

FIGURE:6- ANALGESICS



DISCUSSION

When comparing patient groups for endodontic treatment by gender, more female patients than male patients were discovered. When patients were grouped by gender, there were more female (185) patients and male (115) patients were discovered. This outcome was contrasted with the findings of the study by Andrei Barasch *et al.*, specifically, participants over the age of 45 (83% vs. 75% for those under 45, $p = 0.003$) [16].

The most often given antibiotics in the current study were cefixime (400 mg), amoxicillin (500 mg), metronidazole (250 mg), and metronidazole (500 mg). These are the medications that are prescribed here for endodontic therapy. The most common medication was Amoxicillin 500 mg for 285 patients. Jiali Yu *et al.* were evaluated in the study. Before performing a root canal, the dentist prescribed amoxicillin for a number of conditions. Metronidazole was the second-most commonly prescribed antibiotic by dentists, trailing only amoxicillin [16].

Patients receiving endodontic treatment frequently use analgesics. Diclofenac and paracetamol, as well as aceclofenac and paracetamol, are the analgesics that are used. As a result, 152 individuals received prescriptions for Aceclofenac and paracetamol, compared to 140 patients who received Diclofenac and paracetamol. The work of Maslamani *et al.* was compared to this one. In terms of analgesics, 89 participants received ibuprofen (600 mg) on a regular basis, while 93 people (41% received diclofenac 50 mg on a regular basis)[11].

The endodontic procedure comprises deep caries care, extraction, restoration, and root canal therapy. High tooth survival rates are demonstrated by systematic evaluations of the results of nonsurgical retreatment, apical surgery, replantation, and autotransplantation[17].

At this study, we created an interprofessional teaching site in the dental clinic by helping with patient counselling because dental patients typically have co-morbidities and take a variety of drugs, some of which may have an effect on their oral health and treatment. In the study, Johnson KL et al. were assessed. A pharmacist working in a dental clinic can aid in the gathering, recording, and evaluation of a dental patient's medication history in connection to their dental visit and general health. The clinical pharmacy team's presence was mostly tolerated by the dentistry faculty, staff, students, and patients. Clinical pharmacists can play an important role in dentistry clinics by gathering thorough health and medication histories, connecting with dental and medical specialists involved in a patient's treatment, and more [13]. Al-Saleh *et al.* Due to Lack of interaction with dental professionals was recognised as the most important barrier to providing oral health services to clients. Only 26.5% of undergraduate students who had formal oral health instruction in their programmes were always comfortable giving oral health advice. Nearly one third (35.6%) did. In our prospective study, we encountered no such obstacles, and dental professionals embraced the pharmacists [14].

CONCLUSION

The study confirms that Antibiotics and analgesics were prescribed rationally to the patients with endodontic infections. The use of systemic antibiotics in endodontics should be limited to specific cases. Amoxicillin is the most recommended drug of choice in Antibiotic, because of better absorption and lower risk of side effects, while aceclofenac is the most recommended Analgesic. The effects of demographic details of the patients on the drug prescription patterns were analysed and it was confirmed that the drugs were not prescribed according to the patient demographics. Integrating the pharmacy team into dental clinic will provide dentists and dental students with medication related support and contribute to more robust dental and overall healthcare for patients.

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