Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/xxx
DOI URL: http://dx.doi.org/10.21474/IJAR01/xxx

RESEARCH ARTICLE

PHARMACOLOGY IN ENDODONTICS

Dr. Shazia Siddiqui, Dr. Nurez Anwar, Dr. Rehan Ahmad Khan, Dr. Asmita Gupta, Dr. Sandhya Yadav and Dr. Anubha Srivastav

Manuscript Info

Manuscript History
Received: 21 April 2022
Final Accepted: 24 May 2022
Published: June 2022

Abstract

Aim: This review article focusses on the availability of drugs and their use in Endodontics.
Background: This study aimed at reviewing the use of analgesics, antibiotics and their use in Endodontics, in form of oral or its application. Dosage and inappropriate use of drugs was added into this review.
Methods: The systematic literature search was performed in three databases from 1993 to 2013.English articles that focused on drugs used in endodontics and their role were searched. Systematic and narrative reviews were included.
Result: After evaluation of search papers, 12 relevant articles were used in this review. The importance of drugs with their role, dosage, uses are highlighted in this study. Drugs play an essential role in treatment protocol but at the same time its misuse should be avoided.
Conclusion: There is availability of systemic and topical drugs but their use and dose should be assessed before administration and unnecessary use of these should be avoided.

Introduction:-

A medicine is the substance which has a physiological effect when ingested or otherwise introduced into the body(*Oxford dictionary)*. A *pharmaceutical drug, also referred to as a medicine or medication, officially called medicinal product, can be* defined as any chemical substance — or product comprising such —intended for use in the medical diagnosis, cure, treatment, or prevention of disease.

Table1:- Based on when the drug is administered-

Pre treatment	Treatment	Post treatment
analgesics, antibiotics, anti-anxiety	corticosteroids, antibiotics, local anaesthesia	antibiotics, corticosteroids, analgesics

Table 2:- Based on route of administration-

Local	Systemic
topical antibiotics, topical anaesthetics	Oral- antibiotics, analgesics, anti anxiety Injectable-

Corresponding Author:- Dr. Shazia Siddiqui

	im/iv- antibiotics, analgesics, sedatives Inhalation- sedatives, anaesthesia

Mechanism Of Sensation-

Touch is the detection of mechanical stimulus impacting the skin, including innocuous and noxious mechanical stimuli. Specialized mechanoreceptors respond to cutaneous deformation in a specific way and relay these stimuli to higher brain structures. Somatosensory neurones of the skin fall into two groups: low-threshold mechanoreceptors (LTMRs) that react to benign pressure and high-threshold mechanoreceptors (HTMRs) that respond to harmful mechanical stimulation. LTMR and HTMR cell bodies reside within dorsal root ganglia (DRG) and cranial sensory ganglia (trigeminal ganglia). Nerve fibers associated with LTMRs and HTMRs are classified as Aβ-, Aδ- or C-fibers based on their action potential conduction velocities. C fibers are unmyelinated and have the slowest conduction velocities (~2 m/s), whereas Aδ and Aβ fibers are lightly and heavily myelinated, exhibiting intermediate (~12 m/s) and rapid (~20 m/s) conduction velocities, respectively.

Pain is an, unpleasant sensory and emotional experience associated with actual or potential tissue damage - The International Association for the Study of Pain (IASP).Pain Pathway comprises of-TRANSDUCTION, TRANSMISSION, PERCEPTION, MODULATION. Pain stimuli is converted to energy. This energy is known as *Transduction.* This stimulus sends an impulse across a peripheral nerve fiber (nociceptor). A delta fibers (myelinated) send sharp, localized and distinct sensations. C fibers (unmyelinated) relay impulses that are poorly localized, burning and persistent pain. Pain stimuli travel- spinothalamic tracts. Person is aware of pain – somatosensory cortex identifies the location and intensity of pain. Person unfolds a complex reaction-physiological and behavioral responses are perceived. Inhibitory neurotransmitters like endogenous opioids work to hinder the pain transmission. This inhibition of the pain impulse is known as modulation.

Discussion:-

Analgesics

Analgesics are the class of drug that selectively relieves pain by acting in the Central Nervous System or on Peripheral Nervous System. They are divided into two groups-

Opioid Analgesics, Non-Opioid Analgesic/ NSAIDs. These two class of drugs are basically used to relieve the pain and they act through different mechanisms to relieve this unpleasant sensation. They include a variety of different drugs of different chemical classes which perform this action of analgesia.

The major mechanism of action of NSAIDs is inhibition of cycloxygenase and thus inhibiting the prostaglandin production. This class of drugs are contraindicated in patients with gastrointestinal ulcers, bleeding abnormalities and hence opioid analgesics can be used. Opioids act in the substantia gelatinosa of dorsal horn to inhibit release of excitatory transmitters carrying pain impulses. They exert their action by interacting with specific receptors present on neurones in the CNS and in peripheral tissues.

NSAIDS

Many NSAIDs like Ibuprofen, Aspirin, Flurbiprofen, Ketorolac, and Etodolac have shown to produce significant reductions in dental pain using clinical trials. They act primarily through the inhibition of cyclooxygenase (COX) enzymes 1 and 2. COX-1 has a role in protection of stomach mucosa, kidney function and platelet action. COX-2 is induced by various endogenous compounds such as cytokines, mitogens and endotoxins in inflammatory cells and is responsible for the elevated production of prostaglandins during inflammation. Nakanishi et al demonstrated high levels of expression of COX-2 in samples of human dental pulps with a diagnosis of irreversible pulpitis.

NSAIDS combined with other drugs (e.g., flurbiprofen with tramadol) or pretreatment and posttreatment application of NSAIDs provides effective pain control.

The introduction of selective inhibitors of COX-2 offered the potential for both analgesic and antiinflammatory benefits and reduced GastroIntestinal irritation.

Limitations and Drug Interactions-
Also associated with severe Gastrointestinal complications and risk of adverse effects increases with increasing lifetime accumulated dose of these drugs. Acetaminophen and opioid combination drugs represent alternatives for those patients unable to take NSAIDs.

Acetaminophen-
It is one of the most commonly used drugs found in Combination products for the relief of pain and symptoms of cold or flu. It is considered safe when taken at normal doses, but in higher doses causes liver toxicity and has become the most common cause of acute liver failure. The dosage for healthy adults should not take more than 4 g (4000 mg) of acetaminophen in a 24-hour period. It gets conjugated in the liver to form inactive metabolites.A small portion is metabolized by the cytochrome P450 system to form *Nacetyl- p-benzoquinone imine (NAPQI),* which is very toxic but is generally detoxified by glutathione and converted into nontoxic compounds. Large doses of acetaminophen saturate the main route of metabolism, causing more acetaminophen to be converted to NAPQI. Liver injury occurs once glutathione becomes depleted and NAPQI is allowed to accumulate.

OPIUM
It is a dark brown, resinous material obtained from poppy (Papaver somniferum) capsule. It is known from earliest times, mentioned in Eber's papyrus (1500 BC), in the writings of Theophrastus (300 BC) and Galen (2^{nd} century AD).Its consumption became a social custom in China in the 18^{th} century. Serturner, a pharmacist, isolated the active principle of opium in 1806 and named it morphine, after the Greek God of dreams Morpheus.

Opioid Analgesics-
Generally used in dentistry in combination with acetaminophen, aspirin, or ibuprofen.

It activates opioid receptors located at several important sites in the brain. Activation of these receptors inhibits the transmission of nociceptive signals from the trigeminal nucleus to higher brain regions. Opioids also activate peripheral opioid receptors located in dental pulp.Adverse side effects, which can include nausea, emesis, dizziness, drowsiness, and the potential for respiratory depression. A combination formulation is preferred because it permits a lower dose of the opioid, thereby reducing side effects. Codeine is often considered the prototype opioid for orally available combination drugs. Dosage:60-mg dose of codeine produces less analgesia than either aspirin 650 mg or acetaminophen 600 mg.

Serratiopeptidase-
Serratiopeptidase (Serratia E-15 protease, also known as serralysin, serrapeptase, serratiapeptase, serratia peptidase, serratio peptidase, or serrapeptidase) is a proteolytic enzyme (protease) produced by enterobacterium *Serratia* sp. E-15. This microorganism was originally isolated in the late 1960s from silkworm *Bombyx mori* L. (intestine). Serratiopeptase is produced by purification from culture of Serratia E-15 bacteria.It is an excellent alternative to salicylates (aspirin), ibuprofen, and the more potent NSAIDs. Unlike these medications, SerraEzyme is a naturally occurring enzyme and that does not irritate the digestive system. The Dosage is 5-10mg TDS. The side effects include Skin rash, diarrhea, loss of appetite, gastrointestinal disturbance and nosebleed. Trade names are Kinex (10 mg), Zedase (5 mg), Pepseera (5 mg).

Antibiotics-
The rational use of antibiotics is based upon three variables: a defined indication,the appropriateness of the antibiotic, and the adverse effects associated with the drug.

Antibiotics are prescribed in endodontic practice for either therapeutic or prophylactic purposes.

Penicillins-
Half Life of Penicillins short, limited to about 1 hour.Amoxicillin is generally considered the penicillin of first choice because of its somewhat better absorption from the gut. Also used for periodontal abscesses, periapical abscesses, pericoronitis, acute suppurative pulpitis, necrotizing ulcerative gingivitis, oral cellulitis etc. It is less active against Shigella and H.influenza. Its Dosage resolve with 250-500 mg TDS given for 5 days.

Cephalosporins-
It is obtained from fungus Cephalosporium. Its four generations are

1-First generation- high activity against gram +ve, weak against gram –ve (Cefazolin, cephalexin, cephradine, cefadroxil)
2-Second generation- more active against gram -ve (Cefaclor, cefuroxime)
3-Third generation- highly augmented activity against gram –ve enterobacteriaceae, some inhibit pseudomonas, less active on gram positive cocci and anaerobes (Cefixime, cefdinir, cefotaxime, ceftizoxime, cefoperazone)
4-Fourth generation- highly resistant to B-lactamases, active against many bacteria resistant to earlier drugs. (Cefepime, cefpirome).
All are bactericidal with same mechanism of action as penicillin, i.e inhibition of bacterial cell wall synthesis.

Metronidazole-
Metronidazole is considered a bactericidal drug. It attacks the bacteria's DNA and works against obligate anaerobes but not against facultative bacteria or aerobes. Metronidazole is often used in combination with another antibiotic, usually amoxicillin. Its Half-life is in the 8- to 10-hour range.The side effects include an unpleasant, metallic taste and brown discoloration of the urine, effects that are dose related.

Tinidazole-
It is an equally efficacious congener of metronidazole. Half life is 12hours. Incidence of side effects is lower- metallic taste, nausea, rash.Dose-should not exceed 2gms per day.

Ornidazole-
Activity similar to metronidazole, but longer half life: 12-14 hours. Side effect profile is also similar.

Macrolides-
It acts by inhibiting bacterial protein synthesis. Its of narrow spectrum, mostly gram +ve, few gram –ve, highly active against Str.pyogens, Str.pneumonia, N.gonorrhoeae etc.The Half life is 1.5 hours. Dose is 250-500 mg 6 hourly. Adverse effects include GIT- diarrhoea, epigastric pain, high doses hearing impairment, hypersensitivity. It is second choice drug to penicillins in dental infections and also valuable to patients allergic to penicillins.

Azithromycin-
It is more active than other macrolides against H.influenza, Peptostreptococcus, Clostridia and less active against gram +ve cocci. It possess acid stability, rapid oral absorption, marked tissue distribution and intracellular penetration.

The Dosage is azithral 500 mg once daily is sufficient for most infections. The Side effects include Mild gastric upset, abdominal pain, headache and dizziness.

Clindamycin-
It is often indicated in endodontic infections. It is rapidly and completely absorbed and has a good spectrum of killing oral pathogens, including many anaerobes. It was, however, the first antibiotic to be associated with causing pseudomembranous colitis, a life-threatening condition in which large patches of gut slough epithelium because of toxins from overgrowth of the nonsusceptible organism *Clostridium difficile.* The Half-life is about 3 hours.

Tetracyclines-
Tetracyclines, including tetracycline-HCl, minocycline, demeclocycline and doxycycline, are a group of broad-spectrum antibiotics that are effective against a wide range of microorganisms. It is bacteriostatic in nature, this property may be advantageous because, in the absence of bacterial cell lysis, antigenic byproducts such as endotoxin are not released. It causes inhibition of mammalian collagenases, which prevent tissue breakdown, inhibition of clastic cells, which results in anti- resorptive activity.

Fluoroquinolones-
They inhibit the enzyme bacterial DNA gyrase. The generations are-
1-First generation(Norfloxacin, Ciprofloxacin, Ofloxacin) – active against broad range of bacteria, but the most susceptible ones are the aerobic gram negative bacilli.
2-Second generation (Levofloxacin, Moxifloxacin)- improved activity against gram positive and gram negative bacteria.

Therapeutic antibiotics in Endodontics-
An Adjunct to the treatment-In healthy patients endodontic infections can be treated solely by the early establishment of drainage and removal of the cause of the problem, for example, debridement of the infected root canal system or surgical removal of extraradicular infection. In acute infections antibiotics may be indicated because there is a diffuse spreading infection or evidence of systemic involvement. Antibiotics are not an alternative to dental intervention; they are an adjunct to it.In medically compromised patients host-defence mechanisms may be thought to be inadequate, hence the treatment may sometimes be supplemented with therapeutic antibiotics.

Choice of antibiotic?
At least 70 different bacterial species have been isolated from root canals and synergistic relationships are thought to exist between them. The majority of symptomatic, infected root canals contain anaerobes; it has been proposed that the larger the number of bacterial species present the more symptoms will be experienced.

It has also been demonstrated that intracanal flora from teeth with failed endodontic therapy differs markedly from the root canals of untreated teeth. The most commonly prescribed antibiotics are erythromycin, amoxicillin, penicillin and metronidazole.

Some anaerobes isolated from the endodontic lesions are resistant to penicillin and therefore serious infections are treated empirically with a combination of metronidazole and a penicillin.Tendency in dental practice is to use courses of antibiotics 3–5 days for the treatment of infection .Prolonged courses of antibiotics destroy the commensal flora and abolish colonisation resistance.

The prescribing of systemic antibiotics must therefore be justifiable. The first reported local use of an antibiotic in endodontics was in 1951 when Grossman used a polyantibiotic paste known as PBSC (a mixture of penicillin, bacitracin, streptomycin, and caprylate sodium).Later, Nystatin replaced caprylate sodium as an antifungal agent in a similar medicament, known as PBSN.

Septomixine Forte
Septomixine Forte (Septodont, Saint- Maur, France) contains two antibiotics: Neomycin and Polymixin B sulfate. Tang et al. who demonstrated that a routine one-week application of Septomixine Forte was not effective in inhibiting residual intracanal bacterial growth between appointments. In addition, although the anti-inflammatory (corticosteroid) agent, dexamethasone (at a concentration of 0.05%), is clinically effective, triamcinolone is considered to have less systemic side effects.

Triple antibiotic paste
The infection of the root canal system is considered to be a polymicrobial infection, consisting of both aerobic and anaerobic bacteria.Due to the complexity of the root canal infection, it is unlikely that any single antibiotic could result in effective sterilization of the canal. More likely a combination would be needed to address the diverse flora encountered. A combination of antibiotics would also decrease the likelihood of the development of resistant bacterial strains.

The combination that appears to be most effective consists of metronidazole, ciprofloxacin, and minocycline.

Topical antibiotics and endodontics-
The limited spectrum of activity of the antibiotic preparations available, the potential for bacterial resistance, the risk of drug hypersensitivity and the potential to mask certain aetiological factors limit their usefulness.

Pulpitis -
There is no convincing evidence to justify the use of Ledermix (Lederle Lab Gosport, Hants, UK) to sedate the pulp prior to definitive treatment.There is no indication for the use of topical antibiotics in the treatment of pulpitis.

Pulp capping-
Calcium hydroxide is the most popular agent for both direct and indirect pulp capping. It possess anti-bacterial action, stimulates secondary dentine formation.

Root canal therapy-
The most important elements of root canal preparation are effective access and aseptic biomechanical preparation. Early investigations evaluated two antibiotic-containing preparations: Grossman's polyantibiotic paste, which contains penicillin, bacitracin or chloramphenicol and streptomycin. A mixture of neomycin, polymixin and nystatin. Both of these had some efficacy as intracanal medicaments.

Perio-endo lesions-
Topical antibiotics, such as the tetracyclines or metronidazole, may be applied by some clinicians, to the periodontal defect as an adjunct to root planing.

Local Anaesthetics –Classification
1- Injectable
a. Short duration (30 minutes)-
- Procaine

b. Intermediate duration (60 minutes)-
- Lignocaine, prilocaine

c. Long duration (over 90 minutes)-
- Tetracaine, bupivacaine, ropivacaine, dibucaine

2- Surface anesthetic
a. Soluble
- Cocaine
- Lignocaine
- Tetracaine
- Benoxinate

b. Insoluble
- Benzocaine
- Butylaminobenzoate (Butamben)

Mechanism Of Action
It acts by inhibiting sodium influx through sodium-specific ion channels in the neuronal cell - voltage-gated sodium channels.When the influx of sodium is interrupted - action potential cannot rise and signal conduction is inhibited. Local anesthetics bind (located at inner surface) more readily to sodium channels in activated state – and slows its reversion to the resting state.

Sensitivity Testing
Intracutaneous Test-Agents are diluted sequentially (1/100 or 1/10) with 0.9% saline, if needed. Local anesthetics are injected on the extensor surface of the arm in a small volume (0.02 ml) that produces a wheal of a few mm in diameter. Redness or swelling in the area around the injection site was measured every 5 minutes until 20 minutes, and the judgments were as follows: a positive response, redness of more than 20 mm; a false-positive response, redness of 10-19 mm; or a negative response, redness of less than 10 mm in diameter.

Lignocaine (lidocaine)
It is Most widely used and can be used for surface application and in injectable form.

It blocks nerve conduction in 3 mins whereas procaine may take upto 15 mins. Overdose causes muscle twitching, convulsions, cardiac arrhythmias, fall in BP, coma, respiratory arrests. For Dental use- 2% with or without adrenaline 1:80,000

Mepivacaine
Available in formulation containing levonordefrin, an adrenergic agonist, 1:20000 conc.

Articaine
4% solution containing 1:100,000 and 1:200,000 epinephrine. It is an amide anesthetic that contains thiophene ring and ester linkage. The maximum dose is 7 catridges compared to 13 catridges of 2% lidocaine. It possess potential to cause methemoglobinemia and neuropathies.

Bupivacaine
It causes prolonged pain control, long acting. Bupivacaine exhibits prolonged soft tissue numbness or lip sign. It has slower onset than lidocaine but twice the duration of action (around 4 hours) in mandible.Cardiac patients (e.g., those with unstable angina pectoris, history of myocardial infarction or stroke within the past 6 months, severe hypertension, uncontrolled congestive heart failure, or heart transplant) should not receive a local anesthetic containing a vasoconstrictor and should consult their physicians before undergoing endodontic treatment.Thorough review of the medical history is an absolute requirementfor using bupivacaine. Potential drug-drug interactions occur primarily with the vasoconstrictors in local anesthetic formulations.

Patients Allergic to Local Anaesthesia
Patients who present with a history of "allergy" to local anesthetics are common in clinical practice. Injectable 1% diphenhydramine is a safe, inexpensive, and effective local anesthetic for patients who report "caine" allergies. Utilizing this agent permits the clinician to operate at the time of the initial visit and schedule a referral to the allergist for definitive sensitivity testing at the patient's convenience. It is a first-generation, sedating, oral antihistamine. When topically applied, Diphenhydramine Hydrochloride has excellent anesthetic and antipruritic effects.

Recent Drug Delivery Methods For Local Anesthesia
Effective delivery of local anesthesia is one of the keystones of modern dental practice. Development of newer technologies has provided enhanced pain relief with diminished pain from injection and fewer side effects. The advances are-
1. Electronic Dental Anesthesia – EDA
2. Intra-oral Lignocaine Patch- Dentipatch
3. Jet Injection
4. Iontophoresis
5. EMLA
6. Computer Controlled Local Anesthetic Delivery Devices – CCLAD
7. Intra-osseous Systems – IO Systems

Electronic Dental Anesthesia:
this technique involves the use of the principle of Transcutaneous Electrical Nerve Stimulation (TENS) which has been used for the relief of pain. It can be used a supplement to conventional local anesthesia. Some limitations of this technique are increased salivary flow and inability to use metal instruments freely. It is contraindicated in several conditions such as heart disease, seizures, neurological disorders, brain tumors, patients wearing pacemakers and cochlear implants.

Dentipatch:
a patch that contains 10-20% lidocaine is placed on the dried mucosa for 15 minutes. Hersh et al (1996) studied the efficacy of this patch and recommended it for use in achieving topical anesthesia for both maxilla and mandible.

Jet Injection:
In this technique a small amount of local anesthetic is propelled as a jet into the submucosa without the use of a syringe/needle from a reservoir. This takes place when the knob is pressed to release air pressure which produces a fine jet of solution which penetrates the mucosa through a small puncture wound to produce surface anesthesia. This technique is particularly effective for palatal injections.

Iontophoresis:
This technique first introduced in 1993 is a suitable alternative for application of drug in achieving surface anesthesia. It is a painless modality of administrating anesthesia. Initial reports have shown an encouraging response from patients; however, further research is warranted.

EMLA –
Eutectic Mixture of Local Anesthetics: It contains a mixture of lignocaine and prilocaine bases, which forms an oil phase in the cream and passes through the intact skin. Clarke et al in 1986 suggested the use of EMLA cream for anesthetizing the skin prior to needle insertion as this reduces the incidence of injection pain.

The first of these CCLAD devices, the Wand™ (Milestone Scientific, Inc., Livingston, N.J.), was introduced in 1997. The system enabled a dentist to accurately manipulate needle placement with fingertip accuracy and deliver the Local Anaesthetic with a foot-activated control. The lightweight handpiece is held in a pen-like grasp that provides the user with greater tactile sensation and control compared to a traditional syringe. The available flow rates of delivery are controlled by a computer and thus remain consistent from one injection to the next.

Intra-Osseous Anesthesia:
The use of motor driven perforator to penetrate the buccal gingiva and bone can be considered as the first modern technique of IO anesthesia. The devices used for this technique, inject the solution into the cancellous bone adjacent to the root apex.

Inhalational anaesthesia-
An inhalational anaesthetic is a chemical compound possessing general anaesthetic properties that can be delivered via inhalation. They are administered by anaesthetists through an anaesthesia mask, laryngeal mask airway or tracheal tube connected to an anaesthetic vaporiser and an anaesthetic delivery system. Agents of significant contemporary clinical interest include volatile anaesthetic agents such as isoflurane, sevoflurane and desflurane, as well as certain anaesthetic gases such as nitrous oxide and xenon.

Corticosteroids
They comprise glucocorticoids and mineralocorticoids. Glucocorticoids have been used in endodontics for their potent antiinflammatory effects. The anti-inflammatory properties of glucocorticoids were first appreciated and utilized as an adjunct in endodontic therapy almost half a century ago. Glucocorticoids have been used as an intracanal medication either alone or in combination with antibiotics/ antihistamines, and systemically as a means to decrease pain and inflammation in endodontic patients.

Glucocorticosteroids reduce the acute inflammatory response by suppressing vasodilation, migration of polymorphonuclear (PMN) leukocytes, phagocytosis, inhibiting formation of arachidonic acid from neutrophil and macrophage cell membrane phospholipids, thus blocking the COX and lipoxygenase pathways and respective synthesis of PGs and leukotrienes.

Ledermix-
Ledermix is a paste that combines 1% triamcinolone acitonide (a corticosteroid) and demethylchlorotetracycline (demeclocycline, a tetracycline analog).It is used as a root canal medicament because of its anti-inflammatory and antimicrobial properties. However, given the relative safety/efficacy relationship between steroids and NSAIDs, most investigators choose an NSAID as the drug of first choice for postoperative pain control.

Antibiotic prophylaxis for dental procedures-
All regimens are a single dose given 30-60 mins before the procedure
1-Standard oral regimen
Adults- 2 gm amoxicillin
Children- 50 mg/kg
2-Alternative oral regimen for patients allergic to penicillin or patients who are currently taking a penicillin class antibiotic.
Adults-2 gm cephalexin or 600 mg clindamycin or 500 mg azithromycin
Children-50 mg/kg cephalexin or 20 mg/kg clindamycin or 15 mg/kg azithromycin.
3-Patients unable to take oral medication
Adults-2 gm iv / im ampicillin or 1 gm im / iv cefazolin
Children-50 mg/kg im or iv ampicillin or 50 mg/kg im or iv cefazolin
4-Alternative im/iv regimen for patients allergic to penicillin and unable to take oral medications
Adults-1 gm im/iv cefazolin or 600 mg im/iv clindamycin
Children-50 mg/kg im/iv cephazolin ; 20 mg/kg im/iv clindamycin within 30 mins before the procedure.

Recent Intracanal local drug delivery systems-
Intracanal local drug delivery agents usually consist of antibiotics to eliminate bacterial infection and non steroidal anti inflammatory drugs to reduce/eliminate post operative pain, after mechanical cleaning has been done. Many systems of different shapes (sharp cones, long pins or screws) have been proposed for placement in the root canal as

a temporary dressing for local drug delivery and healing. Huang et al conducted a study in which chlorhexidine-loaded devices were prepared with ethyl cellulose, to form a needle-like device suitable to be inserted in the root canal. Chitosan and polymethylmethacrylate have been used as coatings for absorbent paper to examine the controlled release of chlorhexidine digluconate .

Microparticulate systems-

Novel formulations based on microparticles, which appear promising for the accessibility to the conventionally inaccessible parts of the root canal which have been developed. Sousa et al developed amoxicillin-loaded microparticles (5–38 μm) by spray-drying. The antimicrobial activity of amoxicillin was preserved when it was encapsulated.

Conclusion:-

It can be concluded, therefore, that endodontic treatment does not require antibiotic prophylaxis. Systemic antibiotics should normally only be prescribed to treat dental infections on the basis of a defined need. The potential benefits of antibiotic administration should therefore outweigh the possible disadvantages associated with their use. A dentist who prescribes an antibiotic for a questionable indication may be seen as placing a patient at risk from potential adverse effects of drug.

References:-

1. Zahed Mohammad, Alireza Farhad, Meisam Khalesi. Pharmacological Strategies to Control Post-operative Endodontic Pain. Dent Res J 2007; 4(2):61-68.
2. L.P. Longman, A.J. Preston, M.V. Martin, N.H.F. Endodontics in the adult patient: the role of antibiotics. Wilson Journal of Dentistry 2000; 28:539–548.
3. Fazakerley MW, McGowan P, Hardy P, et al. A comparative study of cephradine, amoxycillin and phenoxymethylpenicillin in the treatment of acute dentoalveolar infections. British Dental Journal1993;174:359–63.
4. Martin MV, Longman LP, Hill JB, et al. Acute alveolar infections: an investigation of the duration of antibiotic therapy. British Dental Journal 1997;183:135–7.
5. McDonnell G, Russell AD. Antiseptics and disinfectants: activity, action, and resistance. Clinical Microbiology Reviews 1999;12:147–79.
6. Rakesh Mittal, Jamal M El- Swiah, Vandana Dahiya. Anaesthetising Painful Pulp in Endodontics-A Review. JOHCD. September 2011;5(3).
7. Zahed Mohammadi, Alireza Farhad, Meisam Khalesi. Pharmacological Strategies to Control Post-operative Endodontic Pain. Dent Res J 2007; 4(2): 61-68.
8. Zahed Mohammadi .An update on the antibiotic-based root canal irrigation solutions. IEJ Spring 2008;3(2)
9. AGGARWAL R, SINGLA M, MITTAL N. Endodontic Consideration for the Usage of Drugs in Pregnant and Lactating Mothers Journal of Clinical and Diagnostic Research. 2010 August ;(4):2974-2978
10. Marina George Kudiyirickal, Romana Ivančaková. Antimicrobial agents used in endodontic treatment. ACTA MEDICA (Hradec Kralove) 2008;51(1):3–12.
11. Neelam Mittal, Jyoti Jain. Antibiotics as an intracanal medicament in endodontics: A review. Indian journal of dentistry 2013;4: 29-34.
12. ? Ashraf f. Fouad. Are antibiotics effective for endodontic pain, Endodontic Topics 2002, 3: 52–66.