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Review Article

Different root canal medicaments used in dentistry: A literature review

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ABSTRACT

Root canal medicaments play an important role in the step of cleaning of root canal. These medicaments are used to make the root canal space free from infection causing micro organisms. There are different types of root canal medicaments available in the market, which have their own advantages along with some disadvantages. The main objective of this article is to study different root canal medicaments, which are used in dentistry.

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1. Introduction

In the successful treatment of root canal therapy, it started with diagnosis, treatment planning, proper obturation of the tooth, and restoration of the tooth. In between the above said steps, before the obturation of the tooth while preparing the canals, it is very much important to maintain the canal field free from any microorganisms that are capable of producing infection. And if the canal space is not free from microorganisms or any other debris, the prognosis of the tooth or the teeth will not be as good.

The primary aim of any root canal therapy is to maintain the canal space free from microorganisms and most importantly prevention of recontamination after the endodontic procedure. Literature stated that only the mechanical preparation of the root canal system is not helpful as well as sufficient to completely eliminate the bacteria from the canal system, along with this, it was

stated that application and usage of intracanal medicaments while cleaning and shaping of the canal plays a major role in eliminating the maximum number of bacteria or microorganisms and helps in achieving the better as well as successful result after the endodontic procedure.¹

Literature stated that medicaments that are used in the root canal must be efficient enough to penetrate the dentinal tubules, should be efficient enough to pass through the accessory canals, should be efficient enough to pass through apical root canal deltas, and simultaneously maintaining the concentration of the solution, so that the solution be efficient enough to make canal free from microorganisms.²

1.1. Ideal properties of intracanal medicament material

1. It should be non toxic as well non irritating to the surrounding or the peri radicular tissue.
2. It must be having strong antimicrobial agent properties with in it.
3. It must be having adequate antimicrobial effect.

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4. It should remain stable in the solution
5. It should be efficient enough to maintain its concentration in the presence of blood or serum.
6. It should not interfere with the healing of the surrounding or the periradicular tissue.
7. It must be having non-staining properties.
8. It must have low surface tension

1.2. Indications for the use of intracanal medicaments

1. To eliminate any microorganisms from the canal space that are capable of producing infection.
2. To neutralize the debris of the tissue.

1.3. Different intracanal medicaments

Literature revealed that, first time Grossman utilized the use of antibiotic paste as an intra canal medicament, in the weeping canals. In his antibiotic paste, he utilized streptomycin, bacitracin, penicillin and caprylate sodium. In this antibiotic paste, penicillin is having its prime most action towards gram positive bacteria, bacitracin shows its prime most action against the stains of the microorganisms that are resistant to penicillin, along with this streptomycin has its prime most action against gram negative microorganisms, and caprylate sodium has its action against the yeasts. These all the components were suspended in to the silicone vehicle.^{3,4}

1.4. Formocresol

In 1904 Buckley proposed that formocresol is an aldehyde, which is very strong as well as efficient intracanal medicament and has been used extensively in the endodontic therapy. It is a strong volatile liquid, which when applied over the cotton pellet gets vaporized, to apply over the pulp chamber for the process of disinfection. Different studies revealed that the solution of formocresol is cytotoxic and shows teratogenicity and it is also helpful in inducing immune reaction.^{5,6}

1.5. Chlorhexidine

Secondly most common used intra canal medicament is chlorhexidine. Chlorhexidine solution shows good antimicrobial action against both, i.e. gram positive as well as gram negative bacteria. The main action of chlorhexidine solution is by altering the cell osmotic equilibrium. The action of chlorhexidine is done by binding of the negatively charged cationic molecule of chlorhexidine to the bacterial cell wall, causing leaching out all the content of the bacteria by altering the permeability of the bacterial cell membrane and ultimately result in bacterial cell lysis. A study revealed that the antibacterial effect of chlorhexidine is found to be very much effective against the gram negative bacteria. Chlorhexidine gel is most commonly used as intra canal

medicament.⁷⁻⁹ The main disadvantage of chlorhexidine as intracanal medicament is that, it stays in the canal for a very much less time. And study revealed, the usage of chlorhexidine gel along with calcium hydroxide shows very much effective actions against *E. coli*.

1.6. Calcium hydroxide

The most commonly used intracanal medicament is calcium hydroxide. Calcium hydroxide was introduced by Herman in the year of 1920. It is very much effective against different microorganisms, it is very much helpful in dissolving organic remnants left in the root canal, it is helpful in reducing the inflammation present peri apically, helps in reducing or inhibiting inflammatory resorption of the root, it is also used as a temporary root canal obturating material. The main reason of antimicrobial action of calcium hydroxide is by releasing of hydroxyl ions and these hydroxyl ions that are released from the calcium hydroxide helps in dissolving the cytoplasmic membrane of the bacteria, these hydroxyl ions help in denaturation of the bacterial proteins and ultimately leads to damage to the bacterial DNA.

1.7. Ledermix paste

Ledermix paste is also used as a potential intracanal medicament. It is an antibiotic paste which is introduced by Schroeder and Triadon in the year 1960. The main constituent of Ledermix paste are tetracycline along with demeclocycline and triamcinolone acetate in the concentration of 1 percent in the base of polyethylene glycol.¹⁰

1.8. Sulphonamides

Sulphonamides can also be used as an intracanal medicament. It is basically a bacteriostatic agent. Its action is by interfering with the bacterial metabolism and ultimately render the microorganism more vulnerable to destruction by the defense mechanism of the own body. It is very much effective even in the presence of the pus. The main disadvantage of the sulphonamides are it results in yellowish discoloration of the tooth.¹¹

1.9. Triple antibiotic paste

The other commonly used intra canal medicament is triple antibiotic paste. This triple antibiotic paste was first demonstrated as intracanal medicament by Hoshino et al. in the year 1996. This triple antibiotic paste includes minocycline, metronidazole and ciprofloxacin. This combination of triple antibiotic paste is needed to cover the diverse flora of the microorganisms that are capable of producing infection. This triple antibiotic paste is either mixed with normal saline or with chlorhexidine solution

of 2 percent results in production of largest zone of inhibition against *E. faecalis*. The major drawback of using triple antibiotic paste is that, the one of the constituent of triple antibiotic paste i.e. minocycline may result in tooth discolouration. To overcome this drawback minocycline has been removed from the triple antibiotic paste, making it double antibiotic paste.⁵

1.10. Photo activated disinfection

A newer technique of photo activated disinfection can be used to disinfect the canal system. Tolonium chloride is the photoactive agent which is used in this photo activated disinfection technique. This technique works by activation of the molecule of photosensitizer by the red laser, which is emitting the radiation of 635 nm of wave length. A small flexible optical fibre is being inserted into the root canal system on to which the light is directed. This unit does not generate heat upto that level which can damage the surrounding oral tissues. This technique works on the principle of damaging the cell membrane of the microorganisms as well as damage to the DNA.¹²

1.11. Phenols

Phenols are also used as an intracanal medicaments, phenols like iodine or tincture iodine can be used for the purpose of intracanal medicament. Iodine has been proven as a good antiseptic solution, that too along with low toxicity to the surrounding or to the adjacent tissue. Iodine helps in killing the bacteria which is present in the infected dentine that too within 5 minutes.¹³

1.12. Herbal products

New remedies that include herbal products can also be used as an intracanal medicament paste like propolis it shows antimicrobial along with it also shows anti-inflammatory properties. It pharmacologically constitutes phenolics as well as aromatic substances. Other herbal products like turmeric, the main yellow component of curcumin shows anti - inflammatory as well as antioxidant properties. It is found to be a potential intracanal medicament.¹⁴⁻¹⁸

2. Conclusion

Endodontic treatment are essentially debridement procedures to disrupt and remove the microbial ecosystem that is associated with disease process. It is important that clinician should understand the close relationship between the presence of microorganisms and endodontic disease processes to develop an effective rationale for treatment. The proper knowledge of intracanal medicament is very, much required for the proper application of the agent as well as sufficient outcome of the endodontic treatment. The efficient outcome of the endodontic therapy is some what dependent on the cleaning of the canal system and the canal

should be free from infection causing microorganisms.

3. Conflict of Interest

The author declares no potential conflicts of interest with respect to research, authorship, and/or publication of this article.

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