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## Review Article

## A literature review on uses of chlorhexidine in dentistry

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## ABSTRACT

In dental practice, one of the most commonly used mouth wash is chlorhexidine. Because of its antimicrobial, anti plaque action, it is the most commonly used mouth wash. Because of its broad antimicrobial action, its uses is widely scattered in the treatment of various oral diseases. In dentistry it can be used in various formulations like gels, sprays, mouthwashes etc.

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## 1. Introduction

Dental plaque plays a major role in the initiation as well as progression of the most common disease of the oral cavity i.e. caries. Plaque is the primary factor that helps in initiating the process of dental caries. Removal of the plaque is the only treatment option to stop the progression of dental caries or other periodontal disease. Plaque removal can be done either mechanically or chemically. Mechanical plaque removal be done professionally by the dentist or by the operator, while on the other hand with the use of chemical method accumulation of plaque over the surface of the tooth can be stopped.

There are variety of antimicrobial agents are available in the market, but only few possess the actual property antimicrobial action, because of lack of the property of substantivity as well as they lack efficiency against some of the microorganisms. None of the antimicrobial as well

as substantivity property of the other formulated microbial agents are comparable with antimicrobial and substantivity property of the chlorhexidine.<sup>1-4</sup> literature revealed that chlorhexidine has been considered as the gold standard against which the efficiency of other antimicrobial agents are compared.<sup>5</sup> chlorhexidine possesses cationic properties with a formulation of bisbiguanide. Chlorhexidine possesses a strong base and found to be most stable in the form of salt.

A search of antiviral agent result in the development of the chlorhexidine in the year of 1940. After the development of the chlorhexidine it was concluded that chlorhexidine possesses antimicrobial properties rather than the antibacterial properties. The antimicrobial spectrum of the chlorhexidine covers broad range that included, gram positive microorganisms, gram negative microorganisms.<sup>6,7</sup> along with spores, yeasts and dermatophytes also.<sup>8,9</sup>

Chlorhexidine gluconate is a 1,1'-hexamethylene bis [5-(p-chlorophenyl) biguanide] di-D-gluconate is a gluconate salt. Its broad spectrum antimicrobial activity results in the

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lysis of the cell wall membrane.

### 1.1. Formulation of chlorhexidine

Chlorhexidine is available in different formulations. It is available as 0.2% chlorhexidine mouth wash concentration, it is used for short term plaque control measure. On the other hand 0.06% is recommended as daily rinse concentration of the chlorhexidine mouthwash. In United States, the patients those are suffering from candidiasis infection, they were advised to soaked their denture in the chlorhexidine solution in the concentration of 0.2% for 15 minutes, that too twice in a day.<sup>10,11</sup>

The pH of chlorhexidine ranges between 5 – 7. Chlorhexidine is advised for topical use only and never advised to be administered systemically. Literature revealed that after a single use of the chlorhexidine mouth wash it remains 30 percent in the saliva for up to 5 hours and simultaneously over the surface of the oral mucosa for up to 12 hours.<sup>11</sup>

### 1.2. Action of chlorhexidine

Chlorhexidine mouthwash possesses antiseptic as well as anti microbial effect of viruses, fungus, bacteria that are responsible for various diseases of the oral cavity. Chlorhexidine at its low concentration that ranges from 0.02% to 0.06% results in the displacement of  $\text{Ca}^{2+}$   $\text{Mg}^{2+}$  ions that results in ultimately loss of potassium ions from the cell wall and results in lysis of the cell wall membrane which ultimately results to its bacteriostatic effect.<sup>12</sup> While on the other hand the bactericidal effect of the chlorhexidine mouth wash solution can be achieved in higher concentration of >0.1%. The antiviral effect of the chlorhexidine mouth wash solution is due to the altered cell membrane permeability.

### 1.3. Different uses of chlorhexidine mouth wash

#### 1.3.1. Caries

The prime most factor in the initiation of the process of dental caries is the accumulation of dental plaque over the surface of the tooth. Plaque over the surface of the tooth contains bacteria's such as streptococcus mutans, lactobacilli spp, that are responsible for the production of lactic acid from the dietary carbohydrates which ultimately results in dissolution of the tooth enamel and dentine surface.<sup>13</sup> In some countries chlorhexidine in the concentration of 0.2% can be used as a daily mouth wash, as it helps in reducing the plaque accumulation over the tooth surface.<sup>14</sup> In some of the studies it was stated that the chlorhexidine in the concentration of 0.2% in the formulation of gel does not reduce streptococcus mutans, when applied to the tooth surface.<sup>15,16</sup>

### 1.4. Periodontal and gingival problem

Diseases which are related to gums or periodontium are mainly caused by the inflammatory response of the bacterial products accumulation over the surface of the tooth or along with the gingival crevices. Most common bacteria responsible for the periodontal or the gum diseases are gram negative anaerobic bacteria's.<sup>17,18</sup> Literature revealed that use of chemical agent such as chlorhexidine as an adjunct to mechanical aids such as tooth brushing or mechanical interdental cleaning helps in reducing the gums or periodontal inflammation. A study revealed that continuous use of chlorhexidine mouth rinse in the concentration of 0.2% for 4 to 5 weeks efficiently helps in reducing the clinical signs of periodontal inflammation.<sup>19,20</sup>

### 1.5. Chlorhexidine has its specific uses with respect to implant therapy, as

Chlorhexidine can be advised as an antiseptic mouth wash with the concentration of 0.12% or 0.2 % a week prior to the implant surgery and a week after the surgery. It is advised till 7 days after the implant surgery to aid healing and to stop the spread of post operative infection. It also aids in prohibiting the formation of implant biofilm.<sup>21–23</sup>

Literature revealed that use of chlorhexidine in the concentration of 0.12% is advised three times a day at least seven days prior and after fifteen days after extraction of the patient suffering from osteonecrosis of the jaw. Literature revealed that the use of chlorhexidine in the concentration of 0.12% is advised by the American association of oral and maxillofacial surgeons in the early management of medication related osteonecrosis of the jaw.<sup>24,25</sup> Literature also revealed that, the use of chlorhexidine mouth wash in the concentration of 0.12 percent or in the form of gel, placed over extraction socket, helps in reducing the clinical symptoms of post operative alveolar osteitis by up to 58 percent.<sup>26,27</sup>

In the field of prosthodontics, chlorhexidine plays an important role in denture wearers patients. Patients those are immunocompromised and are denture wearers may suffer from the problem associated with denture wearing i.e. denture stomatitis. In this clinical condition the underlying tissue of the denture became inflamed and sore due to the action of fungus. As a treatment modality it is advised to the patient, not to wear denture and do mouth rinses with antiseptic mouth i.e. chlorhexidine in the concentration of 0.12 percent, along with this disinfection of denture may also be done by cleaning the denture with chlorhexidine mouth wash, along with this treatment, chlorhexidine gel can also be applied over the affected site over the tissue.<sup>26</sup>

The use of chlorhexidine mouth wash can be used in gingivitis or periodontitis associated with HIV patient. As HIV patients are more prone to develop gingivitis or periodontitis, literature revealed that chlorhexidine plays as

adjunctive role in the treatment of gingivitis or periodontitis induced by HIV. It was revealed that by the literature that, chlorhexidine was found to be very much effective in reducing the candida species in individuals those are affected by HIV.<sup>27</sup>

## 2. Conclusion

Chlorhexidine is not only an antiplaque agent but also possesses the property of antimicrobial agent. Its wide variety of usage in the field of dentistry make its very much popular. The only disadvantage of chlorhexidine mouth wash is that, if it is used for a long duration of time, it may result in brownish discolouration of the tooth surface.

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## 4. Conflict of Interest

The authors declare no potential conflicts of interest concerning the authorship and publication of this article.

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