

Assessment Of Anti-Inflammatory Effect Of Three Different Silver Diamine Fluoride- An In Vitro Study

Research Article

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Abstract

Aim : To compare and evaluate the anti – inflammatory effect of Kedo- SDF, Kids-e SDF and Fagamin SDF.

Materials And Methods: The three different Silver diamine fluoride solutions (Fagamin, Kids-e and Kedo) were prepared in different test tubes. 1 ml of the silver diamine fluoride solution was added to 10-20 ml distilled water at various fixations. This was added to 0.45 mL bovine serum albumin. pH of the mixture was acclimated to 6.3 with 1N hydrochloric acid. Absorbance was measured spectrophotometrically at 660 nm. Diclofenac sodium was used as the standard group.

Results : At 40µL concentration KedoSDF had higher anti inflammatory as compared to the other groups including the standard group. At 50µL concentration Kedo SDF and Kids-e SDF had equal anti-inflammatory action and it was higher than Fagamin SDF and the standard group.

Conclusion: It can be concluded that Kedo silver diamine fluoride solution exhibited higher anti-inflammatory activity as compared to Fagamin solution and Kids-e solution and hence it can be used. The authors also recommend to conduct in-vitro studies in the future based on the anti-inflammatory action of different specimens of silver diamine fluoride.

Introduction

Early childhood caries is a preventable disease that has become a serious concern in developed as well as developing countries. It not only affects the health but also has an impact on the quality of life[1]. The usage of fluoride varnishes and dentifrices has helped in decreasing the rate of caries in children[2].

Cariou lesions can be managed by removal of the caries and restoring the cavity using a suitable material[3]. The cavity can be restored by either conventional methods or by minimal invasive dentistry, where the latter helps in preserving sound tooth structure[4].

Silver diamine fluoride is gaining its interest in the field of pediatric dentistry due to its ability to arrest a carious lesion. This

property is particularly very helpful in young children where they refuse to undergo any dental procedure due to fear or in individuals with special health care needs[5].

Silver diamine fluoride is composed of ammonia, silver and fluoride. There is a variation in the amount of fluoride in different brands[6]. Silver diamine fluoride has both anti-bacterial as well as remineralizing properties[7,8]. The fluoride component in Silver diamine fluoride helps in strengthening the tooth structure and reversing the demineralizing effect caused by the microorganisms[9].

Silver diamine fluoride is usually indicated in children with high risk for caries on any surface of primary teeth or even in the permanent molars. It is contraindicated in carious lesions involving pulp and in individuals having silver allergy. Silver diamine fluo-

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ride is also contraindicated in patients who are conscious about aesthetics as it leaves a dark stain on the tooth surface post its application.

The purpose of this in vitro study was to assess and compare the anti-inflammatory effect on soft tissues of three different brands of silver diamine fluoride.

Materials And Methods

The three different Silver diamine fluoride solutions (Fagamin, Kids-e and Kedo) were prepared in different test tubes. 1 ml of the silver diamine fluoride solution was added to 10-20 ml distilled water at various fixations (10µL,20µL,30µL,40µL,50µL) and this was added to 0.45 mL bovine serum albumin (1% aqueous solution) and the pH of the mixture was acclimated to 6.3 with 1N hydrochloric acid. The specimens were then incubated at room temperature for 20 minutes. The samples were then heated at 55 degrees in a water bath for 30 minutes. The samples were cooled following which the absorbance was measured spectrophotometrically at 660 nm. Diclofenac sodium was used as the standard group.

Protein denaturation was determined with the help of the following equation:

$$\% \text{inhibition} = \frac{\text{Absorbance of control} - \text{Absorbance of sample}}{\text{Absorbance of control}} \times 100$$

Results

The percentage inhibition was recorded for all the three groups and tabulated in a spreadsheet. The values were compared to the standard Diclofenac sodium.

It was observed that at 10µL concentration, Kedo SDF had the highest anti-inflammatory action as compared to the other two groups but as compared to the standard group, Kedo SDF had lesser anti-inflammatory action. At 20µL concentration, Fagamin SDF had higher anti-inflammatory action as compared to Kids-e SDF and Kedo SDF but less than the anti-inflammatory action of the standard group. At 30µL concentration Kedo SDF had higher

anti-inflammatory action as compared to the other two groups but it was lesser as compared to the standard. At 40µL concentration Ked oSDF had higher anti-inflammatory as compared to the other groups including the standard group. At 50µL concentration Kedo SDF and Kids-e SDF had equal anti-inflammatory action and it was higher than Fagamin SDF and the standard group.

Discussion

The highest concentration available for silver diamine fluoride is 38%(44,800ppm) in dental practice[10]. Gao et al concluded that 38% silver diamine fluoride is the most effective concentration to arrest dental caries in children[11]. The dark staining due to formation of silver phosphate that silver diamine fluoride leaves behind is a limitation [12] for aesthetic reasons. A low concentration of 12%(14,150 ppm) silver diamine fluoride was introduced to avoid this limitation[13]. In the present study the three silver diamine fluoride solutions that were used were Fagamin(38%), Kids-e(38%) and Kedo(38%).

Bovine serum albumin was used for protein supplementation and for elimination other contents of the serum that was unwanted. On heating Bovine serum albumin undergoes denaturation. Due to this the antigens that are associated with Type III hypersensitivity reaction are expressed[14]. Inflammation leads to pathological redness, swelling, pain and release of heat. The present study was performed to assess the potential of the three specimens to inhibit protein denaturation that would signify their potential for anti-inflammatory activity.

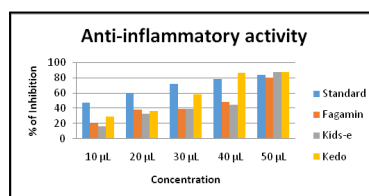
The most commonly used drug for anti-inflammatory activity is Diclofenac sodium which is an NSAID and hence it was used as a standard group in the present study.

It was observed that at different concentration the anti-inflammatory activity of the specimens was not constant. Kedo silver diamine fluoride solution overall had a higher anti-inflammatory activity as compared to Fagamin and Kids-e solutions. Kedo silver diamine fluoride solution is made up of a plant extract that have the capacity to exhibit protein denaturation. On comparing with standard group at 40 µL and 50 µL concentrations it was observed

Table 1: Anti inflammatory action of all the groups at different concentration.

Concentraion	Standard	Fagamin	Kids-e	Kedo
10µL	47	19.9	16	28.9
20µL	60	37.9	32.5	36.3
30µL	72	39.4	39.3	58.3
40µL	78	48.1	44.5	86.3
50µL	84	80.1	87.4	87.4

Graph 1: Bar graph representing anti inflammatory activity of all the groups at different concentrations



that Kedo silver diamine fluoride solution performed better than the standard group also.

Conclusion

It can be concluded that Kedo silver diamine fluoride solution exhibited higher anti-inflammatory activity as compared to Fagamin solution and Kids-e solution and hence it can be used. The authors also recommend to conduct in-vitro studies in the future based on the anti-inflammatory action of different specimens of silver diamine fluoride.

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