

Rare but real: Unusual side effects of chlorhexidine mouthwash – A case-based perspective

Shikha Sharma, Jagbir Singh¹

Department of
Periodontology, Faculty
of Dental Sciences,
SGT University,
Gurugram, Haryana,
¹Department of
Dermatology, ESIC
Hospital, New Delhi,
India

The work belongs to
the Department of
Periodontology, Faculty
of Dental Sciences,
SGT University,
Gurugram, Haryana,
India

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Address for correspondence:

Dr. Shikha Sharma,
Department of
Periodontology, Faculty
of Dental Sciences, SGT
University, Gurugram,
Haryana, India.
E-mail: shikha1390@gmail.
com

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Abstract:

Chlorhexidine (CHX) is a highly effective antiseptic agent. Allergic reactions on use of CHX are rare, but an increase in the percentage of cases is witnessed due to rapid increase in CHX-containing products in recent times. CHX forms an indispensable part of dentistry. The present case report showcases allergic reaction seen as a result of the use of CHX mouthwash, where in patient develops redness and inflammation on gingiva as well as urticarial rash on the skin of the back. The case report warns us for a cautious use of CHX products.

Key words:

Adverse effects, allergic reactions, chlorhexidine gluconate, hypersensitivity, mouthwashes, urticaria

INTRODUCTION

Mouthwash or mouth rinses are one of the effective home care solutions for oral hygiene care and maintenance. These formulations target plaque-causing bacteria, thereby reducing the risk of tooth decay, gingivitis, and halitosis. Nonetheless, mouthwashes alone are inadequate for comprehensive oral care and should be used along with brushing and flossing.^[1]

Chlorhexidine (CHX) gluconate (1,1'-hexamethylene bi [5-(p-chlorophenyl) biguanide] di-D-gluconate) (CHX) is a gluconate salt; a biguanide compound, used since 1950s in clinical practice. Owing to its broad-spectrum antimicrobial property, it disrupts the bacterial cell membranes, making it an effective disinfectant for inanimate surfaces and indwelling medical devices like catheters. In dental practice, it is being used by dental practitioners as an antiseptic mouthwash due to its biocompatible nature and proven efficacy in inhibiting bacterial biofilm and plaque accumulation.^[2]

Moreover, adjunctive use of CHX products has been widely employed in the management of patients with Stage I-III periodontitis and has been found to be effective in improving various periodontal parameters like probing pocket depth (PPD) when compared to nonsurgical therapy.^[3,4] Therapeutic efficacy of locally delivered CHX products has been mainly seen in cases of PPD \geq 5 mm.^[3,5]

As a result of the above-mentioned advantages, CHX has been extensively used in the management

of dental plaque, gingival inflammation, and bleeding. Studies have reported a positive result with CHX, by demonstrating a significant reduction of the pathogenic bacterial species implicated in periodontal diseases, such as *Enterobacteriaceae*, *Porphyromonas gingivalis*, and *Fusobacterium nucleatum*. Along with this, other species such as *Actinomyces* and *Streptococcus*, including *Streptococcus mutans*, one of the principal etiological agents for dental caries, have shown a drastic reduction on its use.^[6,7] In addition, use of the CHX mouthwash has been advocated in immediate prophylactic rinse for the prevention of the postextraction bacteremia and lowering the bacterial load within the aerosol spray.^[8]

The use of CHX has been advocated both within and beyond the perioperative setting, supplementing from the most commonly used agents such as alcoholic and aqueous surgical skin preps, skin wipes, and lubricant gels for urethral catheterization and vaginal and rectal examination. Other applications of CHX include

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its use in central venous catheters, wound dressings, throat gargles, mouthwashes, toothpastes, contact lens solutions, and cosmetics. While its presence is evident in these products, it may not always be as apparent in items like gels, medical devices, toothpastes, and dressings, making it a potential “hidden” or “occult” allergen in healthcare settings.^[9]

CHX use has been advocated both for short-term and long-term purposes, such as adjunctive plaque removal, postsurgical care, prevention of postextraction bacteremia, treatment of oral ulcers, denture stomatitis, dry socket, and oral infections like acute necrotizing gingivitis. Long-term use is recommended for patients with serious medical conditions (e.g., leukemia, hemophilia, acquired immunodeficiency syndrome, and kidney disease) as well as for patients who are unable to maintain oral hygiene, such as elderly individuals, mentally challenged patients, and those with maxillary infections.^[8]

The application of CHX as a mouthwash and gel may result in certain localized side effects, like dry mouth (xerostomia), altered taste sensations (hypogeusia), particularly affecting the perception of salty and bitter flavors. In addition, some individuals may experience a discolored or coated tongue, which can be a temporary condition associated with its use.^[2] On prolonged use, it is associated with certain adverse effects like extrinsic tooth staining, attributed to the polymerization of carbohydrates within the acquired pellicle, forming melanoidins. Furthermore, CHX also denatures proteins, creating free sulfhydryl groups that react with iron or tin ions, resulting in yellow pigments.^[10]

Serious adverse reactions to CHX include Type 1 or immunoglobulin E (IgE)-mediated allergic reactions, which typically occur immediately upon contact with a substance. These reactions involve the activation of immune cells and the subsequent release of histamine into the interstitial tissues. Common symptoms include itching, angioedema (swelling), and hives (urticaria). In severe instances, anaphylaxis may develop, leading to difficulty in breathing, hypotension, dizziness, and even collapse. Anaphylaxis is most likely seen when CHX comes in contact with deeper body tissues or internal mucosal surfaces during medical procedures or patients with a previous history of exposure. Prior to full anaphylaxis, patients may first experience mild hives (urticaria) as a warning sign.^[11]

CASE REPORT

A 35-year-old male patient visited the department of periodontology with a chief complaint of bleeding gums. After obtaining the patient’s consent, comprehensive examination and complete oral prophylaxis was done followed by a prescription of CHX mouthwash to be used twice daily for 1 month.

Following the use of CHX mouthwash on the 1st day, no reaction was observed. But on subsequent second exposure, the patient developed itching along with urticarial rash on the back, which increased with time [Figure 1].

Intraorally, on examination, the gingiva was found to be inflamed, exhibiting erythema [Figure 2]. In addition, multiple

characteristic erythematous, pinpoint lesions were observed on the palatal mucosa [Figure 3]. The patient was advised to discontinue the use of mouthwash immediately, and systemic therapeutic agents were prescribed as outlined below:

1. Tablet prednisolone 20 mg OD for 5 days and then taper the dose
2. Tablet avil 25 mg BID for 7 days.

Following the course of the medications, symptomatic regression was observed both intraorally and extraorally. Intraorally, gingival inflammation and erythema subsided [Figure 4], with a complete resolution of lesions on the palate [Figure 5]. Extraorally, a noticeable reduction in the urticarial rash and pruritus on the back was seen [Figure 6]. Following a thorough evaluation, findings suggested a likely causal relationship between CHX exposure and the hypersensitivity reaction.

To establish CHX gluconate in the mouthwash as the causative agent of the allergic reaction, the patient was advised to undergo a patch allergy test on the forearm [Figure 7] with all the ingredients of the mouthwash. Patch allergy test was done using the “CLAIMS CHAMBER,” where in the chambers in the “CLAIMS PATCH” were loaded with the following substances:

1. Ponceau 4R
2. Carmoisine coloring agent
3. CHX gluconate mouthwash
4. Control.

The armamentarium used in the patch test is shown in Figure 8.

Methodology of the application of the “CLAIMS PATCH”

The “CLAIMS PATCH” is based on flexible virgin plastic chamber material in combination with the adhesive tape. The adhesive tape in the CLAIMS PATCH CHAMBER used is a semi-occlusive micropore (3M).^[12] To provide additional support and stability, a micropore tape onto the patch was applied [Figures 9 and 10]. The allocation of test materials was as follows: Site 1 – Ponceau 4R; Site 2 – Carmoisine dye; Site 3 – CHX gluconate mouthwash; and Site 4 – Negative control.



Figure 1: Urticarial rash on the patient’s back



Figure 2: Gingival erythema with inflammation



Figure 3: Erythematous lesion on the palate



Figure 4: Posttreatment subsidence of gingival redness and inflammation



Figure 5: Posttreatment remission of palatal red lesion



Figure 6: Postmedication resolution of urticarial rash on the back of the patient/
Back showing resolution of urticaria after medication



Figure 7: Patient's forearm (pretest) before patch allergy application

After 12 h of application of the patch, the patient reported pruritus at the forearm site. Subsequent to which the "CLAIMS PATCH" was discontinued. A positive allergic response was observed at Site 3. According to the International Contact Dermatitis Research Group criteria of the patch test, a palpable erythema graded as +1 was recorded. Sites 1, 2, and 4 demonstrated negative responses [Figure 11]. These results substantiated CHX gluconate in the mouthwash as the etiological factor responsible for the hypersensitivity reaction.

DISCUSSION

CHX is recognized as a broad-spectrum antimicrobial agent with proven efficacy against Gram-positive and Gram-negative bacteria, as well as fungi, which are



Figure 8: Armamentarium for the CLAIMS patch test



Figure 9: CLAIMS patch secured with micropore tape



Figure 10: CLAIMS patch secured with an extra layer of micropore tape



Figure 11: Response observed after patch removal

among the most common pathogens associated with healthcare-associated infections.^[1]

Owing to its potent antimicrobial activity, CHX is quite effective against bacteria, viruses, fungi, and a number of other oral pathologies. The most widely available concentrations are 0.06%, 0.12%, and 0.2% allowing it to function as either a bacteriostatic or bactericidal agent depending on the formulation and clinical indications.^[2]

Beyond its conventional use as a mouthwash, CHX is also utilized in perioperative procedures, such as skin wipes, lubricants for urethral catheterization, and during rectal and vaginal exams. This broad clinical utility has contributed to its status as an often underappreciated “occult” allergen, posing diagnostic challenges in both dental and medical practice.^[9]

The most frequently reported allergic response to CHX use is a Type I hypersensitivity reaction, mediated by IgE. Upon immediate contact with CHX, immune cell activation occurs, leading to histamine release into surrounding tissues. This cascade produces immediate clinical symptoms, including pruritus, urticaria, and angioedema.^[11]

Another form of hypersensitivity associated with CHX is a delayed cutaneous reaction, classified as a T cell-mediated Type IV hypersensitivity response, seen mainly in patients with prolonged exposure to CHX mouthwash or CHX-containing

products. Contact dermatitis represents the most frequent manifestation of this delayed response.^[13]

In the study by Viresh Chopra *et al.*, allergic urticaria was reported on the use of CHX, characterized by erythematous rashes distributed over the forehead, antecubital fossae, forearms, lower abdomen, lateral torso, and the posterior aspect of the neck.^[14]

Timothy J. Watts reported a case of fixed drug eruption associated with CHX use. A fixed drug eruption reaction is a type of delayed hypersensitivity reaction which occurs on the same site on subsequent administration of the drug.^[15]

In a case series by Wittczak *et al.*, CHX was identified as a significant occupational allergen with clinical presentation ranging from cutaneous to airway and systemic manifestations. Given its “hidden allergic” potential, CHX use warrants caution in both medical and nonmedical settings.^[16]

In a case reported by Keni *et al.*, topical application of CHX gel resulted in erythema, swelling, and vesicle formation on the lip, accompanied by burning sensation seen on its repeated use.^[17]

The present case highlights a hallmark allergic reaction associated with CHX use. While CHX remains a cornerstone

antimicrobial agent in dental and medical practice because of its broad-spectrum efficacy, its prescription should be tailored to clinical necessity. Dentists should prescribe CHX based on the specific requirement, understanding its differential mechanism of action on different microorganisms responsible for causing widespread oral diseases and infections.

CONCLUSION

Blind and an overzealous use of CHX as an over-the-counter drug has a potential of increasing the probability of adverse drug reactions, which in certain cases can be life-threatening.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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