



## Original Research Article

## Comparison of the efficacy of active oxygen - containing mouthwash (BlueM) with chlorhexidine mouthwash (Hexidine) and its effect on plaque, calculus, and gingival inflammation

Chitrani Rajkhowa<sup>1,\*</sup>, Shiny Supriya L<sup>1</sup>, J Bhavadharani<sup>1</sup>, Afreen Jannath A<sup>1</sup>, Nivedha K<sup>1</sup>, Aishwarrya Padmanaban<sup>2</sup>

<sup>1</sup>Dept. of Periodontics, Institute of Dental Studies and Technologies, Modinagar, Uttar Pradesh, India

<sup>2</sup>Private Practitioner, Uttar Pradesh, India



## ARTICLE INFO

## Article history:

Received 02-03-2023

Accepted 25-03-2023

Available online 15-04-2023

## Keywords:

Mouthwashes

Chlorhexidine

Gingival irritation

Plaque

Calculus

BlueM

## ABSTRACT

**Aim:** To compare the efficacy of active oxygen - containing mouthwash (BlueM) with chlorhexidine mouthwash (Hexidine) and its effect on plaque, calculus, and gingival inflammation.

**Materials and Method:** A Double blind parallel study was done on 20 systemically healthy patients with the presence of generalized chronic gingivitis in the age group of 20-45 years. Each subject will rinse their mouth with the mouthrinse assigned to them, or twice daily for one minute in the morning and before going to bed. They will be instructed to swish it properly around the mouth and avoid its ingestion.

**Results:** Descriptive statistics was performed by calculating mean and standard deviation for the continuous variables. Intergroup and intragroup comparison between chlorhexidine and Blue M at baseline (To) and at the end of 3 weeks (T1) showing no statistical differences between the two groups.

**Conclusion:** Blue M can be used as a safe alternative to chlorhexidine in reducing the microbial load. But when compared to each other there wasn't a significant change between them. Chlorhexidine has the edge in being very cheaper compared to Blue M. Further studies are required with conclusive evidence to be able to determine whether oxygen enriched mouthwashes can replace chlorhexidine in the future.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

### 1. Introduction

Mechanical aids such as toothbrush, floss, interdental aids and adjunctive chemotherapeutic agents such as mouthwashes and dentifrices are the oral hygiene measures. Mouthwashes (mouth rinses) are solutions or liquids used to reduce the microbial load in the oral cavity. They provide a safe and effective chemical means of reducing or eliminating accumulation of plaque.

Nowadays, many mouthwashes are available for this purpose, and chlorhexidine is proved to be the most effective gold standard chemical agent in plaque control.<sup>1,2</sup>

\* Corresponding author.

E-mail address: [abraryounus94@gmail.com](mailto:abraryounus94@gmail.com) (C. Rajkhowa).

Chlorhexidine is an antimicrobial agent and is a biguanide that possess the highest inhibitory effect on plaque formation and gingivitis.<sup>2</sup> However, its long-term daily use is associated with a number of local side effects such as brownish discoloration of the teeth, restorative materials and the dorsum of the tongue<sup>3</sup> with interference in taste.<sup>4,5</sup>

To overcome the limitations of the Chlorhexidine, various newer agents with similar antimicrobial activity are being developed. 'BlueM' mouthwash is one such product which does not contain antibacterial chemicals, and its efficacy is determined by the release of active oxygen and content of lactoferrin and has been claimed to be used for a longer duration without any side effects. The active oxygen

within the mouthwash normalizes and controls harmful bacteria and accelerates wound healing process.<sup>6,7</sup> The mouthwash is fresh and does not contain alcohol or fluoride. Alcohol can give a dry sensation to the mouth which can give a bad taste and Fluoride can damage implants as it can cause a reaction with the titanium leading to corrosion. It also contains honey as one of its ingredients which not only is a sweetener but also antibacterial and as soon as it comes in contact with saliva it releases oxygen. Also, honey helps in reduction of inflammation and swelling in wounds.<sup>8</sup>

However, to the best of our knowledge we could trace only one experimental study on the effectiveness of BlueM mouthwash which reported reduced severity of inflammatory changes and improved hygienic conditions in patients with coronary heart disease.

So, the present study aim to assess the effectiveness of BlueM mouthwash and its comparison to gold - standard chlorhexidine mouthwash on plaque, calculus, and gingival inflammation.

## 2. Materials and Methods

A Double blind parallel study was done on 20 systemically healthy patients with the presence of generalized chronic gingivitis from the Out Patient Department of Periodontology, Institute of Dental Studies and Technologies, Kadrabad, Modinagar (U.P.).

### 2.1. Inclusion criteria

1. Patients with all 32 permanent teeth were considered.
2. Patients were in the age group of 20-45 years.

### 2.2. Exclusion criteria

Patients with systemic diseases with not considered. Grossly carious, fully crowned or restored and orthodontically bonded teeth were excluded. Subject with destructive periodontal disease or those on antibiotic or anti-inflammatory drugs were excluded from the study.

### 2.3. Methodology

A thorough supragingival dental prophylaxis to remove stains, calculus, and plaque will be done in all 50 patients. Oral hygiene instructions were given by the examiner to all subjects in order to standardize the oral hygiene procedures. Subjects were given similar brush and paste by the investigator. All subjects continued to practice regular, non-supervised oral hygiene. All the subjects will be assessed for plaque, calculus, and gingival inflammation at baseline and at the end of the 21-day experimental period.

A randomized two - group parallel study with random allocation of 25 subjects each to any one of the two experimental mouth rinses [Chlorhexidine mouthwash (control group) and BlueM mouthwash (test group) will

be done. Each subject will rinse their mouth with the mouthrinse assigned to them, or twice daily for one minute in the morning and before going to bed. They will be instructed to swish it properly around the mouth and avoid its ingestion.

All subjects were examined seated on a dental chair by the investigator himself.

Indices used for assessing plaque and gingivitis were

1. Plaque index (Turesky Modification of Quigley Hein Plaque Index(1970)<sup>9</sup>
2. OHI index simplified (Green JC and Vermillion JR)<sup>10</sup>
3. Modified gingival index (Lobene et al)<sup>11</sup>
4. Accordingly, two test products were allotted to the participants
5. Test product 1 – Chlorhexidine mouthwash
6. Test product 2 – Blue M mouthwash

All the subjects were put into statistical analysis.

## 3. Results

The study included a total of 50 participants following the inclusion and exclusion criteria. Descriptive statistics was performed by calculating mean and standard deviation for the continuous variables.

**Table 1:** Shows the age distribution of subjects in the age range of 18– 45 years

Group	Range	Age	
		Mean	Std. Deviation
1	22	28.96	5.891
2	22	27.84	6.774
Total	22	28.40	6.308

## 4. Discussion

Bacterial plaque is one of the major etiologic agents involved in the initiation and progression of periodontal disease. The role of microorganisms in the onset of gingivitis and evolution of periodontitis increased dramatically after the recognition of bacterial plaque as the major cause of chronic gingivitis. The association of organisms with periodontal disease has been found long ago. Based on the strong association between certain microorganisms and periodontal diseases, there has been an increasing interest in the use of antimicrobial agents in their management. For the most part, chemical therapy has been used as an adjunct to mechanical therapy.<sup>5</sup> Various chemical methods of reducing plaque, such as mouth rinses, are used, as they can provide significant benefits to patients who cannot maintain adequate mechanical plaque control. Most of the mouth rinses, which contain modern chemicals such as chlorhexidine, have undesirable side effects, such as staining of teeth and taste alteration.<sup>6</sup> As an

**Table 2:** Shows the gender distribution in Group A, Group B, i.e males and females.

			Group		Total
			1	2	
Sex	F	Count	3	0	3
		% within Group	100.0%	.0%	5.7%
		Count	0	12	32
	M	% within Group	.0%	48.0%	60.4%
		Count	0	13	18
		% within Group	.0%	52.0%	34.0%
Total	Count	3	25	53	
	% within Group	100.0%	100.0%	100.0%	

**Table 3:** Intragroup comparison between chlorhexidine and Blue M at baseline (To) and at the end of 3 weeks (T1) showing no statistical differences between the two groups

		Levene's Test for Equality of Variances			
		F	Sig.	Mean Difference	Std. Error Difference
PI (To)	Equal variances assumed	.457	.502	-.20800	.15746
	Equal variances not assumed			-.20800	.15746
PI(T1)	Equal variances assumed	.045	.832	-.26520	.16074
	Equal variances not assumed			-.26520	.16074
OHI (To)	Equal variances assumed	.334	.566	-.06800	.13033
	Equal variances not assumed			-.06800	.13033
OHI (T1)	Equal variances assumed	.052	.821	-.10760	.12060
	Equal variances not assumed			-.10760	.12060
MGI (To)	Equal variances assumed	.003	.959	-.03480	.07561
	Equal variances not assumed			-.03480	.07561
MGI(T1)	Equal variances assumed	.117	.734	-.09800	.08557
	Equal variances not assumed			-.09800	.08557

**Table 4:** Intergroup comparison between chlorhexidine and Blue M at baseline (To) and at the end of 3 weeks (T1) showing no statistical differences between the two groups

	VAR00001	N	Mean Rank	Sum of Ranks
OHI (To)	1	25	22.92	573.00
	2	25	28.08	702.00
	Total	50		
OHI (T1)	1	25	23.38	584.50
	2	25	27.62	690.50
	Total	50		
MGI (To)	1	25	24.82	620.50
	2	25	26.18	654.50
	Total	50		
MGI(T1)	1	25	23.28	582.00
	2	25	27.72	693.00
	Total	50		
PI (To)	1	25	23.02	575.50
	2	25	27.98	699.50
	Total	50		
PI(T1)	1	25	21.62	540.50
	2	25	29.38	734.50
	Total	50		

alternative, Blue oral gel formula was developed to counter the disadvantages faced by chlorhexidine. Bluem® oral gel formula was created by Peter Blijdrop, a man on a mission, for specific mouth ailments, and contains the following ingredients: Alcohol, Water, Silica, Sodium Saccharin, Sodium Perborate, Glycerin, Lactoferrin, Citric Acid, PEG-32, Sodium Gluconate, Xanthan Gum and Cellulose Gum have different purposes. The application of the gel leads to a significant reduction in deep periodontal pockets due to the release of active oxygen. This leads to fast and progressive healing.<sup>8</sup> Previous studies did have shown a reduction in the colony forming units of bacteria, which gives similar results as compared to chlorhexidine. It was found that there was a significant reduction in the colony forming units after treatment, but there was no difference between the two groups. The only limitation of the study is its small sample size and the treatment was for a short duration of time. Further research should be carried out with a larger sample size.

## 5. Conclusion

Blue M can be used as a safe alternative to chlorhexidine in reducing the microbial load. But when compared to each other there wasn't a significant change between them. Chlorhexidine has the edge in being very cheaper compared to Blue M. Further studies are required with conclusive evidence to be able to determine whether oxygen enriched mouthwashes can replace chlorhexidine in the future.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

## References

1. Loe H, Schiott CR, Clavind L, Karring T. Two years oral use of chlorhexidine in man. I. General design and clinical effects. *J Periodontol Res.* 1976;11(3):135–44.
2. Prasanna SG, Lakshmanan R. Characteristics, uses and side effects of chlorhexidine - A review. *J Dent Med Sci.* 2016;103:103497.

doi:10.1016/j.jdent.2020.103497.

3. Gjermo P. Chlorhexidine and related compounds. *J Dent Res.* 1989;68:1602–8.
4. Leard A, Addy M. The propensity of different brands of tea and coffee to cause staining associated with chlorhexidine. *J Clin Periodontol.* 1997;24(2):115–8.
5. Moran J, Pal D, Newcombe R, Addy M. Comparison of phenolic and 0.2% chlorhexidine Mouthwash on the development of plaque and gingivitis. *Clin Prev Dent.* 1991;13(4):31–5.
6. Lang NP, Catalanotto FA, Knopfli RU, Antczak AA. Quality specific taste impairment following the application of chlorhexidine gluconate mouthrinses. *J Clin Periodontol.* 1988;15(1):43–8.
7. Martinsek PE, Chucta S, Schlanger R. The use of topical oxygen and negative pressure wound therapy to potentiate wound healing: 1283. *J Wound Ostomy Continence Nurs.* 2007;34(3S):38.
8. Tested and Reviewed, Part 4: BlueM toothpaste, mouthwash and oral gel; 2018. Available from: <https://www.dental-tribune.com/news/tested-and-reviewed-part-4-bluem-toothpaste-mouthwash-and-oral-gel/>.
9. Turesky S, Gilmore ND, Glickman I. Reduced plaque formation by chloromethyl analogue of vitamin C. *J Periodontol.* 1970;41(1):41–3.
10. Greene JC, Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc.* 1964;68:7–13.
11. Lobene RR, Weatherford T, Ross NM, Lamm RA, Menaker L. A modified gingival index for use in clinical trial. *Clin Prev Dent.* 1986;8(1):3–6.

## Author biography

**Chitrani Rajkhowa**, Consultant Periodontics

**Shiny Supriya L**, Consultant

**J Bhavadharani**, Consultant

**Afreen Jannath A**, Consultant

**Nivedha K**, Consultant

**Aishwaryya Padmanaban**, Consultant Orthodontist

**Cite this article:** Rajkhowa C, Supriya L S, Bhavadharani J, Jannath A A, Nivedha K, Padmanaban A. Comparison of the efficacy of active oxygen - containing mouthwash (BlueM) with chlorhexidine mouthwash (Hexidine) and its effect on plaque, calculus, and gingival inflammation. *Int J Oral Health Dent* 2023;9(1):44-47.