Original Article

To Compare The Efficacy Of Wheat Grass Mouthwash And Chlorhexidine Mouthwash On Ph And Buffering Capacity Of Saliva In Children – A Randomized Control Trial

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Abstract

Introduction: Consumption of sugary substance causes bacterial adhesion to the tooth which leads to metabolization and acid production. When the pH of oral cavity falls below the critical pH (5.5), dissolution of minerals starts. Chlorhexidine is a gold standard mouthwash used by the dentist. Even though, chlorhexidine mouthwash is more effective in plaque control, it cannot be used for long duration due to its unpleasant side-effects which directs more attention towards the mouthwash with less side-effects i.e., organic homemade products. E.g., Wheatgrass (Triticum aestivum) which has shown anti-inflammatory, astringent, antibacterial properties.

Aim and objective: To compare the efficacy of wheat grass mouthwash and chlorhexidine mouthwash on pH and buffering capacity of saliva in children.

Materials and methods: This single-blind, randomized clinical study was conducted on thirty 7- 13 years old children. Thirty children were divided randomly into 2 groups i.e group A – 0.2% chlorhexidine and group B – wheat grass mouth wash. Saliva is collected before the mouth rinse and 2 weeks after the continuous mouth rinsing once daily. The pH and buffering capacity of saliva was checked using saliva check buffering kit. Data collected were analysed using paired t-test and independent t-test.

Result: On intergroup comparison no statistical significant result was observed whereas on intragroup comparison highly statistical significant ($p<0.001$) difference was observed.

Conclusion: Efficacy of wheatgrass on pH and buffering capacity is same as that of chlorhexidine hence can be used as an alternative.

Keywords: Wheatgrass mouthwash, Chlorhexidine, pH and Buffering capacity

Introduction

Tooth surface is subjected to caries and various infections due to elements that favour the microbial growth. Prevention of dental caries is one of the main focus of pediatric dental practice. Dental caries is a multifactorial disease. Interaction of bacteria, diet and host response play a major role in initiation and progression of dental caries. It is one of the most common infectious diseases affecting the tooth, and causing its demineralization. One of the major factors leading to demineralization is acidic pH. When a child consumes sugary substance, the bacteria adhered to the tooth metabolize it and produce acid. When the pH of oral cavity falls below the critical pH (5.5), dissolution of minerals starts.[1]

A gold standard mouthwash which is prescribed by most of the dentist during treatments like gingival inflammation and periodontal diseases. Susceptibility to dental and periodontal disease depends on risk factors includes genetics, systemic factors, and oral hygiene. Plaque is the primary cause for gingivitis. Most of the chemical products contain an antiseptic that plays an important role in controlling plaque accumulation. Mouthwashes are an antiseptic solution which is used to reduce the microbial load in the oral cavity. Mouth rinses have the ability to deliver the therapeutic effect all over the tooth surface including interproximal areas in which even toothpastes are not much effective. Even though, chlorhexidine mouthwash is more effective in plaque control, it cannot be used for long duration because some of its unpleasant side-effects after long duration usage pays more attention toward herbal drugs. Plants and plant extracts demonstrate effects that are immune enhancing, anti-inflammatory, anti-cancer, etc.[2]

Natural medicines have been a source of medical treatments for more than thousands of years, and they play a key role in the primary health care in underdeveloped and developing countries. Various herbal products such as Propolis, Emblica officinalis (also called as Amla), Ocimum sanctum L. (also known as Ocimum tenuiflorum, Tulsi), and Azadirachtaindica (commonly known as Neem) have shown significant precedence in reducing signs of gingival and periodontal inflammation. Similarly, they have the ability to prevent dental caries by inhibiting the virulence factors of S. mutans and Lactobacillus. The use of plants and their derivatives which have preventive and therapeutic effects could contribute to oral health.[3]

Wheatgrass (Triticum aestivum) refers to young grass of the common wheat plant, which belongs to Poaceae family. This is the most commonly found herb in India, although its nativity is currently unknown. Wheatgrass' culms are simple, hollow or pithy, glabrous, and the leaves are approximately 1.2 m tall, flat, narrow, 20-38 cm long and 1.3 cm broad. The spikes are long, slender, dorsally compressed and somewhat flattened. This plant is believed to have many nutritional values; it has been shown to have anti-inflammatory, antioxidant, anticarcinogenic, immunomodulatory, laxative, astringent, diuretic, antibacterial and anti-aging properties. Its use in acidity, colitis, kidney malfunctions, athero-sclerosis and swelling has been shown to be beneficial. [4] So, the purpose of this study is to compare the efficacy of wheat grass mouthwash and chlorhexidine mouthwash on pH and buffering capacity of saliva in children.

Materials and Methods

This single-blind, randomized clinical study was conducted on forty 7-13 years old children who were reporting to the Department of Pediatric and Preventive Dentistry of Chhattisgarh Dental College and Research Institute. After screening the subjects were selected based on the inclusion and exclusion criteria. Ethical clearance was obtained from Institutional ethical committee.

Inclusion Criteria:

- Children of age group 7-13 years.
- Children exhibiting Frankl's behaviour rating 3 or 4.
- Children with prior parent consent

Exclusion Criteria:

- Children with history of antibiotic in past 3-4 weeks

- Children with history of fluoride application within 3-4 weeks
- Children with history of any systemic disease or allergy to wheat grass
- Children exhibiting Frankl's behaviour rating 1 or 2.

Preparation of wheat grass mouthwash:

We will mix around one ounce (30 ml) of wheatgrass juice with around six ounces (180 ml) of water.[4]
Children were randomly categorized into 2 groups by closed envelop method in which the subjects were blinded to both the mouthwashes that were used in the study:
Group A: 0.2% chlorhexidine mouthwash (Rexidine; Warren India)
Group B: Wheat grass mouthwash ("Four Seasons" Wheat Grass juice)
The nature of the study was explained to the participants and to their respective parents. Informed consent was obtained.
Children in both the groups were given their respective mouth wash and were asked to rinse for 2 mins. Saliva is collected using polythene tube before the mouth rinse and 2 weeks after the continuous mouth rinsing once daily using polythene tubes provided with the kit. pH and buffering capacity of saliva was checked using G C saliva check kit. (GC Asia Dental Pvt. Ltd) (fig 1). All the Subjects of the groups were kept seated for 5 min in a relaxed state and was instructed to expectorate saliva by spitting method into a collection cup provided in a kit.[5]

Fig 1

The study was continued for two weeks, and salivary samples were taken and evaluated as follows:

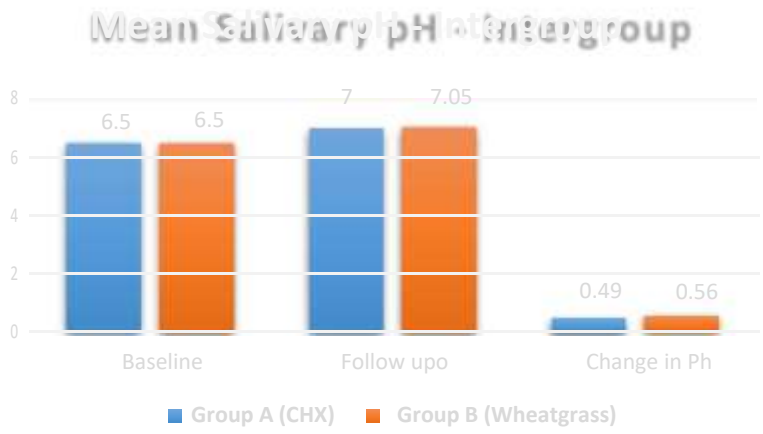
- For measurement of pH, a Sample of saliva was brought into contact for 10 seconds, and then the colour of the strip was checked according to the manufacturing chart provided.
- For measurement of buffering capacity, buffering test foil pack was unpacked with the help of pipette, which was used to draw saliva from the cup & 1-1 drop was dispensed onto each of the 3 test pads.

The values were noted, and comparison was made between both the groups. All clinical examinations i.e., pre and post pH and buffering capacity was performed by the examiner. The obtained values will be recorded, tabulated, and data collected was analysed using paired and unpaired t test.

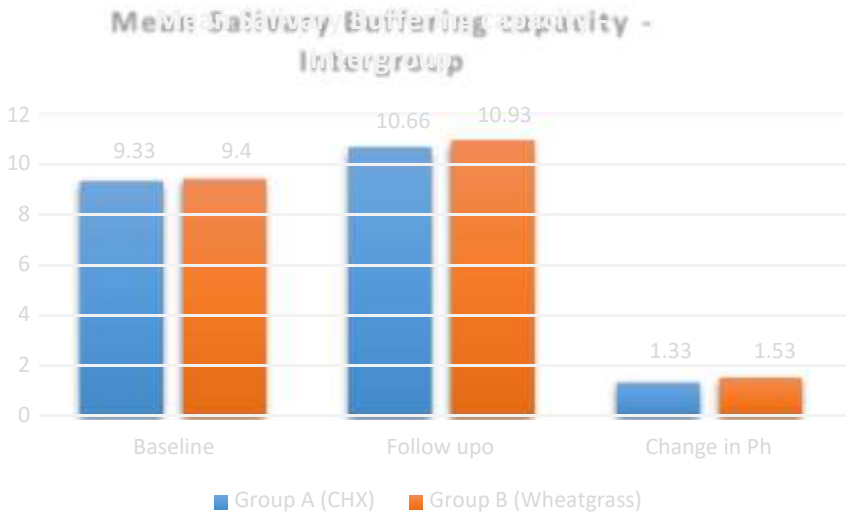
Results:

The protocol of the study was strictly followed by all the participants in the study, with no reported systemic side effects in the two groups. Mean pH and buffering capacity at baseline and after two weeks were tabulated. All data collected were analysed by statistical software SPSS (SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). The student's t test was used for the analysis of intra and intergroup comparison.

On intergroup comparison using unpaired t test, Salivary Ph and buffering capacity was found to be higher in Group B (Wheatgrass) as compared to Group A (CHX) during follow up and in respect to overall change in pH and buffering capacity but no statistically significant difference was observed between both groups. (Graph 1&2)



Graph 1



Graph 2

Salivary pH	Baseline Mean (SD)	Follow up Mean (SD)	Change in salivary Ph Mean (SD)
Group A (CHX)	**6.5 (0.23)**	**7.0 (0.16)**	**0.49 (0.28)**
Group B (Wheatgrass)	**6.5 (0.23)**	**7.05 (0.17)**	**0.56 (0.11)**
Unpaired t test	**t =1.00**	**t =0.405**	**t =0.505**

P value, Significance	**p =1.000(NS)**	**p =0.405(NS)**	**p =0.505(NS)**

Table 1

Effect on pH: The baseline mean pH of chlorhexidine and wheatgrass mouth wash was found to be 6.5 (SD .23) and 6.5 (SD .23), respectively. After two weeks, mean pH values were 7.0 (SD .16) and 7.4(SD .17), respectively. (Table 1)

p>0.05 – no statistical significant difference (NS)

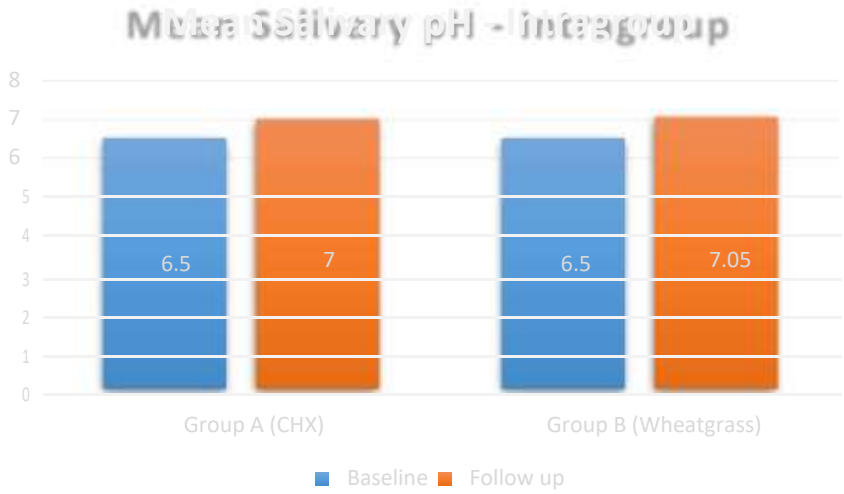
Effect on buffering capacity: At baseline, pre-buffering capacity chlorhexidine and wheatgrass mouth wash was found to be 9.33(SD .81) and 9.4(SD .73) respectively. After two weeks of the study buffering, capacity was determined and found to be 10.66 (SD.72) and 10.93 (SD.88), respectively which was not significant (Table 2)

p>0.05 – no statistical significant difference (NS)

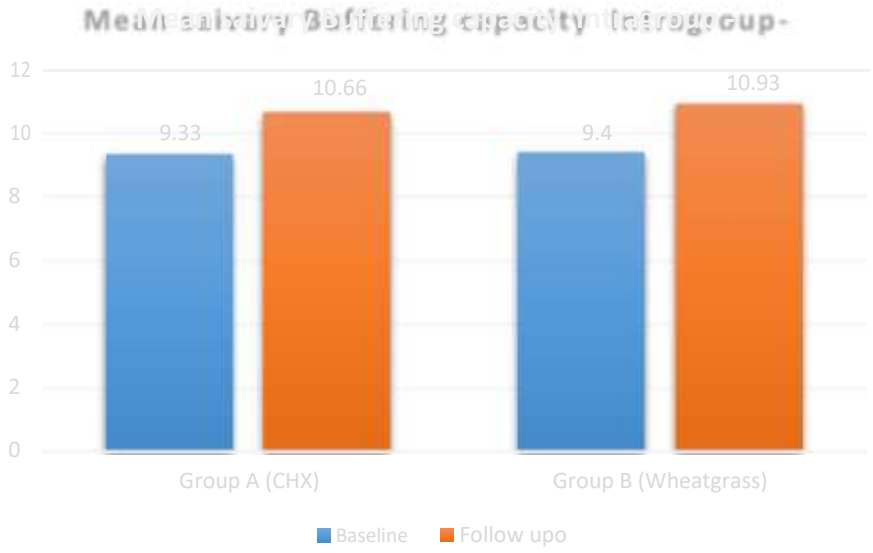
On intragroup comparison using paired t test, highly statistically significant (p0.001) difference i.e., increase in salivary pH and buffering capacity was observed was observed between both groups. (Graph 3&4)

Salivary buffer capacity	Baseline Mean (SD)	Follow up Mean (SD)	Change in buffering capacity Mean (SD)
Group A (CHX)	**9.33 (0.81)**	**10.66 (0.72)**	**1.33 (0.89)**
Group B (Wheatgrass)	**9.4 (0.73)**	**10.93 (0.88)**	**1.53 (0.51)**
Unpaired t test	**t = -0.235**	**t = -0.904**	**t = -0.747**
P value, Significance	**p = 0.816 (NS)**	**p =0.374 (NS)**	**p =0.461 (NS)**

Table 2



Graph 3



Graph 4

Effect on pH: on intra group comparison of pH it was found that at baseline Ph of chlorhexidine group and wheat grass group were 6.5(SD.23) and 6.5 (SD.23) respectively but after 2 weeks mean pH value was 7.0 (SD.16) and 7.05 (SD.17) with p <0.001** which was highly significant (Table 3)

Salivary pH	Baseline Mean (SD)	Follow up Mean (SD)	Mean Difference ± SE	Paired 't' test	P value, Significance

Group A (CHX)	**6.5 (0.23)**	**7.0 (0.16)**	**0.49 ± 0.07**	**t = -6.55**	**p<0.001****
Group B (Wheatgrass)	**6.5 (0.23)**	**7.05 (0.17)**	**0.54 ± 0.07**	**t = -7.153**	**p<0.001****

**p<0.001 – highly statistical significant difference

Table 3

Effect on buffering capacity: on intra group comparison of buffering capacity was found that buffering capacity at baseline buffering capacity of chlorhexidine group and wheat grass group were 9.33(SD.81) and 10.66 (SD.72) respectively but after 2 weeks mean buffering capacity was 9.4 (SD.73) and 10.93 (SD.88) with p <0.001** which was highly significant (Table 4)

Salivary Buffer Capacity	Baseline Mean (SD)	Follow up Mean (SD)	Mean Difference ± SE	Paired 't' test	p value, Significance
Group A (CHX)	**9.33 (0.81)**	**10.66 (0.72)**	**1.33 ± 0.28**	**t = -4.733**	**p<0.001****
Group B (Wheatgrass)	**9.4 (0.73)**	**10.93 (0.88)**	**1.53 ± 0.29**	**t = - 5.161**	**p<0.001****

**p<0.001 – highly statistical significant difference

Table 4

Discussion:

Herbs are nature's gift to humans. A variety of plants have been used to treat various systemic conditions successfully. Wheat grass Juice (WGJ) has been scientifically proven, traditionally used since ancient times, to treat various diseases and disorders. It is believed that wheatgrass, as a part of a raw food diet has many health benefits it cleanses the body of toxins and also provides a proper balance as supplemental nutrient.[6]

The founder of the Hippocrates Health Institute Dr. Ann Wigmore (1985), believed that wheatgrass, as a part of a raw food diet is used for therapeutic purposes and also can be used in halitosis, body odor.[7] Japanese scientist's studies have shown that wheat grass can help in neutralizing and eliminating toxins from the body. It has the ability to destroy harmful germs and neutralizes bacteria. It prevents tooth decay and tooth aches. Lay pulp of wheatgrass soaked in juice and placing on diseased area in mouth or chewing of wheatgrass and spitting out the pulp helped reduce tooth decay.[8] Wheat is valuable in the prevention and cure of pyorrhea.[9] Rinsing the mouth with wheat grass helps in reducing the toxins in the gums, thereby improving the overall health the juice acts as an excellent mouth wash for sore throats and pyorrhea.[10] It can be chewed for beneficial results.

A number of plants are used as folk remedies in the various parts of the world. Although a significant number of studies have been carried out to obtain purified plant component, lesser screening field trials have been initiated on crude plant materials.[11]

According to Richard it could be fairly said that the history of wheatgrass or cereal grass healing could be attributed to chlorophyll. Researchers discuss the "anti-inflammatory, wound healing, and malodour-reducing properties of chlorophyllin" which is a derivative of chlorophyll. From clinical observation of many patients using wheatgrass extract, it can be vouched for a number of the remarkably effective healing outcomes.[12]

Rajpurohit L et.al. conducted a study to determine the antimicrobial activity of wheatgrass on gram positive bacteria and found that wheatgrass has shown maximum antimicrobial activity against streptococcus mutans and lactobacillus.[13] In our study significant difference was found after the use of wheat grass mouth wash in salivary pH and buffering capacity due to is antimicrobial anti-inflammatory and astringent property.

Conclusion:

The wheat grass mouth wash was as effective as a chlorhexidine mouth wash. Future studies have to be focused at increasing the substantively of wheatgrass mouthwash so that they could be a future alternative to commercially available mouthwashes such as 0.2% chlorhexidine with great antimicrobial, cost-effective, and preventive strategies for dental caries.

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