

## Effect of noni as a pre-procedural rinse in gingivitis patients: A cross-sectional study

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### ABSTRACT

**Aim:** *Morinda citrifolia* (Noni) has been used for decades in traditional Asian medicine. It has a lot of pharmacological properties and clinical implications. It has antibacterial, anti-inflammatory and antimicrobial properties. It can be used in a number of diseases such as cancer, infectious diseases, cardiovascular diseases, diabetes, and also female-specific problems. Noni also exerts its curative effect on gingivitis and periodontitis which are also inflammatory in nature. The most common form of the gingival disease is plaque-induced gingivitis which is caused due to the interaction between bacteria in the dental plaque, the tissues, and inflammatory cells of the host. There have been numerous research studies done in animals and humans to assess the effect of noni. This study was done to assess the effect of noni as a pre-procedural rinse. **Materials and Methods:** A total of 10 patients with moderate to severe gingivitis were selected for the study and divided into an experimental group ( $n = 5$ ) and a control group ( $n = 5$ ). The experimental group was given noni, and the control group was given chlorhexidine mouthwash as a pre-procedural rinse. Saliva samples were collected before and after the use of pre-procedural rinse from both the groups. The total colony-forming units were counted by inoculating nutrient agar by the pour plate method. **Results:** Noni ( $P = 0.039$ ) as a pre-procedural rinse has statistically significant results compared to chlorhexidine ( $P = 0.061$ ). **Conclusion:** The antibacterial effect of noni was seen to be effective in gingivitis patients.

**KEY WORDS:** Chlorhexidine, Gingivitis, *Morinda citrifolia*, Noni, Pre-procedural rinse

### INTRODUCTION

A large percentage of the world's population suffers from gingivitis or periodontitis. Poor dental hygiene is the main cause for gingivitis which leads to accumulation of dental plaque.<sup>[1]</sup> Supragingival plaque which contains non-specific bacterial mass induces gingival inflammation.<sup>[2]</sup> Periodontitis is a chronic infectious condition of the supporting tissues of the teeth. It is caused by microorganisms which lead to inflammation of the gingiva, periodontal tissue destruction, and alveolar bone loss.<sup>[3]</sup> In addition to bacteria, host response also plays a major role.<sup>[4]</sup> This involves the activation of innate immune response where monocyte/polymorphonuclear leukocyte-derived pro-inflammatory cytokines are upregulated, and the macrophage-derived growth factors are downregulated.<sup>[5]</sup>

The use of various natural and herbal products to treat various oral diseases has become more common in the field of dentistry.<sup>[6]</sup>

The botanical name of Noni is *Morinda citrifolia*. The name *M. citrifolia* is derived from two Latin words "morus" referring to mulberry and "indicus" referring to Indian. It is a part of the Rubiaceae family.<sup>[7]</sup> *M. citrifolia* is known by different names in different places, it is known as Noni in Hawaii, Indian mulberry and nuna in India, mengkudu in Malaysia, nhaut in Southeast Asia, and cheese fruit or painkiller bush in the Caribbean.<sup>[8]</sup> In addition to the fruit odor, the leaf size and shape helps the traditional healers to recognize the different varieties.<sup>[9]</sup> Since the 1990s, the products derived from noni juice have been commercialized in the USA and distributed to other parts of the world.<sup>[10]</sup>

For more than 2000 years, *M. citrifolia* L. has been used as traditional folk medicine for different diseases such as fever, headache, arthritis, diabetes, and gingivitis.<sup>[11-13]</sup>

Due to the various reports showing its therapeutic effect, *M. citrifolia* juice was sold as a wellness drink in 1996.<sup>[14]</sup> The European Commission approved the fruit juice of *M. citrifolia* as a novel food in 2003.<sup>[15]</sup> Long-term use of herbal medicine has the advantage of having a lesser chance of side effects.<sup>[16]</sup>

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**Table 1: CFUs of both Group A and Group B**

Group A (pre)	Group A (post)	Group B (pre)	Group B (post)
2640 CFU/ml	1720 CFU/ml	552 CFU/ml	240 CFU/ml
1870 CFU/ml	540 CFU/ml	504 CFU/ml	204 CFU/ml
660 CFU/ml	180 CFU/ml	408 CFU/ml	168 CFU/ml
720 CFU/ml	420 CFU/ml	388 CFU/ml	132 CFU/ml
1080 CFU/ml	480 CFU/ml	476 CFU/ml	244 CFU/ml

The reduction in CFU in Group A is more than that in Group B. CFUs: Colony-forming units

**Table 2: Statistical significance**

Group A and B	Statistical significance
Noni as pre-procedural rinse (CFUs)	0.039
CHX as pre-procedural rinse (CFUs)	0.061

CFUs: Colony-forming units

**Figure 1: Morinda citrifolia (noni)****Figure 2: Colony-forming unit of noni (pre)**

This study was done to assess the effect of noni as a pre-procedural rinse.

### Aim

The aim of the present study was to assess the effect of noni juice (*M. citrifolia*) as a pre-procedural rinse, before scaling and root planing compared to chlorhexidine in gingivitis patients.

## MATERIALS AND METHODS

A total of 10 patients with moderate to severe gingivitis were selected for the study according to AAP classification 1999 and divided into Group A (10 - experimental) and Group B (10 - control) based on inclusion and exclusion criteria.

Patients with a history of systemic illness such as diabetes mellitus, immunological disorders, HIV hepatitis infections, history of any allergy to herbal medicines (suspected or known), use of tobacco, smoking, alcoholism, aggressive periodontitis, and immunocompromised state, pregnant or lactating females were excluded.

Unstimulated saliva samples were collected at baseline.

Group A patients were given noni juice (40%) and Group B patients were given chlorhexidine mouthwash (0.2%) as pre-procedural rinse before scaling and root planing.

30 min after using the pre-procedural rinse, unstimulated saliva was collected again.

The total colony-forming units (CFUs) present in saliva were determined by inoculating on nutrient agar. Fixed amount of inoculum (1 ml) was placed in the sterile petri dish containing nutrient agar. The plate was then incubated at 37° for around 12 h. Microorganisms grew on the surface of the medium. Each colony is represented as a "CFU." Each colony (both large and small) was counted carefully.

## RESULTS

The statistical test performed was paired *t*-test using SPSS version 20. To find out the antibacterial effect of noni juice, CFU count is taken which gives the microbiological evidence. In Group A, the mean number of colonies declined from 1394 to 668 after using noni juice as a pre-procedural rinse, and there was a statistically significant difference ( $P = 0.039$ ). This indicated the antibacterial effect of noni juice. However, there was no significant reduction seen in the case of Group B ( $P = 0.061$ ).



**Figure 3:** Colony-forming unit of noni (post)

## DISCUSSION

Bacterial infections can be treated with plants and natural products. There are many secondary metabolites found in plants such as terpenoids, flavonoids, tannins, and alkaloids. These secondary metabolites have been found *in vitro* to have antibacterial properties.<sup>[17]</sup> Bacterial infections are the main cause for most of the oral diseases, and medicinal plants manifest antibacterial activity against numerous microorganisms.<sup>[6]</sup>

The current study clinically evaluated the effect of *M. citrifolia* (noni) compared to chlorhexidine as a pre-procedural rinse. There was a significant reduction in the number of CFUs in the experimental group that used noni as a pre-procedural rinse. This showed that *M. citrifolia* has antibacterial properties.

According to Glang *et al.*, antibacterial and anti-inflammatory properties are seen in noni. Hence, there are positive effects of noni extract on plaque-induced gingivitis.<sup>[2]</sup> Moreover, he also reports that it is an excellent tool for the treatment of gingivitis and periodontitis when local and systemic treatment of noni juice is combined with good oral hygiene.

According to a study done by Glang *et al.*, there was a significant decrease in papilla bleeding index in the group that used noni juice to rinse their mouth followed by swallowing. During the treatment phase, there was no significant change in the bacterial composition of patient oral cavities. Hence, the authors suggested that the improvement in the clinical parameters may be due to the anti-inflammatory properties of noni juice.<sup>[2]</sup>

Several publications have reported the anti-inflammatory effects of noni. These effects are controlled by mechanisms including the inhibition of cytokines, such as cyclooxygenase-2, interleukin (IL)-1 $\alpha$  ( $\beta$ ), IL-8, IL-6, and tumor necrosis factor- $\alpha$ <sup>[18,19]</sup> and receptor antagonism of an important trigger of inflammation called bradykinin.<sup>[20]</sup> Evidence also shows that the activity of

metalloproteinases-9 is inhibited due to the effect of noni juice.<sup>[19]</sup>

The present study did not assess the anti-inflammatory properties of noni juice. However, the antibacterial properties of noni juice could be clearly demonstrated by the study [Tables 1 and 2, Figures 1-3].

## REFERENCES

1. Marsh PD. Microbial ecology of dental plaque and its significance in health and disease. *Adv Dent Res* 1995;8:263-71.
2. Glang J, Falk W, Westendorf J. Effect of *Morinda citrifolia* L. fruit juice on gingivitis/periodontitis. *Sci Res* 2013;2:21-17.
3. Socransky SS, Haffajee AD. The bacterial etiology of destructive periodontal disease: Current concepts. *J Periodontol* 1992;63:322-31.
4. Van Dyke TE, Lester MA, Shapira L. The role of the host response in periodontal disease progression: Implication for future treatment strategies. *J Periodontol* 1993;64:792-806.
5. Offenbacher S, Odle BM, Van Dyke TE. The use of crevicular fluid prostaglandin E2 levels as a predictor of periodontal attachment loss. *J Periodontal Res* 1986;21:101-12.
6. Saini R, Sharma S, Saini S. Ayurveda and herbs in dental health. *Ayu* 2011;32:285-6.
7. Scot CN. Species profiles for Pacific island agroforestry *Morinda citrifolia* noni. In: Craig RE, editor. USA: Permanent Agriculture Resource; 2006.
8. Chan-Blanco Y, Vaillant F, Perez AM, Reynes M, Brillouet MC, Brat P. The noni fruit (*Morinda citrifolia* L.): A review of agricultural research, nutritional and therapeutic properties. *J Food Compos Anal* 2006;19:645-54.
9. Pawlus AD, Kinghorn AD. Review of the ethnobotany, chemistry, biological activity and safety of the botanical dietary supplement *Morinda citrifolia* (noni). *J Pharm Pharmacol* 2007;59:1587-609.
10. Aruna MA, Rao NR, Deepthi B, Prasanna JL, Surya PM. Ashyuka: A hub of medicinal values. *Int J Biol Pharm Res* 2013;4:1043-9.
11. Mathivanan N, Surendiran G, Srinivasan K, Sagadevan E, Malarvizhi K. Review on the current scenario of Noni research: Taxonomy, distribution, chemistry, medicinal and therapeutic values of *Morinda citrifolia*. *Int J Noni Res* 2005;1:1-6.
12. Wang M, Kikuzaki H, Csiszar K, Boyd CD, Maunakea A, Fong SF, *et al.* Novel trisaccharide fatty acid ester identified from the fruits of *Morinda citrifolia* (Noni). *J Agric Food Chem* 1999;47:4880-2.
13. West BJ, Palmer SK, Deng S, Palu AK. Antimicrobial activity of an iridoid rich extract from "morindacitrifolia" fruit. *Curr Res J Biol Sci* 2012;4:52-4.
14. Kamiya K, Hamabe W, Tokuyama S, Satake T. New anthraquinone glycosides from the roots of *Morinda citrifolia*. *Fitoterapia* 2009;80:196-9.
15. Potterat O, Hamburger M. *Morinda citrifolia* (noni) fruit-phytochemistry, pharmacology, safety. *Planta Med* 2007;73:191-9.
16. Taheri JB, Azimi S, Rafieian N, Zanjani HA. Herbs in dentistry. *Int Dent J* 2011;61:287-96.
17. Cowan MM. Plant products as antimicrobial agents. *Clin Microbiol Rev* 1999;12:564-82.
18. Kim HJ, Jang SI, Kim YJ, Chung HT, Yun YG, Kang TH, *et al.* Scopoletin suppresses pro-inflammatory cytokines and PGE2 from LPS-stimulated cell line, RAW 264.7 cells. *Fitoterapia* 2004;75:261-6.
19. Basar S, Uhlenhut K, Högger P, Schöne F, Westendorf J. Analgesic and anti-inflammatory activity of *Morinda citrifolia* L. (Noni) fruit. *Phytother Res* 2010;24:38-42.
20. Hirazumi A, Furusawa E, Chou SC, Hokama Y. Immunomodulation contributes to the anticancer activity of *Morinda citrifolia* (Noni) fruit juice. *Proc West Pharmacol Soc* 1996;39:7-9.

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