

Research Question

Does cranberry extract reduce *Streptococcus mutans* in the oral cavity?

Abstract

Streptococcus mutans is the most prominent cariogenic bacteria in the oral cavity due to strong adhesion properties.¹ Reducing the leading cariogenic bacteria in dental caries is important for the longevity of natural teeth. The anti-adhesion effects from cranberry derivatives could be helpful in reducing the amount of *S. mutans*.^{1,2} This literature review aims to determine whether cranberry extract based mouth rinse is effective in reduction of the *S. mutans* bacterial load. Current evidence seems to indicate that cranberry derivatives in mouth rinses can effectively reduce numbers of this specific bacterium in the oral cavity.³ As a result, cranberry extracts in non-dialyzable material (NDM) form could potentially be an alternative to antibiotic mouth rinses including chlorhexidine rinse.

Introduction

- Leading cariogenic bacteria: *S. mutans*⁴
 - Caries formation leads to colonization of *S. mutans* on tooth surfaces²
- Mouth rinses are utilized for their antibacterial purposes¹
 - Common antibacterial agents include chlorhexidine
- Cranberry extracts
 - Contain anti-adhesion agents
 - History of use in prevention and treatment of non-caries related infectious diseases^{1,2}

Zones of Inhibition by Mouthrinse¹

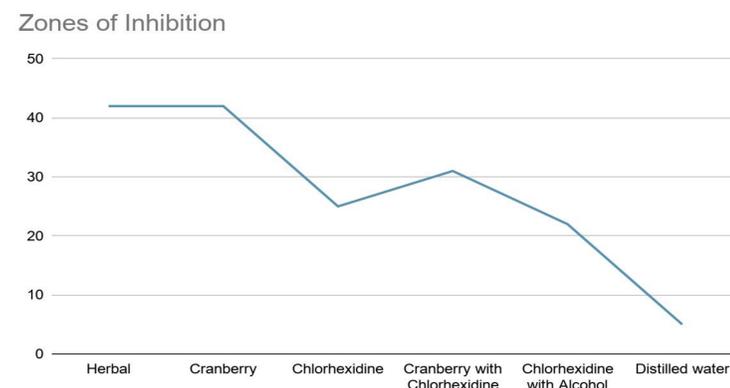


Figure 1: Zones of inhibition as found by researchers in 2019 trial; herbal and cranberry mouth rinses outperformed others in bacterial reduction.³

Review of Literature

- Each study used a high-molecular weight, NDM extract from cranberries due to the anti-coaggregation activity against bacteria
 - Juices alone tend to have high sugar and/or sucrose contents as well as acidic components
 - Would contribute to demineralization of enamel or decalcification of tooth structure^{3,5,6}
- 2015 single-blind, in-vivo study in India school setting²
 - 40 participants ages 9-12
 - Tested NMD cranberry extract based mouth rinse on plaque and salivary scores
 - Results: Both plaque score and salivary score declined significantly over 30 days
- 2015 double-blind randomized clinical trial⁷
 - 50 participants ages 18-20.
 - Cranberry extract and chlorhexidine effects on *S. mutans* colonization compared
 - Results: Nearly equivalent *S. mutans* colonization reduction between chlorhexidine and cranberry extract
 - 69% & 68% reduction respectively⁷
- 2019 in-vitro, double-blind study in pediatric dental clinic¹
 - 20 randomly selected children
 - Antibacterial effects of various rinses compared
 - Results: herbal and cranberry based mouth rinses with or without chlorhexidine showed greater zones of inhibition (meaning greater antibacterial activity against *S. mutans*) than chlorhexidine mouth rinse alone and chlorhexidine with alcohol¹



Discussion

- Evidence supports inclusion of cranberry extract in mouth rinse as bacterial reduction agent against *S. mutans* of children^{3,5}
 - Inclusion criteria:
 - Children with at least 4 decayed, missing due to caries, or filled teeth, as well as use of once daily with non-fluoridated toothpaste and no other remedies^{3,5,6}
- There may be conflicting evidence:
 - 2004 study found NDM cranberry extract based mouthwash only reduced *S. mutans* in saliva but the study lacked evidence of reduction in plaque accumulation and gingival tissue⁴
- Advantages of NDM cranberry extract include:
 - Herbal nature, reduced toxicity likelihood, no undesirable side effects of cranberry extract observed in these studies⁵
- Limitations of the studies reviewed:
 - Minimal research has been done to date on this topic, most studies contained relatively small sample sizes, and short length
- Suggestions for future research:
 - More studies to confirm if bacterial loads are reduced in dental plaque or just saliva
 - Larger sample sizes and increased study length
 - Determination of the minimal level of extract required for antimicrobial effects

Conclusion

Through research it can be concluded cranberry extract does significantly reduce the instances of *Streptococcus mutans* in the oral cavity^{3,5,7,2}. Currently, however, there is not enough evidence to confirm whether this antibacterial effect is seen in the dental plaque or just in salivary microorganisms, or whether it could be feasible replacement for more traditional antimicrobials such as chlorhexidine.

References

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