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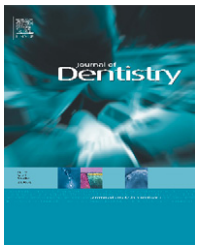

A new treatment alternative for sensitive teeth: A desensitizing oral rinse

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ABSTRACT

Objective: Tooth sensitivity is a common, painful dental condition. Consumer dental products, mostly dentifrices, play an important role in sensitivity treatment. The objective of this review is to describe a new mouthwash-based desensitizing technology.

Data: Background literature concerning desensitizing products is reviewed. Potassium salts are the most commonly used active ingredients in desensitizing dentifrices. Clinical studies show that while potassium salt dentifrices are generally effective; most formulations require several weeks to exert their desensitizing effect. Recently, a new desensitizing dentifrice containing the amino acid arginine was introduced. This dentifrice acts to occlude the dentinal tubules, and has been shown to be highly effective in multiple clinical studies. This arginine-containing dentifrice has also been shown to provide instant relief of sensitivity pain when applied directly to the sensitive tooth surface.

In contrast to dentifrices, there are few desensitizing mouthwashes available. Building on the success of the arginine-based dentifrice, an arginine-based mouthwash formula was developed and tested.

Sources: Published studies in peer-reviewed publications.

Study selection: Controlled and blinded clinical studies to provide evidence of efficacy. In vitro studies are included to indicate the mechanism of action. This review includes studies testing the new arginine-based desensitizing mouthwash.

Conclusion: Clinical findings indicate that this new desensitizing mouthwash, based on the Pro-Argin™ mouthwash technology effectively reduces sensitivity symptoms and can be used alone or as a adjunct to the use of the arginine-containing dentifrice in the home treatment of tooth sensitivity.

1. Introduction

1.1. *Approaches to the treatment of sensitive teeth*

Consumer dental products targeting tooth sensitivity constitutes a segment of the oral care market where the application of biotechnologies promise innovation and the opportunity for growth.[1] In the past, most consumer products for tooth sensitivity were dentifrices that exerted their effectiveness following multiple weeks of twice-daily use.[2] Although some clinical studies have examined the effectiveness of desensitizing mouthwashes, the use of desensitizing mouthwashes as a supplement to dentifrice use has not been thoroughly evaluated or embraced. Recent advances in the treatment of sensitivity may allow the dental community to think outside the *toothpaste-box* in terms of the way consumers can

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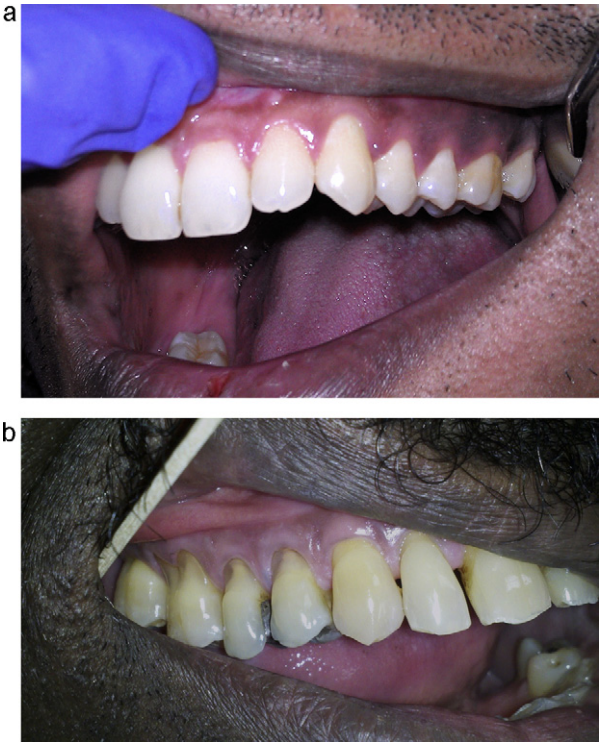

Fig. 1 – Clinical images of sensitive canine and premolar teeth. Areas of gingival recession and cervical tooth structure loss can be subtle (A) or extensive (B).

successfully use desensitizing products. As will be reviewed in this paper, the introduction of efficacious new actives has allowed investigators to consider alternative methods of applying desensitizing agents and a reassessment of the desensitizing mouthwash concept.

The teeth are richly innervated structures.[3] In healthy intact teeth, intense cold can activate these nerves resulting in a sensation of sharp pain. When dentine is exposed the teeth can become markedly more sensitive to normally innocuous stimuli such as air currents, temperature changes and probing with a sharp instrument (Fig. 1).[4] Although preventable to a degree, gingival recession and tooth wear, conditions that predispose teeth to becoming sensitive, are almost inevitable consequences of keeping our teeth throughout our increasing life span. This is particularly true since aggressive oral hygiene practices and healthy diets rich in acidic fruits accelerate tooth structure loss.[5,6] Dental cleanings and periodontal procedures can also result in dentine exposure and can leave teeth sensitive.[5] In light of these facts it is no wonder that tooth sensitivity is a common problem.

Unlike enamel, dentine is a permeable tissue traversed by fluid-filled dentinal tubules.[7] Nerve fibres are not found in the superficial parts of the dentine but are restricted to the deep areas of the tubules and superficial pulp tissue.[8] When stimuli activate these nerve fibres a sensation of pain may be experienced. Peroxides used in tooth whitening diffuse through the enamel and dentine, activating nerve fibres resulting in the characteristic ''zinger'' pain described as accompanying whitening treatments.[9]

Air blasts and controlled tactile stimulation applied with a sharp probe are two methods used to evoke pain in clinical trials examining the efficacy of tooth sensitivity treatments. When applied to intact teeth, little discomfort results from either of these two stimuli. In contrast, these same two stimuli often evoke pain when they are applied to teeth with exposed dentine. When air blasts are applied to exposed dentine evaporation of dentine fluid occurs, causing fluid shifts to occur in the dentine tubules. These fluid movements mechanically activate nerve endings located in deeper areas.[10] Probing dentine with a sharp instrument indents the surface slightly. When the probe tip is moved, the dentine surface rebounds causing a localized outward fluid shift in the tubules.[11,12]

Although the intradental nerves appear to respond to these dentine fluid shifts directly, the odontoblasts may also respond to dentine stimulation activating the intradental nerve endings indirectly.[13,14] In understanding the aetiology and potential therapies to treat dentine sensitivity, one important clue obtained from clinical research is the observation that not all exposed dentine is sensitive. Nature has solved the sensitivity problem by evolving several mechanisms where dentine permeability gets reduced by reactionary dentine formation and the formation of intratubular mineral deposits.[15,16]

Based on our understanding of the physiological mechanisms linking dentine stimulation with pain, there are two ways in which tooth sensitivity treatments can act on sensitive teeth to reduce sensitivity symptoms (Fig. 2):

(1) Treatments can reduce dentine permeability to the extent that stimuli such as air blasts and probing do not cause dentinal fluid shifts that activate the intradental nerves. This can be accomplished by treatments that deliver materials such as particulates that occlude the tubules. Alternatively, agents that interact with the oral environment to encourage the formation of mineral in the dentinal tubules can reduce dentine permeability.[17] The effect of prospective tubule-occluding agents on dentine can be assessed using in vitro studies where dentine permeability is measured and by studies that examine the impact of treatments on dentine structure.[18,19]
(2) Agents in dental products can act to reduce the excitability of the intradental nerves, making them less likely to respond to dentinal fluid shifts.[20] Potassium salts such as potassium nitrate, potassium chloride and potassium citrate are used as theraputic agents in desensitizing products. In experiments where the responses of intradental nerve fibres are recorded, potassium salts depolarize nerves resulting in transient excitation.[21,22] Following this transient activation the excitability of the nerves becomes depressed, making the nerves unresponsive to stimulus. When normally pain evoking stimuli such as air blasts and tactile stimulation are applied to human dentine, the pain responses can be reduced by potassium salt application to the exposed dentine.[23] When potassium salts are applied to dentine in human teeth, the desensitizing effects are transient and modest in magnitude.[24] These and other results raise questions concerning the ability of potassium salts to reduce nerve excitability when used clinically.[25]