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MECHANICAL PROPERTY CHANGES IN ORTHODONTIC WIRES AFTER EXPOSURE TO CHLORHEXIDINE MOUTHWASH: A REVIEW STUDY

Abstract:

Orthodontic wires, especially nickel-titanium (NiTi) and stainless steel (SS), are widely used in clinical orthodontics due to their favorable mechanical properties. However, these materials are prone to degradation when exposed to chemical agents commonly used in oral hygiene, such as chlorhexidine (CHX). This review aims to assess the effects of chlorhexidine mouthwash exposure on the mechanical properties and corrosion resistance of different orthodontic wire types. A comprehensive review of published studies was conducted, focusing on in vitro investigations evaluating changes in tensile strength, surface morphology, ion release, and corrosion behavior of orthodontic wires following exposure to various concentrations and durations of CHX. Most studies found that CHX, especially in higher amounts or with longer exposure, greatly changes the surface texture and weakens the strength of NiTi and SS wires. Exposure to CHX also showed a likelihood of corrosion and release of ions that could affect how well it works in real-life situations and the safety of patients involved. Extended use of wires with chlorhexidine mouthwash could affect their strength and ability to resist corrosion, so it is important to be careful in recommending CHX based mouth rinses for orthodontic treatment.

buildup and gum inflammation effectively [2]. In the year 2013, although the beneficial antimicrobial properties of CHX are well recognized and supported by research findings; a growing body of evidence suggests that prolonged or repeated interaction with this substance may compromise the chemical properties of arch wires over time. Studies have observed changes in wire structure resistance, to corrosion and mechanical behavior when subjected to CHX [3]. These modifications could potentially affect the effectiveness of force application during treatment procedures. Result in extended treatment durations and potential wire breakdown issues. Considering the use of CHX mouthwash in various situations and the significant impact of archwire effectiveness on treatment outcomes it's important to understand how exposure, to CHX could affect the physical characteristics of different types of orthodontic wires analysis seeks to consolidate existing literature on how CHX influences the mechanical traits of wires, specifically looking at tensile strength, elastic modulus, surface roughness, and resistance to corrosion. Furthermore, the analysis delves into the implications of these findings and offers evidence-based suggestions for healthcare professionals.