

# Natural Anti Bio Adhesives to Prevent Bacterial Biofilms on Orthodontic Ligatures: An Approach

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## Abstract

UV responsive photocatalyst  $\text{TiO}_2$ , biocide polymer, R. elliptica extract, silver nanoparticles using H. inuloides extract have been studied to eliminate biofilms on orthodontic materials. However, plant could be explored as anti bioadhesive agents to prevent biofilm on orthodontic ligatures.

## Introduction

Oral cavity is a safe home for over 700 distinct microbial species. During orthodontic treatment, variety of aerobic and anaerobic genera viz. Streptococcus, Actinomyces, Klebsiella, Escherichia, Porphyromonas, Prevotella, Lactobacillus, etc. tend to colonize on elastomeric ligatures, fixed twin block appliances, aligner materials, brackets [1-3]. Several approaches to disperse and control biofilms have been reviewed earlier [4]. It has been suggested that the surface morphology, surface chemistry and surface charges could be responsible for bioadhesion and plaque formation [3]. However, a promising mechanistic approach to evolve biofilm resistant surface chemistries of the orthodontic materials is still awaited. Thus, this precise write up highlights the need to explore natural anti bioadhesives to curb orthodontic biofilms.

## Combating Biofilms: Synthetic Agents

It has been advocated that the biofilm initiation might be impacted by hydrophilic effect, mechanical properties and antibacterial properties. Researchers have suggested ultraviolet responsive photocatalyst  $\text{TiO}_2$  as a useful tool for development of orthodontic resin with antimicrobial properties [5]. In another study, 10% biocide polymer, poly(2-tert butylaminoethyl) methacrylate has been found to decrease the adhesion of Streptococcus mutans and Staphylococcus aureus on acrylic surface. Earlier, a modified acrylic resin coated with 3-hydroxypropylmethacrylate or Sulphobetaine methacrylate has shown significant reduction in the

adhesion of Streptococcus mutans, Candida albicans and Candida glabrata to acrylic resin [6].

## Combating Biofilms: Plants Extracts

Studies on surface characterization and biocompatibility of auto polymerizing acrylic resins coated with light curable coating containing different concentrations of Reynoutria elliptica extract have exhibited significant antimicrobial activity against Streptococcus mutans and Candida albicans [7]. The coating of metallic silver nanoparticles using an extract of Heterotheca inuloides has been found to improve physical properties of the ligatures and decreased the incidence of dental enamel demineralization [8]. Recently, in a review literature, a number of plant extracts such as Lentinus edodes, Cinchona, Alnus japonica, Glycyrrhiza glabra, Quercus infectoria, Azadirachta indica etc. have been quoted to possess anti colonization properties against different bacterial species. Besides these, voluminous plant wealth like Commiphora myrrha, Ficus retusa, Acalypha indica, Phyllanthus multiflorus, Acacia arabica etc is available with their potential as dental remedies [5].

## Anti Bioadhesive Surfaces: A Newer Approach

Several approaches to smooth surfaces with minimal microbial binding include nature of material, surface texture and morphology with minimal retentive sites, addition of fillers and pigmentation. The colour and material dependent bacterial colonization on

elastomeric rings has already been studied with due emphasis on to further explore the area [2]. As cited in preceding paragraphs, there is a huge plant wealth available on our planet, thus, at least the traditional plants used to treat dental ailments could be further explored for their antimicrobial and antibiofilm potential. Such plant extracts could be exploited to alter the surface chemistries of orthodontic materials to evolve promising anti bioadhesive tools.

## Conclusion

Medicinal plant extracts could be thought of as plausible preemptive tools to alter surface chemistries of orthodontic ligatures and impart anti bioadhesive properties to orthodontic ligatures.

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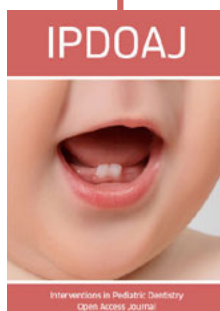
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