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Antimicrobial Action of AXOL™ on Periodontopathic Bacteria

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The antimicrobial action of AXOL™ was tested against a panel of periodontopathic bacteria, which included *Treponema denticola, Treponema vincentii, Treponema* sp., *Porphyromonas gingivalis, Prevotella intermedia, Prevotella melaninogenica,* and *Fusobacterium nucleatum*. The AXOL™ commercial solution (undiluted) was effective in inhibiting some of the bacteria but not all. The rational for the use of antimicrobials is discussed.

Key Words: antimicrobials, periodontal organisms.

Introduction

The indiscriminate use of antibiotics in dentistry is a serious matter as the dental field lacks the tools to correctly diagnose oral infections in the clinical setting. The choice of an antibiotic in the treatment of periodontal diseases is problematic for this reason and also because of patient compliance, adequate dosage and the delivery system. Many investigators have proposed the use of antimicrobials delivered subgingivally in the treatment of periodontal diseases (Rosling et al., 1976; Waerhaung et al., 1984 and Haardy et al., 1982). In as much as these antimicrobials have antibacterial properties, their effects on specific periodontal pathogens is not precisely known. The aim of this study was to determine the antimicrobial effects of AXOL™, a liquid solution composed primarily of iodine, fenol, thimol, menthol, eucalyptol and plant extracts, on selected periodontopathic bacteria.

Material and Methods

Bacteriological testing was performed by a well-diffusion method. The test microorganisms used in this study were ATCC strains and human isolates of seven obligate anaerobes recognized as periodontopathic organisms (Table 1). Each organism was grown

for 72 hours in MTYGVS broth (Salvador et al., 1987) and the inoculum standardized to the MacFarland 0.5 standard. Using a plating device (Spiral Systems, Gaithersburg, MD), the spirochetes species were inoculated on Petri dishes with 20 ml of MTYGVS agar medium and *Porphyromonas gingivalis, Prevotella intermedia* and *Fusobacterium nucleatum* were inoculated on Petri dishes with 20 ml of enriched tryptic soy agar (ETSA) (Salvador et al., 1987). Serial dilutions of the AXOL™ mouthwash were made with sterile water. A 0.1 ml sample from each diluted aliquot was placed, respectively, into a 10-mm diameter well cut in MTYGVS or in ETSA agar. The plates were then incubated at 35°C under the atmosphere of 85% N_2 - 10% CO_2 - 5% H_2 for 7-14 days, and the zones of inhibition of bacterial growth measured in millimeters across the diameter of the well. The experiment was carried out in triplicate. After incubation, any zone of inhibition of width greater than 2 mm was noted, and the end point, or minimum inhibitory dilution was obtained.

Table 1 - Organism strains used to determine minimum inhibitory concentration of AXOL™.

Treponema denticola	ATCC 35405
Treponema denticola	Human Isolate
Treponema vincentii	ATCC 35580
Treponema sp	Human Isolate
Porphyromonas gingivalis	Human Isolate
Prevotella intermedia	Human Isolate
Prevotella melaninogenica	Human Isolate
Fusobacterium nucleatum	Human Isolate

Results

The effects of AXOL™ on the putative periodontal bacteria is shown in Table 2. The undiluted solution of AXOL™ was inhibitory for *T. denticola, T. vincentii, T.* sp. and *P. gingivalis*. There was no inhibitory effect of AXOL™ on *P. intermedia, P. melaninogenica* or *F. nucleatum* at any of the tested concentrations.

Discussion

The effects of AXOL™ solution commercially available in Brazil and utilized at various dilutions are shown in Table 2, which clearly indicates that this solution has antimicrobial properties. AXOL™ was inhibitory for putative pathogens such as *T. denticola* (Simonson et al., 1988; Bretz et al., 1990) and *P. gingivalis* (Slots et al., 1988) as well as for putative candidates such as *T. vinventii*. The AXOL™ solution had no antimicrobial

Table 2 - Effects of AXOL™ on pure cultures of putative periodontal bacteria.

Organism	Reference strain/ Culture medium	Zone of inhibition		
		Neat	1:2	1:5
T. denticola	ATCC 35405/MTYGVS	9 mm	5 mm	NZ
T. denticola (ASLM)	Human Isolate/MTYGVS	9 mm	5 mm	NZ
T. vincentii	ATCC 35580/MTYGVS	8 mm	4 mm	NZ
T. sp. (US)	Human Isolate/MTYGVS	7 mm	4 mm	NZ
P. gingivalis (PG1)	Human Isolate/ETSA	7 mm	3 mm	NZ
P. gingivalis (PG2)	Human Isolate/ETSA	7 mm	3 mm	NZ
P. melaninogenica (PM1)	Human Isolate/ETSA	NZ	NZ	NZ
P. melaninogenica (PM2)	Human Isolate/ETSA	NZ	NZ	NZ
P. intermedia (PI1)	Human Isolate/ETSA	NZ	NZ	NZ
P. intermedia (PI2)	Human Isolate/ETSA	NZ	NZ	NZ
F. nucleatum (FN1)	Human Isolate/ETSA	NZ	NZ	NZ
F. nucleatum (FN2)	Human Isolate/ETSA	NZ	NZ	NZ

NZ - no zone.

properties on organisms considered to be important in periodontal diseases such as *P. intermedia, P. melaninogenica* and *F. nucleatum*, at the tested concentrations. It might be possible that at higher concentrations this antimicrobial may exhibit inhibitory effects on these organisms as well.

Ideally, it would be interesting to submit any antibiotic or antimicrobial substance to a panel of fresh isolates coming from periodontally diseased sites or individuals. The rational behind such procedures would be to determine the susceptibility of certain organisms to prospective antimicrobials. However, this is virtually an impossible task in the clinical setting.

The improper use of antibiotics in the treatment of periodontal diseases raises serious concerns as to what method can best address the control of periodontal infections. Most dentists do not know how to administer antibiotics. In addition, patient compliance is always problematic. Several antimicrobial agents such as iodine, salts, chlorhexidine, among others, are frequently used as adjunctive tools to control periodontal infections. We have tested the antimicrobial action of a commercially available solution (AXOL™) on selected periodontopathic bacteria. AXOL™ was effective in inhibiting some of the pathogens but not all. We conclude that antimicrobial susceptibility tests can provide information on how to accomplish optimal results on the control of the periodontal microbiota in the treatment of periodontal diseases.

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