

Effects of Pulegone in Cutaneous Lesions of Experimental Pseudomoniasis in goat

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Abstract

Background and objective: The issue of antibiotic resistance is currently being pursued very seriously. One of the drug-resistant bacteria is *Pseudomonas aeruginosa*. As an opportunistic and important pathogen in human and livestock, this bacterium can be resistant to various antibiotics in different ways. For this reason, research to obtain antimicrobials from alternative sources such as plants and plant essential oils is considered by many researchers. This study investigated the antimicrobial potentials and therapeutic effects of pulegone in experimental cutaneous pseudomoniasis in goats clinically.

Materials and methods: Four two-year-old female goats weighing approximately 45 kg were used. To prepare the *P. aeruginosa* inoculation site, the right and left chest and the flank on both sides of the animal were shaved to an area of 30 cm² at each site. After suppressing the immune system by injection of dexamethasone, in each place at five points and at each point 0.4 ml of *P. aeruginosa* suspension, was injected intradermally. After cutaneous pseudomoniasis induction, lesions in the right thoracic region were treated with glycerol-soluble pulegone, lesions in the left thoracic region were treated with gentamicin ointment as standard treatment, and lesions in the right thoracic region were treated daily with glycerol. Lesions in the left flank were not treated as a control group.

Results: The results of this study showed that pulegone, just like gentamicin, treats goat cutaneous pseudomoniasis wounds in nine days and heals them effectively.

Key words: Skin lesion, *Pseudomonas Aeruginosa*, Pulegone, Animal model, antibiotic resistance

***In-vitro* Investigation of Antimicrobial Activity of Ethanolic Extract of Sumac (*Rhus coriaria* L.) against some Pathogenic Microorganisms**

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Abstract

Background and objective: Sumac (*Rhus coriaria* L.) contain various phenolic compounds with antimicrobial and antioxidant properties. The purpose of this research was to evaluate the *in-vitro* antimicrobial effect of ethanolic extract of sumac on some pathogenic microorganisms (*Escherichia coli*, *Staphylococcus epidermidis*, *Enterobacter aerogenes*, *Bacillus cereus*, and *Candida albicans*).

Materials and methods: The ethanolic extract of sumac was obtained by the maceration method and its antimicrobial effect was then investigated by the antimicrobial methods disc diffusion agar, well diffusion agar, minimum inhibitory concentration, and minimum bactericidal/fungal concentration. SPSS software and Duncan test ($p < 0.05$) were used to analyze the data.

Results: The sumac ethanolic extract had a considerable antimicrobial effect on the microorganisms tested. According to the disc and well diffusion agar methods, the most sensitive and resistant bacterial species to the extract were *S. epidermidis* and *E. aerogenes*, respectively. The minimum inhibitory concentration for the microorganisms was in the range of 8-32 mg/ml.

Conclusion: The sumac ethanolic extract shows a considerable antimicrobial effect on the pathogenic microorganisms and high antioxidant activity. Therefore, the ethanolic extract of sumac could be used as a natural antimicrobial and antioxidant agent.

Keywords: Antimicrobial effect, Pathogenic bacteria, Sumac, Ethanolic extract

Prevalence of *Tinea capitis* in Primary Schools of Zahedan. 2020-2021

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Abstract

Background and objectives: *Tinea capitis* is a common childhood infection in many parts of the world so that it has a challenging treatment for patients. Due to the importance of *Tinea capitis* in school-age children the aim of this study was to investigate the prevalence of *Tinea capitis* in primary schools in Zahedan.

Materials and methods: This descriptive cross-sectional survey was conducted during two months (October and November 2020). Ten primary schools of Zahedan city were examined in order to consist of 2328 students; 1407 boys and 921 girls. Samples were collected of 36 students with clinical signs and suspected *Tinea capitis*. In the laboratory, the collected samples were tested for the presence or absence of *Tinea capitis*.

Results: 1.5% of students (n = 35) had *Tinea capitis*; *Ectotrix* and *Endotrix* types. The prevalence was 1.92% in male students and was 0.25% in female students, which was statistically significant ($P \leq 0.05$).

Conclusion: The findings of this study showed that the incidence of *Tinea capitis* with various types of *Ectotrix* and *Endotrix* in students of Zahedan city is significant. The highest prevalence of *Tinea capitis* is related to *Ectotrix* type and the prevalence of *Tinea capitis* is higher in male students in comparison female students.

Key words: *Tinea capitis*, Fungus, Dermatophytes

Resistance to Aminoglycosides among Biofilm Producing *Escherichia coli* Strains Isolated from Patients with Urinary Tract Infection in Isfahan during 2017

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Abstract

Background and objective: Urinary tract infections (UTIs) are known as a worldwide serious challenge, mainly because of higher recurrence rates due to the ability of strains to form biofilm which results in resistance to frontline antibiotics such as aminoglycosides. Aminoglycosides are broad-spectrum antibiotics that show appropriate bactericidal activity against most Gram-negative bacteria such as uropathogenic *Escherichia coli* (UPEC). In this study we aimed to assess the antibiotic resistance patterns of biofilm producing UPEC strains isolated from patients with UTI in a referral hospital in Isfahan.

Material and methods: During 2017, a total of 166 Uropathogenic UPEC strains were collected from a referral hospital laboratory in Isfahan. All isolates were cultured on MacConkey agar and eosin methylene blue agar and identified using Polymerase Chain Reaction (PCR) assay. The ability of strains to form biofilm was tested by quantitative microtiter plate (MTP) assay and susceptibility of biofilm-producing strains to amikacin, gentamycin, kanamycin, streptomycin, and tobramycin was determined using disk diffusion method according to the recommendations of Clinical & Laboratory Standards Institute (CLSI).

Results: Using phenotypic methods & PCR test all isolates were confirmed as *E. coli* in which 39 strains (23%) were biofilm positive; and among all, 18, 26 and 56% of UPEC strains were able to form strong, moderate, and weak biofilm, respectively. Moreover, 28% of biofilm producing strains showed susceptibility to all antibiotics tested and 72% were resistant to streptomycin. Moreover, resistance to kanamycin and amikacin was also limited to 36 and 10% of strains, respectively. A total of 7 resistance patterns were determined among the strains in which pattern 1 (resistance to streptomycin) was the most prevalent pattern.

Conclusion: The results of this study indicated the presence and persistence of aminoglycoside resistant and biofilm producing UPEC strains among patients with UTI in the studied hospital in Isfahan. Also, tobramycin and gentamicin were selected as the the most effective antibiotics against biofilm producing strains in this research.

Keywords: UPEC, UTI, aminoglycosides, biofilm, microtiter plate assay, tobramycin, gentamicin

Frequency of Vancomycin Resistant Enterococci Strains in Sewage Treatment Plants in Isfahan during 2018 and 2019

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Abstract

Background and objective: Enterococci are members of human and animal gastrointestinal tract normal microbiota that enter the environment via sewage and can survive for a long period of time. These bacteria have the ability to acquire resistance to different classes of antibiotics and play an important role in spread of vancomycin resistance among Gram positive cocci. The aim of this study was to assess the presence of different enterococcal species in sewage treatment plants (STPs) in Isfahan.

Material and methods: During 2018 and 2019 sampling was carried out from incoming raw sewage, sludge and effluent of 2 sewage treatment plants in Isfahan. Samples were prepared and cultured on M-Enterococcus agar supplemented with vancomycin and 2,3,5-triphenyltetrazolium chloride. Selected colonies were identified as enterococcus genus using common biochemical tests and at the species level by multiplex-PCR assay using specific primers. Antibiotic resistance of strains to penicillin, erythromycin, ciprofloxacin, rifampin, tetracycline, nitrofurantoin, chloramphenicol, linezolid and quinupristin-dalfopristin was determined according to the guidelines of CLSI. The presence of *vanA-vanG* genes among the strains was assessed using multiplex-PCR assay.

Results: A total of 80 vancomycin resistant enterococci (VRE) strains were identified in which 96 and 4% were *Enterococcus faecium* and *Enterococcus faecalis*, respectively. All strains showed resistance to penicillin, erythromycin and ciprofloxacin, and none of the strains were resistant to linezolid and quinupristin-dalfopristin. Moreover, 5 antibiotic resistance patterns were identified among the isolates and all strains were resistant to at least 4 antibiotics. All VRE strains were only positive for *vanA* gene and the other resistance genes were not detected.

Conclusion: The high prevalence of multiresistant VRE strains in effluent of STPs in Isfahan indicating the low efficiency of sewage treatment process for removing of antibiotic resistant bacteria.

Keywords: VRE, sewage, *vanA*, erythromycin, ciprofloxacin, Isfahan

Chemical Properties and Antimicrobial Activity of *Cymbopogon olivieri* Ethanolic Extract on Pathogenic Microorganisms: A Laboratory Study

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Abstract

Background and objective: The plant compounds have antimicrobial and antioxidant properties. Therefore, they can be used as a good alternative to chemical drugs. Kah Makki (*Cymbopogon olivieri* (Boiss.) Bor) is used as a disinfectant and to treat stomach pain. In this study, the total phenolics and flavonoids content, antioxidant properties, and antimicrobial activity of ethanolic extract of Kah Makki plant on some microorganisms were investigated.

Materials and methods: The ethanolic extract of the plant was prepared and its total phenolic and flavonoid contents, and antioxidant activity (DPPH- and ABTS-radical scavenging) were measured. Moreover, disk diffusion agar, well diffusion agar, minimum inhibitory concentration, and minimum bactericidal/fungicidal concentration methods were used to evaluate the antimicrobial activity of the ethanolic extract on *Enterobacter aerogenes*, *Staphylococcus aureus*, *Candida albicans*, and *Penicillium italicum*.

Results: In disk diffusion agar method, the smallest growth inhibition zone was observed for *Enterobacter aerogenes* and the highest one was observed for *Staphylococcus aureus* and *Candida albicans*. The lowest inhibition zone in well diffusion agar method was related to *Enterobacter aerogenes* and the highest value was related to *Candida albicans*. The lowest inhibitory and bactericidal/fungicidal concentration was observed for *Candida albicans* and the highest concentration was observed for *Enterobacter aerogenes*.

Conclusion: It was found that the ethanolic extract of Kah Makki has an appropriate antimicrobial effect against a wide range of pathogenic microorganisms (gram-positive, gram-negative bacteria, mold, and yeast), in conjugation with its considerable levels of phenolic and flavonoid compounds, and high antioxidant properties. Therefore, the plant can be used as a strong antimicrobial compound to inhibit a wide range of microorganisms and as an alternative to chemical drugs.

Keywords: *Kah Makki, Ethanolic extract, Antimicrobial property, Phenolic compounds*