

## **The Antimicrobial Effect and Interaction between the Aqueous and Ethanolic Extracts of *Plantago major* on *Staphylococcus aureus*, *Listeria innocua*, *Escherichia coli* and *Pseudomonas aeruginosa* “in vitro”**

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### ***Abstract***

**Background and objective:** *Plantago major* belongs to Plantaginaceae family and is an endemic medicinal herb distributed throughout the Iran. Therefore this study is aimed to examine the antimicrobial activity of *Plantago major* on 4 pathogenic bacteria species including *Staphylococcus aureus*, *Listeria innocua*, *Escherichia coli* and *Pseudomonas aeruginosa*.

**Materials and methods:** In this study was extracted by maceration method. Determination of the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values were used as quantitative method, and disk diffusion (Kirby-Baur) and Pure plate methods were applied as qualitative methods.

**Results:** The results of the Kirby-Baur test showed that extracts of *Plantago major* at the concentration of 20 mg/ml has no inhibitory effect on bacterial growth. The results indicated that the maximum diameter of inhibition zone of aqueous or ethanol extracts of *Plantago major* in a concentration of 80 mg/ml pertained to the bacterium *Staphylococcus aureus*. The minimum zone diameter in this concentration was associated with *Pseudomonas aeruginosa*. The minimum inhibitory concentration of the aqueous extract of *Plantago major* for *Staphylococcus aureus*, *Listeria innocua*, *Escherichia coli* and *Pseudomonas aeruginosa* were 25, 50, 100 and 200 mg/ml, respectively, and the MIC of ethanol extract were 12.5, 25, 50 and 100 mg/ml, respectively. The minimum bactericidal concentration of the aqueous extract of *Plantago major* for *Staphylococcus aureus*, *Listeria innocua*, *Escherichia coli* and *Pseudomonas aeruginosa* were 50, 50, 200 and 400 mg/ml, respectively, and the MIC of ethanol extract were 25, 25, 50 and 200 mg/ml, respectively.

**Conclusion:** The ethanolic extract of the *Plantago major* compared with the Vancomycin antibiotic had more inhibitory effect on studied bacteria. Furthermore, *Plantago major* extracts showed greater inhibitory effect on Gram-positive bacteria in comparison with Gram-negative bacteria.

**Keywords:** *Plantago major*, Extract, interaction, Antibiotic, pathogenic bacteria.

## **Evaluation of Ethanol on Bacterial Contamination of computer keyboards at two medical centers in Semnan**

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### **Abstract**

**Background and objective:** Computer keyboard may serve as reservoirs for the transmission of microorganisms. The purpose of this study was to determine bacterial contamination of computer keyboards in various wards of Fatemiyeh and Amir-Almomenin hospitals in Semnan city and evaluation of ethanol efficacy on the contaminations.

**Materials and methods:** This study was done on different parts of the computer keyboards at two medical centers in Semnan city before and after disinfection. With multi-stage stratified sampling, 48 samples of 24 computer keyboards was collected. Specimens cultured on blood agar, manitol salt agar and eosin methylene blue (EMB). Bacteria diagnosed depending on phenotypic characteristics and biochemical properties. For the analysis and comparison of data, SPSS software version 21 was used.

**Results:** All of the samples obtained from the computer keyboards on both medical centers previously disinfected with ethanol, shown bacterial contamination (100%). Totally, 12 different bacterial species isolated and at least one pathogen in 95.8% of the samples grew. In Amir-Almomenin hospital keyboards, gram positive sporulating bacilli with 33.3% and from Fatemiyeh hospital keyboards, *Escherichia coli* with 29.1% were prominent.

**Conclusion:** The data of this study suggest that microbial contamination of keyboards in different sections of hospitals is prevalent and that keyboards may be successfully decontaminated with disinfectants. Also contamination rate of intestinal bacteria in Amir-Almomenin hospital due to usage of disinfectants has significant decreased than Fatemiyeh hospital.

**Keywords:** Bacterial contamination, computer keyboard, ethanol, disinfectants, hospital, Semnan

## **Fractionation of the Venom of Iranian Cobra Snake by Gel Filtration Chromatography and Reverse-Phase HPLC and Evaluation of Antibacterial Activity of Isolated Fractions on Standard Bacterial Strains**

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### **Abstract**

**Background and objective:** For many years, antibiotic resistant infections including septicemia, burn infection, and peritonitis have been reported from many hospitals and still no antibiotic guarantees comprehensive treatment. Antimicrobial peptides are one of suggested solutions to overcome the problem. The goal of this study was tracing for an antimicrobial peptide in the venom of Iranian cobra snake, *Naja naja oxiana* and evaluation of its toxicity on human Red Blood Cells as well.

**Materials and methods:** Snake venom was firstly fractionated using Gel filtration chromatography. The resulted fractions controlled for antibacterial activity against *E. coli* and *Staphylococcus aureus*. The fractions responsible for antibacterial activity were fractionated by Reverse Phase- HPLC. All major peaks were collected and controlled for activity against *E. coli*. Positive fractions selected to examination of activity against *Pseudomonas aeruginosa* (ATCC27853), *Acinetobacter baumannii* (ATCCBAA747), and *Staphylococcus aureus* (ATCC29213). Toxicity of candidate antibacterial fraction was evaluated by in vitro hemolysis assay.

**Results:** The weight of proteins and peptides approximately ranged from 7KDa to 170 KDa. According to results, 8 fractions were obtained gel filtration chromatography. Among 8 fractions only 3 fractions were peptide and had the most area percent. Three fractions, F6, F7, and F8, selected for determination of MIC against *E. coli* and *S. aureus*. Two fractions had antibacterial activity at 50µg for both of examined bacteria. As the amount of fraction F7 was greater than F6, it was candidated for further fractionation by HPLC. 12 peaks were eluted and collected from column. Among the fractions, F4, F9, F10, and F12 were more effective against *E. coli*. Fraction 12 had the most activity as compared to the others. The weight of F12 approximately estimated as an 8KDa peptide. The MIC for F12 against *E. coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* were determined at 6.25, 25, and 50µg respectively.

**Conclusion:** We could find a bactericidal peptide. It is the first report for antibacterial activity of Iranian cobra snake venom. This peptide did not show any direct or indirect hemolytic activity. Natural compounds like antimicrobial peptides derived from venomous animals could be an effective solution to deal with multidrug resistant pathogen.

**Keywords:** Iranian cobra snake, *Naja naja oxiana*, venom, Antimicrobial peptides, FPLC, RP-HPLC.

## Antibiotic Resistance and Plasmid-Mediated AmpC Beta-actamases among Clinical Isolates of *Escherichia coli*. Vali-e-Asr Hospital, Qom city, Iran, 2016

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### Abstract

**Background and objective:** Plasmid mediated AmpC  $\beta$ -lactamase resistance in *Escherichia coli* is an emerging problem worldwide. Phenotypic methods are commonly used for detection of resistance production in Gram-negative isolates, but molecular data about the prevalence of plasmid-mediated AmpC-type resistance at the national level are needed. Hence, a prospective study was undertaken to determine antibiotic resistance and detection of plasmid-mediated AmpC beta-lactamases among clinical isolates of *Escherichia coli* from Patients of Vali-e-Asr hospital in Qom city.

**Materials and methods:** In this cross-sectional, descriptive study (conducted between 20 March and 20 May, 2016), 61 specimens of *E. coli* were collected from patients visiting Vali-e-asr Hospital in Qom, Iran, using conventional microbiological methods. To determine antibiotic resistance of the specimens, antibiogram obtained from disk diffusion test was used. Then, the screened strains were examined for PCR amplification of (CITM, FOX)-type plasmid-mediated AmpC beta-lactamases- producing genes. The results were analyzed by using SPSS software

**Results:** Among 61 *E. coli* specimens, 54 specimens (88.5%) were associated with urine and the rest (11.5%) with blood. In terms of gender, 49 patients (80.3%) were female and 12 patients (19.7%) were male. Among the specimens, the highest and least antibiotic resistance was observed against amoxicillin and imipenem, respectively. Resistance to ceftazidime was seen in 27 specimens (69.2%). From the results, CITM was identified in 7.4% of specimens, but FOX was not detected in specimens.

**Conclusion:** Results showed that the prescription of antibiotics for patients with plasmid-mediated AmpC beta-lactamases -producing strains not only did not stimulate recovery, but also led to the formation of resistant strains. In addition, the phenotypic methods do not produce the actual number of AmpC  $\beta$ -lactamase strains. Therefore, the conduction of genotypic studies in society leads to effective and faster treatment of patients, and prevents the spread of resistant bacterial isolates.

**Keywords:** plasmid-mediated AmpC  $\beta$ - lactamases, *Escherichia coli*, Vali-e-Asr hospital ,Qom city

## **Survey of Antibiotic Prophylaxis Administered Before Surgery in a Teaching Hospital in Tehran**

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### ***Abstract***

**Background and objective:** Antibiotic Prophylaxis is used for prevention of surgical site infection before surgery. The aim of this study is to determine current status of administration of antibiotic prophylaxis in different surgical wards of a teaching hospital, and compare it with standard guidelines.

**Materials and methods:** It is retrospective and descriptive study. 200 patients who had undergone surgery were enrolled to study. Demographic information and parameters of antibiotic therapy such as indication, type of antibiotic, dose, route, the time of administration before surgery and duration of prophylaxis were collected from cases in check list. Then compared to the national and international guidelines.

**Results:** 188 of 200 patients had indications of antibiotic Prophylaxis that all received antibiotics. In 71 cases (37.7%) the type of administered antibiotic was appropriate. Time of administration in 109 cases (58%), dosage in 17 cases (9.3%), route in 181 cases (96.5%), duration in 111 cases (59.4%) was appropriate. Only 11 cases (5.8%) met all the aspects of guidelines for antibiotic prophylaxis.

**Conclusion:** The time of administration before surgery, type and dosage had the most discrepancy with the guideline. Inappropriate use of antibiotic prophylaxis causes extra costs besides increasing resistant microorganisms and undesired side effects, so preparing guidelines according to economic situation and accessibility to drugs recommended.

**Keywords:** Antibiotic, Prophylaxis, Surgery, Guideline

## Detection of Multi-drug Resistance Genes in Uropathogenic *E. coli* by Multiplex-PCR

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### **Abstract**

**Background and objective:** Urinary tract infection caused by *E. coli* is one of the most common infections in the all group age in worldwide. The aim of this study was identified of *dfrA1*, *TEM*, *tetB* and *cat1* multi drug resistance genes in the Uropathogenic *E.coli* isolated from clinical samples by multiplex-PCR.

**Materials and methods:** 100 samples isolated from patients with urinary tract infections. For detection of *E.coli* was used biochemical and microbiological tests. By antibiogram was identified antibiotic resistance of *E.coli* strain. Then prevalence of *dfrA1*, *TEM*, *tetB* and *cat1* genes in the Uropathogenic *E.coli* isolated was finded by multiplex-PCR.

**Results:** From 100 samples, 63 were *E. coli* strains. The highest and lowest antibiotic resistance were detected to chloramphenicol (92.1%) and tetracycline (33.3%). By molecular analysis was identified frequency of studied genes, as, *dfrA1*(38.1%), *TEM* (65.1%), *cat1* (92.1%) (highest), and *tetB* (25.4%) (lowest).

**Conclusion:** Prevalence of urinary tract infection in the community by *E.coli* and distribution of it's resistance and virulence factors, the fast and perfect detection of this bacteria and it's resistance genes are necessary.

**Keywords:** UPEC, (*dfrA1*, *TEM*, *tetB*, *cat1*) genes, multiplex-PCR

## Prevalence Rate, Antibiotic Resistance Properties and Frequency of SCCmec Types in *Staphylococcus aureus* Strains Isolated from Various Types of Meat

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### Abstract

**Background and objective:** High antibiotic resistance in strains of this bacterium caused its high importance. The present investigation was carried out to study the antibiotic resistance properties and frequency of SCCmec types in the *Staphylococcus aureus* strains isolated from various types of meat.

**Materials and methods:** In total, 140 meat samples were collected and immediately transferred to the laboratory. After culture, Genomic DNA was extracted and the PCR assay was developed in order to detect the presence of SCCmec types. Antibiotic resistance pattern was carried out using the simple disk diffusion.

**Results:** Of 140 meat samples, 25 samples (17.85%) were contaminated with *S. aureus*. Bovine meat had the highest (33.33%) and ovine meat had the lowest (10%) levels of contamination. Statistically significant difference of  $P < 0.05$  was seen between types of sample and prevalence of *S. aureus*. Strains had the highest levels of resistance against tetracycline (100%), methicillin (37.84%), cefotaxim (78.12%) and ampicillin (75%). SCCmec IVa (40.74%), SCCmec IVb (18.51%) and SCCmec III (18.51%) had the highest prevalence among methicillin resistant *S. aureus* strains.

**Conclusion:** Meat is an important source of methicillin resistant *S. aureus*. Application of the disk diffusion method can do the effective favor to prohibit from the occurrence of antibiotic resistance. Whole meat cooking before consumption has been inhibited from the occurrence of food poisoning due *S. aureus*.

**Key words:** *Staphylococcus aureus*, Chicken meat, Red meat, Antibiotic resistance, SCCmec types.

## Frequency of Erythrocyte Sedimentation Rate above 100 mm/h and its Related Factors in Hospitalized Patient. Ardabil in 2015

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### **Abstract**

**Background and objective:** The Erythrocyte Sedimentation Rate (ESR) is indirect measures that can be used to assess a patient's general level of inflammation. An extremely elevated ESR (>100 mm/h) has a 90% predictive value for a serious diseases. This study has been done for preparing more information about the reasons of ESR (>100 mm/h) in adults who had been referred to Imam-Khomeini hospital.

**Materials and methods:** This is a descriptive study and whole hospitalized patients in this hospital with the ESR levels more than 100 included in this study from September 2014 to September 2015.

**Results:** 127 patients have been encountered in this study and 59.08% of them were female and 40.92% were male. The average age of the participants were 55.54 and the average ESR level were 112.6 with the highest affluence of 34% for infection and 13% for other diseases. The most important illnesses in this study were osteomyelitis (14%), CKD (14%) RA (10%). The levels of Hb and Cr have been evaluated that are 9.27 for Hb and 2.1 for Cr.

**Conclusion:** In comparison to different studies, the most important reasons for the rise of ESR level are infection diseases and secondary reasons malignancies and autoimmune diseases and kidney defects are the reasons for the rise of ESR level.

**Key words:** Etiology, Erythrocyte Sedimentation Rate, Patients.