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Effect of walnut tree root (Juglandaceae) on Escherichia coli resistant to antibiotics

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Abstract

The aim of this study was to evaluate the effect of walnut tree root (Juglandaceae) on Escherichia coli resistant to various antibiotics. Walnut tree root extract was obtained using a rotary device. 20 cases of E. coli were obtained from urinary tract infections at Zabol hospital and MIC and MBC were determined using dilution in the wells. The results of the study showed that the concentrations of 20 and 10 mg/L had the highest inhibitory effect at a concentration of 40 milligrams per milliliter, most have lethal effects. Our results suggest the effect of the extract against the tested bacteria in the laboratory that can represent their effects on living systems.

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Keywords: Antimicrobial activity, Extract, Root, Orchids, E. coli.

1. Introduction

Referring patients to different wards, are subject to hospital infections And of the most important factors involved in nosocomial infections and consequently, deaths from it. Gram-negative Escherichia coli bacteria of the Enterobacteriaceae family and one of the most important cause many infections such as sepsis or blood infection made public, gastroenteritis, meningitis, infants, gallbladder and biliary tract infection, wound infection, pneumonia, peritonitis, and especially infection urine is (Rowe and Saenz, 1989; Gulluce et al., 2006). The use of

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herbs to treat disease is a history of centuries. Today with the vast majority of drugs are chemical, but it is estimated that at least a third of all medicinal products of plant origin, or after extraction from the plant have been modified (Eisenberg et al., 1998; Afkari et al., 2016).

Juglans regia L. (*Juglandaceae*) is not only an agricultural commodity, but its leaves, barks, stems, pericarps, fruits, flowers and ligneous membranes are all applied for different medicinal uses. In fact, walnut leaves are considered a source of healthcare compounds, and have been intensively used in traditional medicine for treatment of venous insufficiency and for its antidiarrheic properties. Antifungal, antibacterial and antioxidant activities of this plant have also been described (Isanga et al., 2007; Miraliakbari and Shahidi, 2008; Amaral et al., 2003). The health benefits of walnuts are usually attributed to their chemical composition. Walnuts are a good source of essential fatty acids and tocopherols (Amaral et al., 2005). The aim of this study was to evaluate the effect of walnut tree root (*Juglandaceae*) on *Escherichia coli* is resistant to various antibiotics.

2. Materials and methods

2.1. Extraction

Maceration method used for extraction, this means that after crushing the leaves, 10 g of each sample, this time with a filter paper is smooth. After completion of extraction, extracts obtained using a rotary machine (vacuum distillation) are condensed at a temperature of 40 to 50 ° C and dried at a temperature of 50-40 ° C for 2 days.

2.1.1. Determine the dry weight of the extract

First, determine the weight of a test tube and then poured ml1 from extracts of the content of the tube is dry at room temperature. After drying the extract, the weight of the test tube re-determined. Tube weight equal to the weight of dry extract is calculated.

2.2. Preparation of bacteria

All clinical samples that are collected from different wards, microbiology culture medium containing blood agar, Mac Canan agar, EMB agar and chocolate agar and the corresponding biochemical tests (including catalase test, urea greed and Simon citrate are identified for *E. coli*).

2.2.1. The sensitivity of bacteria to conventional antibiotics

Bacteria frozen in our sub-culture and after incubation of the bacteria suspension with the same opacity 5.0 McFarland units produced, then we dilute the suspension to a 10. 1.0 ml of the time taken and the appropriate medium according to the type of bacteria can be cultivated table. The disk containing antibiotics, put on the medium. After incubation Antibiogram table and measure the diameter of inhibition of bacteria resistant to antibiotics commonly used semi-sensitive and determined.

2.3. Antimicrobial test extract

The sensitivity of the bacterial isolates to extract dilution method using well checked. Seven wells of microtiter plates in 100 ml of Mueller-Hinton nutrient broth (MHB) is added. The first wells extract 100 ml of the diluted solution is added and removed after mixing with 100 ml of the first wells will be added to the second well and so to the last well done this is the last well beyond the 100 ml culture medium 100 ml of microbial suspension containing 107 units per ml, equivalent to 5.0 McFarland added and incubated at 37 ° C for 24 hours to be put. The first well which prevents the growth of bacteria is then put in the incubator as (MIC) is considered And to ensure the transparent plate 10 microliters removed will be transferred to Mueller-Hinton agar after 24 hours the first time able to destroy 99.9% of bacteria is shown as the minimum lethal concentration.

3. Results and discussion

The results of the study showed that the extract of the roots of orchids in high concentrations, inhibits the growth of *E. coli* samples were so that the highest concentration of inhibition at concentrations of 10 and 20 milligrams per milliliter so that 7 and 5 bacterial strains were inhibited at this concentration and can also be stated

that the minimum inhibitory concentration equal to the concentration of 5.2 milligrams per milliliter. So that three strains of bacteria are inhibited in this as well as the most lethal concentration of 40 milligrams per milliliter to 4 strains of bacteria in this inhibitory concentration (Table 1).

Table 1

MIC and MBC walnut tree root against *E. coli*.

Bacterial cod	MIC/MBC	Bacterial cod	MIC/MBC
1	5/10	11	10/20
2	5/10	12	5/10
3	10/20	13	10/20
4	2/5/5	14	20/40
5	10/20	15	20/40
6	20/40	16	10/20
7	10/20	17	5/10
8	20/40	18	2/5/5
9	10/20	19	2/5/5
10	20/20	20	5/10

Infectious diseases are the leading cause of premature and caused the deaths of thousands of people around the world are daily (Beg et al., 2000; Afkari et al., 2016). A large number of commercial antibiotic for infection control infectious diseases in humans are used around the world. Long-term use of antibiotics is the emergence of multi-drug resistant bacteria and clinically important problem in the treatment of infectious diseases has created (Singh et al., 2002), therefore it is necessary to focus on the discovery of new antimicrobial materials from other sources such as plants and animals. Extensive research done. Medicinal plants as a potential source of special attention are instances chemotherapy treatment; It has been determined that these plants have a variety of anti-microbial materials with low toxic effects or are toxic plant during their secondary metabolism of many compounds with complex molecular structures; and some of them have antimicrobial properties (de Souza et al., 2005).

Documents and historical evidence testify to the fact that Iran is one of the most ancient human civilizations that familiar with medicinal plants and Iranians, including men full of valuable experience in the field of medicinal plants are used. The results of the study showed that the concentrations of 20 and 10 mg L had the highest inhibitory effect at a concentration of 40 milligrams per milliliter, most have lethal effects. Noumi and colleagues in a study conducted in 2010, concluded that the minimum inhibitory concentration extract from 006/0 to 195/0 walnut against class candidates varied mg ml (Noumi et al., 2010).

Isanga review and partners in 2007 as well as in the Mir Ali Akbar and martyrs in 2008, antifungal, anti-bacterial and antioxidant plant has been described (Isanga and Zhang, 2007; Miraliakbari and Shahidi, 2008). In honor Chaleshtori and associates study results showed that ethanol extract of walnut leave MIC for *Streptococcus mutans* and *sanguinis* 125 and 6/15 mg ml. The inhibition of *Streptococcus mutans* to extract chlorhexidine (P=000/0) and *Streptococcus sanguinis* about not show significant differences (058/0 = P). (Chaleshtori honor et al., 1389). In reviews San Francisco, California, evaluated the effect of walnuts on *E. coli* bacteria *E. coli* population has decreased by about 99%. In this study the effect of walnuts on tannin extract also showed *E. coli* bacteria has been destroyed (Kolal, 1965). The results of this study show that the Iranian walnut leaves have antibacterial properties is significant in vitro and these findings could field more research in the future for purification of active components and efficiency of walnut leaf derivatives in clinical conditions provided and as an antibacterial for the treatment and prevention of urinary tract infections used.

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