

Antibacterial Activity of Leaves Extract from Oak (*Quercus persica*) Against Some Positive and Negative Bacteria

Hassan Nourafcan¹, Maisam Nasrollahpour², Iman Bajalan^{3*}

1. Department of Horticulture, Miyaneh branch, Islamic Azad University, Miyaneh, Iran

2. Student of Medicinal Sciences, Islamic Azad University, Tabriz Branch, Tabriz, Iran

3. Young Researchers Club, Borujerd Branch, Islamic Azad University, Borujerd, Iran

Corresponding author: Iman Bajalan

ABSTRACT: The jungles in west and northwestern of Iran that are the main place where oak trees are grown, are 5.2 million hectare big and contain over 49 % of the jungles of Iran. This study reports on the antibacterial activity of extract taken from the leaf of oak (*Quercus persica*) against two positive (*Staphylococcus aureus* and *Bacillus subtilis*) and two negative (*Klebsiella pneumoniae* and *Escherichia coli*) bacteria. Antibacterial activity of oak determined with disc diffusion test. Collecting the samples was done in Lorestan provenance, after that drying in shadow and extracting by rotary. Finally the mere extract was poured in Petri dish and put in the refrigerator. Results of this study showed the antibacterial activity of leaf of oak.

Keywords: Antibacterial activity, Disc diffusion, Leaves of oak, Extract

INTRODUCTION

Staphylococcus aureus is a gram-positive globe-like bacterium with cluster design that has capsule and can grow in two forms aerobic and non-aerobic. These organisms can live long in dry surfaces and they are the cause of some partial infections such as, abscess, pneumonia, scalded skin syndrome, toxic shock syndrome, and food borne illnesses (Finegold, 1990; Martin, 1982; Chang et al., 2002). *Bacillus subtilis* is also one of the factors that create illnesses (Bahador and Bahador, 2008).

Klebsiella pneumoniae is one of the most important parts of *Klebsiella*. It has a capsule that creates colony and increases the amount of sickening of these organs, in the body. Alcoholics and also those who have lung problems are in the danger of affection, because their bodies cannot clean the oral secretions from the lower respiratory tracts (Bahador and Bahador, 2008).

Escherichia has 5 types. The most common in medicine is *Escherichia coli*. It is gram-negative, non-aerobic and optional also it is zymogenic and oxidase-negative. These organisms are the cause of some diseases like sepsis, urinary tract infection, and cyst infection (Bahador and Bahador, 2008).

Considering the increasing resistance of pathogen bacteria towards antibiotics, the researchers have studied the antimicrobial components of the plants, so that by studying more about them, they can find ways for using the components as a natural conservator and also decrease the side effects of using chemicals and synthetics in foods (Sanchez-Moreno et al., 1999). In recent years, the scientists have got interested in the antimicrobial characteristic of some plants and their extracts and through several investigations, antimicrobial. Characteristic of some plants and their components are proved (Won et al., 1997; Delcampo et al., 2000; Elgayar et al., 2001).

Considering the great importance of plant extracts and also the great numbers of oak trees in the Zagros jungles, the objective of this study was investigating the antibacterial activity of oak-leaf extract on *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia* and *Bacillus subtilis*.

MATERIALS AND METHODS

Collecting the plant samples was done in a village named Dinarvand in Lorestan provenance from Iran. Three samples were chosen from this area. Each sample containing 10 trees that were healthy from the aspect of pests. After sampling, the process of drying was done in the shade, and the room temperature. After drying, the samples were kept in some bags, separately until the time of extracting. In every bag, the name of the area, the place of collecting, and its special number were recorded. In order to extract, first the sample were crushed heftly in order to decrease the volume rather than the level. Then 10 gr of each sample was put in a 1-litre jar and about 100 ml 96% alcohol was added to it. Afterwards the samples were in the room temperature and away from sunlight, for 72 hours. During the time, samples were shaker and mixed for several times. Then in order to thicken the extract, Rotary set was used, and this action (thickening) was done in half an hour. Finally the mere extract was poured in Petri dish, and was tightly covered by its leaves, then in the refrigerator till the time of antimicrobial activitydeterminate.

Table 1. The characteristic of the used bacteria in the experiment

| No. | Bactria | gram | PTCCNo. | Culturecondition | Risk group |
|-----|------------------------------|------|---------|-------------------|------------|
| 1 | <i>Staphylococcus aureus</i> | + | 1112 | 37 ⁰ C | 2 |
| 2 | <i>Klebsiella pneumoniae</i> | - | 1053 | 37 ⁰ C | 2 |
| 2 | <i>Bacillus subtilis</i> | + | 1254 | 37 ⁰ C | 1 |
| 4 | <i>Escherichia coli</i> | - | 1270 | 37 ⁰ C | 2 |

Bacteria were provided from Tabriz University in Iran. For doing the anti-bacterial test by the method of Disc diffusion test from Muller-Hinton agar plate, made in Merk, Germany was used. For providing this plate, 34 grams of the plate was dissolved in 1 liter water, and after that was autoclave (10 min, 115 ⁰c). The suspension that was supplied from bacteria was compared with .5 McFarland standards, so that they are equal from the viewpoint of tiff. 100 micro liter of the suspension was poured in the environment and was spread then it was placed under sterile Hood for 20-25 min, so that the environment gets completely dry. After that 15 micro liter of the extracts were poured on each disc, and also for negative control, 15 micro liter of DMSO was added to the discs. The discs were sterile for 10 min then were placed on the plate in basins with certain distances and 3 rows, by forceps. Also oxytetracycline and solphamecine antybiogram disks were used as positive controls. Basins were placed in 1(37 ⁰c) for 18-24 hours and inhibition zone was measured based on millimeter.Finally for doing statistical analysis and for drawing the diagrams, the software SAS and EXCEL 2007 were used subsequently.

RESULTS AND DISCUSSION

The results of comparing the average of data by the use of Duncan test showed that the most inhibition zone belongs to solphamecine on *Staphylococcus aureus* bacteria. The least inhibition zone belongs to negative control of DMSO. Among the extracts of oak tree, the most inhibition zone belonged to *Staphylococcus aureus* (figure 1).

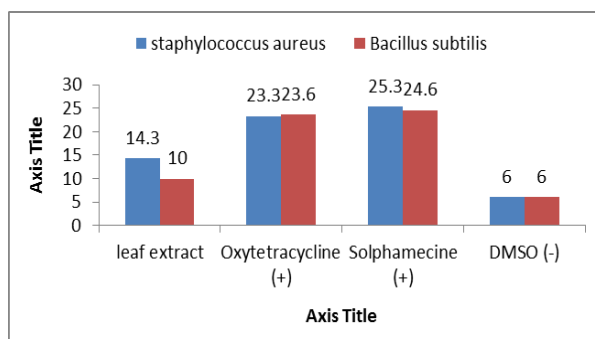


Figure 1. The inhibition zone of *Staphylococcus aureus* and *Bacillus subtilis* bacteria in the presence of leaf extract, negative and positive controls

Also the results showed that the most inhibition zone belonged to solphamecine on *Escherichia coli* bacteria. But there was no significant difference among DMSO and oxytetracycline. Among the extracts of the oak tree leaves, the most inhibition zone belonged to *Escherichia coli*. While inhibition zone in the presence of plant extract was more than DMSO and oxytetracycline (figure 2).

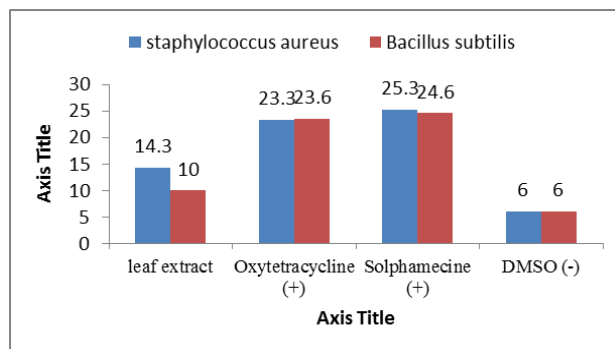


Figure 2. The inhibition zone of *Escherichia coli* and *Klebsiella pneumonia* bacteria in the presence of leaf extract, negative and positive controls

The investigations in this research showed that the extract of oak leaf has antibacterial characteristics against the bacteria presented in this research. Also the results show that the effect of these extracts against gram positive bacteria is more than two gram negative Bacteria. By the use of the results of this research we can come to this conclusion that the extract of oak leaf has antibacterial characteristics and considering this characteristic we can make medicine with natural resources. Also by doing more researches about this, it will be possible to identify the most important material in the oak leaf that has the most antibacterial characteristics. More information regards this, needs more studies.

REFERENCES

- Bahador A, Bahador F. 2008. Medical bacteriology: Murry. Publication by Debaj p. 352. (In Persian).
- Chang C, Yang M, Wen H, Chern J. 2002. Estimation of total flavonoid content in propolis by two complementary colorimetric methods. *Journal of Food & Drug Analysis* 10: 178-182.
- Delcampo J, Amiot MJ, Nguyen C. 2000. Antimicrobial effect of Rosemary extracts. *J. Food. Protec* 63 (10): 1359-68.
- Elgayar M, Draughon FA, Golden DA. 2001. Antimicrobial activity of essential oils from plants against selected pathogenic and saprophytic microorganisms. *J. Food. Protec* 64 (7): 1019-24.
- Finegold M. 1990. Printed in the United States of America, The C.V. 8th Ed. Mosby Company. St Louis. Missouri p. 329.
- Martin AR. 1982. Antibiotics. In: Doerge, R. F. Wilson and Griswold's. Text book of organic medicinal and Pharmaceutical Chemistry. 8nd. Ed. J. B. Lippincott Co. Toront P. 225.
- Sanchez-Moreno C, Larrauri JA, Saura-Calixto F. 1999. Free radical scavenging capacity and inhibition of lipid oxidation of wines, grape juices and related polyphenolic constituents. *Food Research International* 32: 407-412.
- WonDji, Min SJ, Hyun. CC. 1997. Antimicrobial activity and distilled components of garlic and ginger. *Agri. Chem. and Biochem* 40 (6): 514-18.