

Evaluating the Anti Bacterial Effects of *Allium jesdianum* Boiss Extract

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Abstract: *Allium* genus has some valuable species such as onion and garlic for human being. *Allium jesdianum* Boiss species is a bulbar and durable plant with 2-3 leaves which grows in altitudes of Arasbaran region. The herb has various uses in foods and is used traditionally in treatment and decreasing rheumatic and digestive pains as well as renal calculus excrete. The aim of this study was to evaluating the anti bacterial effects of *Allium jesdianum* Boiss extract. Microorganisms were cultured in agar mauler Hilton media such that swabs smeared with bacterial suspension were moved traversal on the media surface then the media was turned at angle of 60° and culturing were repeated 2 times. These results demonstrated that sulfide compounds form an important part of extract's constituents. Also, curzerenon and curzemne are the materials which are available significantly in this extract. Anti microbial effects of understudied herb are probably due to presence of sulfide and trepnoid compounds.

Key words: Anti bacteria, extract, *Allium jesdianum* Boiss, microorganisms, species, Iran

INTRODUCTION

Allium genus has some valuable species such as onion and garlic for human being. *Allium jesdianum* Boiss species is a bulbar and durable plant with 2-3 leaves which grows in altitudes of Arasbaran region. The herb has various uses in foods and is used traditionally in treatment and decreasing rheumatic and digestive pains as well as renal calculus excrete (Zargari, 1998). There are several reports on extract analysis and evaluation the anti microbial effects of some known species of *Allium* such as onion (*A. sotivum*).

Avato *et al.* (2000) have reported that the constituents of garlic extract include 15% diallyl disulfide and 38% diallyl trisulfide. The same study demonstrated that anti fungal effects of the extract are more than its anti bacterial effects and the effective material of the herb is Diallyl Disulfide (DDS) so that the extracts which have more DDS, demonstrate stronger anti microbial and anti fungal effects (Avato *et al.*, 2000).

Furthermore, in another study which was conducted on *Allium fistulosum* extract it was reported that the most important constituent is 30.6% dipropyl disulfide, 12% methylpropyl trisulfide and 12.3% dipropyl trisulfide (Pinoj *et al.*, 2000). The constituents available in *Allium macrochaetum* were evaluated by Bisrow and the main ingredients was reported as 53.8% diallyl disulfide,

26.19% diallyl trisulfide and 5.9% allylmethyl trisulfide (Baser *et al.*, 1997). In the present study, researchers will evaluate the constituents and anti microbial effects of *Allium jesdianum*.

MATERIALS AND METHODS

Allium jesdianum was gathered from Arasbaran woods of Ahar district on Tir month of 1390. Water distillation method and Klunjer system was used for 2 h in order to extraction. Obtained extracts were stored in small dark vials at 2°C following rinsing with sodium sulfate.

GC System: GC analysis was conducted by means of Gas Chromatography System (Model 9A) made by Shimudzo Company equipped with DB-5 bar, the height of 30 m, internal diameter of 0.25 mm and thin layer thickness of 0.15 µm. Oven temperature was kept at 40°C for 5 min then the temperature increased to 250°C with the speed of 4°C min⁻¹. The temperature of injection and detector sections was 260°C; also the gas carrying helium with the speed of 32 cm sec⁻¹ was used.

GC/MS System: GC/MS analysis was conducted by means of Varian System (Model 3400) equipped with DB-5 bar, the height of 30 m, internal diameter of 0.25 mm and thin layer thickness of 0.25 µm. Oven temperature

increased from 60-250°C with the speed of 4°C min⁻¹. The gas carrying helium with the speed of 1.1 mm min⁻¹ as well as 70 eV ionization energy was used. Identification of the extract constituents was done by means of mass spectrum and inhibition index according to Adams (1995). In order to obtain various extracts, the following methods are used:

Liquid extract: About 50 g of dried and powdered herb and 300 mL water were mixed and kept in refrigerator for 72 h. Then the mixture was filtered.

Ethanolic extracts: About 50 g of dried and powdered herb and 300 mL of 80% ethanol were mixed and kept in refrigerator for 72 h. Then, the mixture was filtered.

Etheric extracts: About 50 g of dried and powdered herb and 300 mL diethyl ether were mixed and kept in refrigerator for 72 h. Then, the mixture was filtered. Microbial tests was conducted using gram positive bacteria, i.e., *Staphylococcus aureus* PTCC1431 and *Streptococcus pyogenes* PTCC1447 and gram negative bacteria, i.e., *E. coli* PTCC1335 and *Proteus mirabilis* PTCC1076. Microorganisms were cultured in agar mauler Hilton media such that swabs smeared with bacterial suspension were moved traversal on the media surface then the media was turned at angle of 60° and culturing were repeated 2 times.

In order to anti microbial evaluations in the 80 µL of extracts rinsed with sodium sulfate and solved in n-hexane together with various extracts were poured in each of holes which were made in medium. Then, the samples were kept at 37°C for 24 h, followed by determining the rate of extracts' inhibition using the measurement of growth inhibition haloes' thickness of various extracts.

RESULTS AND DISCUSSION

The results of extracts' constituents have been shown in Table 1. These results demonstrated that sulfide compounds form an important part of extract's constituents. Also, curzerenon and curzerme are the materials which are available significantly in this extract. 22.34% Tri sulfide dimethyl, 9.25% disulfide-1-methyl, 19.03% hexa decanopic acid, 12.03% phytol and

8.03% pentacoosan are some important constituents of the extract. Studies demonstrate that *Allium sativum* constituents which obtained by hydrodistillation include 48.56% diallyl disulfide, 12.82% methylallyl trisulfide, 8.16% m is methylallyl disulfide and 11.96% diallyl trisulfide (Kim *et al.*, 1995). Also, the studies conducted by Pinoj *et al.* (2000) on identification of compounds available in *A. fistulosum* extract demonstrated that important constituents of the extract are 3.06% dipropyl disulfide and 12.3% methyl propyl sulfide.

Analysis of garlic extract showed as well that diallyl disulfide and diallyl trisulfide are the main constituents of the extract (Pinoj *et al.*, 2000; Riaz *et al.*, 1998).

The studies conducted by Lopes *et al.* (1997) on fresh leaves' using GC/MS showed that 84% of extracts volume are sulfide compounds. Some sulfide compounds identified in this herb have not been reported about other species of *Allium*; some of these compounds are 1-methylthioalk (en)yl disulfide and 1-(methylthio)ethyl disulfide allyl (Lopes *et al.*, 1997).

The results of anti microbial effects of liquid, ethanol and ether extracts of *Allium jesdianum* are given in Table 2. The results demonstrate that liquid extracts of the herb lack of especial anti microbial effects while ethanolic extracts have more anti microbial effects compared with others.

The results show furthermore that ethanolic extracts of the herb have stronger anti microbial effects such that are more effective against *E. coli* and *Streptococcus pyogenes*.

Table 1: Type and percentage of *Allium jesdianum* constituent

Constituents	Percentage	RI
Trisulfidedimethyl	22.34	987
Disulfide methyl-1-ethyl	9.25	1020
Nonanal	2.87	1101
Decanal	5.32	1202
Cyclomen aldehyde	2.01	1461
Beta-Ionone	3.57	1489
Curzerene	7.62	1499
Germacrene-B	0.58	1561
Aph-cederenepoxide	3.99	1575
Curzerenone	2.62	1606
Methylhexadecanoate	0.65	1922
Hexadecanoic acid	19.03	1923
Phytol	12.83	1943
Sclarene	1.51	1975
Pentacosane	8.03	2500
Heneicosane	3.65	2627
Heptacosane	4.15	2700

Table 2: Antimicrobial effect of *Allium jesdianum* extract on understudying bacteria

Microorganisms	Gram (+/-)	Aqueous extract	Etheric extract	Ethanolic extract	Essential oil
<i>Staphylococcus aureus</i> PTCC1431	+	0	5	9	0
<i>Streptococcus pyogenes</i> PTCC1447	+	0	9	14	0
<i>E. coli</i> PTCC1335	-	0	0	18	0
<i>Proteus mirabilis</i> PTCC1076	-	0	0	11	0

CONCLUSION

Studies conducted by Qiao *et al.* (2001) on anti microbial effects of garlic extract revealed that it is more effective on *E. coli* compared with other microorganisms. Also, the studies of Avato *et al.* (2000) on this issue demonstrated that the compounds available in the extracts of garlic have anti bacterial and anti fungal effects and diallyl disulfide has the most anti biotic effect. Anti microbial effects of understudied herb are probably due to presence of sulfide and trepnoïd compounds.

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