IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals

Human Journals
Research Article
March 2018 Vol.:9, Issue:1

The Prospects Usage for Certain Herbal Medicinals Preparation in Azerbaijan and the Fighting Against the Spread of Antibiotic-Resistant Microorganisms

IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals

Qambarli I. J. [1], E. M. Agayeva[2], S. J. Ibadullayeva*[3], V. A. Narimanov[2], V. N.Abbasova[1]

[1]*Azerbaijan State Agrarian University*

[2]*Azerbaijan Medical University, department of Microbiology and immunology*

[3]*Azerbaijan National Academy of Sciences, Institute of Botany*

Submission: 24 February 2018
Accepted: 2 March 2018
Published: 31 March 2018

Keywords: extracts, essential oil, preparation, antibiotic

ABSTRACT

Bacteriostatic effects of the tinctures of *Tanacetum coccineum*, *Hypericum perforatum* and *Cuminum cyminum* and bactericidal effect of essential oil of cumin has been identified. The use of these preparations in the prophylaxis and treatment of the gastrointestinal infections can decrease of the disease, increasing the overall resistance of animals and reducing the treatment duration of compared treatment with antibiotics. In addition, will prevent the formation of antibiotic-resistant microorganisms.

HUMAN JOURNALS
www.ijsrm.humanjournals.com

INTRODUCTİON

The problem of resistance to infectious diseases pathogens to antibiotics has medical and socio-economic significance. Many countries consider it a threat to national security.

According to opinions of World Health Organization (WHO) experts, the World is entering an era when antibiotics lose effectiveness and usual infections, which could be cured many decades ago, can pose a serious danger today [https://en.wikipedia.org/wiki/ World_ Health_ Organization; Warren et al.,2001; www.antibiotic. ru/index.php., 2018].

The wide use of chemotherapeutic drugs leads to the formation of drug resistance accompanied by the appearance of persisting and L-forms of bacteria, alteration of phenotypical features of microorganisms and complicates their identification [Agayeva et al;., 2017; Agayeva et al., 2016; Alimardanov, 2017; Williams, 2001].

Prevention of the development of antimicrobial resistance is almost impossible to challenge. Thus, development of alternative treatment methods is an essential and actual task.

Leading pharmaceutical companies have already ceased development of new chemical drugs and substitute them by treatment drugs produced from plants and by methods of genetic engineering.

Medicinal plants differ from antibiotics and chemical drugs by low costs, the absence of side effects and low risk of development of resistance. The medicinal flora of Azerbaijan is one of the richest in the World [Ibadullayeva et al., 2013; Munir Ozturk et al., 2018].

During the last decade, intensive ethnobiological investigations are held in Azerbaijan, however many problems relating to the implementation of plants in medicine and veterinary, particular mechanisms of their action, rational implementation schemes remain uninvestigated.

Therefore, we conducted research in order to find medicinal plants effective in treatment and prevention of acute intestinal infections (AII) in microorganism.

Etiological structure of AII is constantly increasing due to new bacteria and viruses [Agayeva et al., 2017; Belov et al., 1994; Golshenkov, 1988].

Polyetiological nature of AII, frequent substitution of etiological agents and their variability, formation of atypical, non-cultivated strains, the spread of antibiotic resistance, heterogeneity of microorganism population and weak immune response to opportunistic bacteria antigens make the development of new approaches for prevention and treatment of this pathology an important task.

As the keeping and feeding conditions (life "under the same roof") of dogs are close to human living conditions and causes of changes in intestine microbiocenosis are, similar they can be considered not only as domestic pets but also as biological model for investigation of drugs used for treatment and prevention of AII and immune status violations.

MATERIALS AND METHODS

Preventive and treatment efficacy of medicinal plants (extracts of *Hypericum perforatum* L. – fam. Hypericaceae Juss., *Tanacetum coccineum* (Wild) Grierson- fam. Asteraceae Dumort and *Cuminum cyminum* L. -fam. Apiaceae Lindl. were investigated. Extracts, potions, powdery forms of medicinal plants obtained from solid-phase extraction and *Cuminum cyminum* essential oil were investigated.

Plants were gathered in Tovuz-Gazakh region of Azerbaijan [Ibadullayeva et al., 2017]. The vegetable raw material was dried, moisture was determined according to the methodology described in State Pharmacopoeia [Stat Phar 1989]. Extracts of medicinal plants were prepared in accordance with requirements of State Pharmacopoeia. Powdery medicinal forms were diluted in boiled water before usage.

Diagnosis of AII was based on results of bacteriological, clinic, pathological and epizootological investigations. Identification of isolated microorganisms was performed microbiologically via VİTEK and Mari POK, with the implementation of diarrheal panel able to identify 10 bacteria and 4 viruses in 2 hours.

Serogroups of strains were detected using agglutination reaction (AR) of diagnostic OK agglutinins. Adhesive *Escherichia coli* antigens were detected by AR with agglutinins to adhesive antigens F41, K99, and K88. Bacteriostatic and bactericidal actions of medicinal preparations were evaluated by conventional methods. Antimicrobial action of *Cuminum cyminum* L. (fam. Apiaceous Lindl.) essential oil was evaluated by the method of Narimanov

& Aliyev [1989]. Test cultures, reference and epizootological strains of *Escherichia coli* were used.

RESULTS

Etiological structure of AII in dogs was investigated and main pathogens were revealed (*Escherichia coli*, Citrobacter, Campilobacter-15.2%). Out of 53, *Escherichia coli* strains 35 have shown hemolytic activity correlating with pathogenicity to white mice.

During serological typing epizootic *E.coli* strains were divided into 08, 09, 0127 serogroups while according to adhesive antigens K99 and K88 *Escherichia coli* strains were revealed.

Antibiotic resistance to ampicillin was detected in 20%, chloramphenicol - 11%, co-trimoxazole - 8%, gentamycin - 1% strains. *Escherichia coli* strains have shown resistance to clinically significant antibiotics.The most effective drugs were gentamycin, levomycetine, furazolidone, and furaginum.

Conducted research has proved that number of resistant and polyresistant strains is continuing to increase. In our opinion, application of medicinal plants is the most prospective approach.

Bacteriostatic and bactericidal features of medicinal plants were investigated by serial dilutions method.

The optic density of *Escherichia coli* cultures grown in beef-extract broth was detected using SPF – 16 spectrophotometers and inverse relationship between these densities and concentration of prepared infusions and decoctions having antimicrobial, binding, tanning and ambient features.

The bacteriostatic action of medicinal plants extracts against *E.coli* 0127 K99 strain causing AII in dogs was evaluated using serial dilutions method.

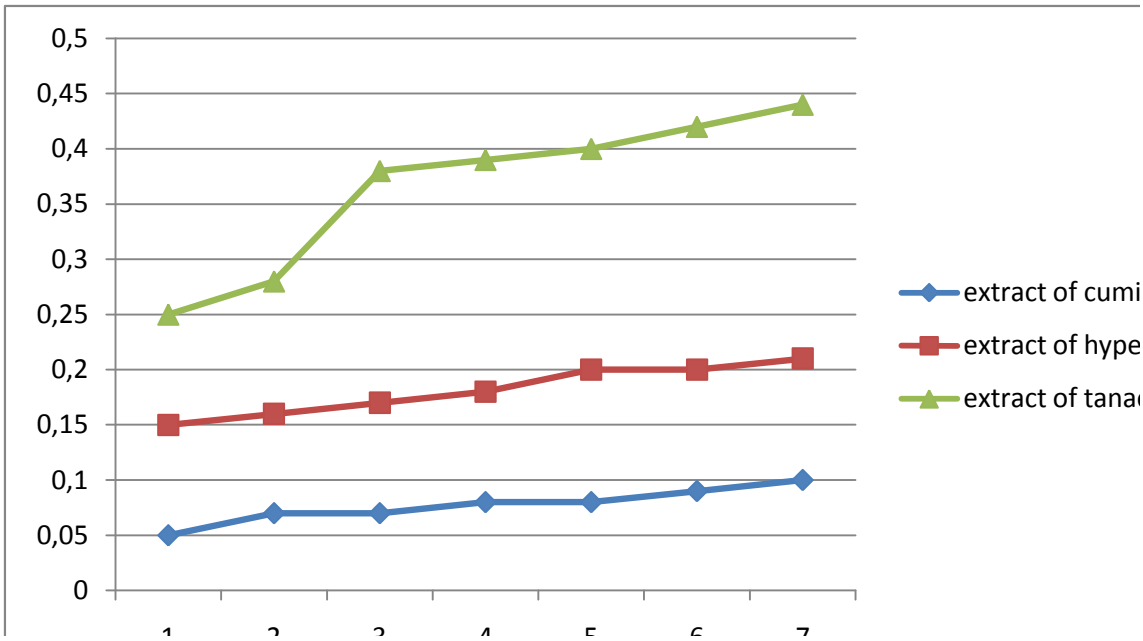

Fig 1. The relationship between bacteriostatic features of medicinal plants and optic density of E.coli cultures.

Conducted research has revealed an inverse relationship between optic density of *Escherichia coli* culture grown in beef-extract broth (BEB) and medicinal plants concentration.

A decrease in concentrations of extracts and decoctions was accompanied by the increase in biomass of microorganisms in BEB. The highest density value was observed for *Tanacetum coccineum*, the lowest – for *Hypericum perforatum*.

Thus, the bacteriostatic action of investigated plants against AII pathogens was proved.

The highest bacteriostatic action had extracts of *H.perfaratum* and *Cuminum cyminum*, while *T.coccineum* has the lowest effect.

Bactericidal features of investigated medicinal plants are related to polyphenols and tanning substances in their structure.

Bactericidal action of *C.cyminum* essential oil against AII pathogens was evaluated as well.

Previously we proved experimentally and practically superiority of essential oil over other forms of plant preparations (bactericidal action, the absence of development of resistance).

The results of long-term investigations of *C.cyminum* essential oil revealed that 3% and 5% alcohol-aqueous concentrations of cumin are optimal (table).

Bactericidal action of cumin essential oil against AII pathogens was revealed.

1:1600 dilution of cumin essential oil has bactericidal effect against *Escherichia coli*, 1:3200 - against *Staphylococcus enteritidis*.

1:800 dilution had a positive effect on *Campylobacter fetus* & *Candida albicans*.

Table 1. Antimicrobial action of cumin essential oil obtained in Apsheron Peninsular

Number of cultures	Name of microorganism	Serial dilution of essential oil in BEB							
		1:200	1:400	1:800	1:1600	1:3200	1:6400	1:12800	1:2560
1	*Esherichia coli*	-	-	-	-	+	+	+	+
2	*Campylobacter fetus*	-	-	-	+	+	+	+	+
3	*Staphylococcus enteritidis*.	-	-	-	-	-	-	+	+
4	*Candida albicans*	-	-	-	+	+	+	+	+

Legends: (+) – the growth of test culture, (-) – the absence of growth of test culture. During *Candida albicans*, cultivation sugar broth was used instead of BEB.

REFERENCES

1. Aghaeva E.M., Mammadova R.E., Narimanov V.A., Seyidova G.M. Resistance to antimicrobial agents of purulent-inflammatory diseases of the skin/ The 4th All-Russian scientific-practical conference with international attendance. Dangerous infectious diseases of social importance 2017, Sochi, pp. 7-8
2. Aghaeva E.M., Narimanov V.A.,Bayramov A.G., Javadov S.S., Bakhishova E.A. Dynamics of resistancefrequency of microorganisms to antibiotics in urogenital infections/ Health magazine, 2016, No. 6, pp. 92-96
3. Aghayeva E.M, Ganbarli I.J. Etiological structure of diarrhoeal diseases of dogs/ Azerbaijan National Academy of Sciences, Scientific works of the Microbiology Institute, Baku, 2017, vol. 15, No.1, pp.141-145
4. Alimardanov A.S. Antibiotic sensitivity and antibiotic resistance of E. coli in poultry farms/ Vet. medicine, Vestnik, 2007, No.7, pp. 18-24
5. Belov A.D., Danilov P.A. Dog Diseases // M., 4ePo, 1994, 368 p.
6. Golshenkov P.P. Medicinal plants in the complex therapy of calves with gastrointestinal diseases// Veterinary, 1988, No. 6, p. 7
7. State Pharmacopoeia SSSR: 2. Methods of general analysis. Medicine plant raw material / IX T. Mos.: Medical, 1989, 400p.
8. Zverev V.V., Bikov A.S. Medical mikrobiologi, immunologi and virology// Textbook «MIA», 2016, 321p.
9. Ibadullayeva S., Alakberov R. Medicinal plants (Etnobotany and Phytoterapya)// Baku, Elm, 2013, 331p.
10. Ibadullayeva S.J., Abbasova V.N. Ethnopharmacological Importance of Medicinal Plants Spread On Tovuz-Gazakh Territory/ ANAS Proceedings, Biological & Medicinal Sciences №2-72, 2017, p.66-72

11. Munir Ozturk, Ernaz Altundag, Sayyara İbadullayeva, Volkan Altay, Behnaz Aslanipour. A Comparative analysis of Medicinal and aromatic plants in the traditional medicine of İgdır (Turkey), Nakhchivan (Azerbaijan) and Tabriz (İran)// Pak.J.Bot., 2018, p.337-343.
12. Costerton J.W. The biofilm primer// Berlin. Springer, 2007, v.1, 200 p.
13. Williams J.D. Antibiotic resistance in hospital pathogens alquisition or spread// Intren. J. of Antimicrob Agents, 2001, V.18, N 13, p 295-298
14. Warren D.K., Fraser V.J. Infection control measures to limit antimicrobial resistance// Crit.Care Med., 2001,v29,N4,p.128-134
15. www.antibiotic. ru/index.php., 2018