ETHNO BOTANICAL AND ANTIMICROBIAL ACTIVITY OF TERMINALIA ARJUNA AND TERMINALIA CHEBULA

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ABSTRACT

Introduction

Infection is a major problem for the mankind since long ago. The newer antibiotics are seeming less effective in the life threatening infections due to the development of the resistance, as a result research is looking at the other alternatives to combat the infection. In this regard alternative and complementary system of medicine is playing its own role contributing by its own way. A large proportion of the world population use complementary and alternative medicine to fulfill the health needs of humans and animals. And there is increasing acceptance of herbal medicine as an alternative.

Objective:

To evaluate the antimicrobial activity of Terminalia arjuna and Terminalia chebula on various bacterial stains using various dosage modalities mentioned in Ayurveda classics.

Materials and Methods:

T. chebula and T. arjuna on various dosage modalities are selected to evaluate their efficacy on certain microbial stains such as ATCC Staphylococcus aureus 25923, ATCC Escherichia coli 25922 and ATCC Pseudomonas aeruginosa 27853.

Discussion & Conclusion.

The results of the study demonstrate the antimicrobial potential of the various dosage modalities of extract of T. arjuna & T. chebula. However, further detailed studies are required to confirm these findings.

Key words: Terminalia, Anti-microbial.
Background.

Wide spread use of antimicrobials used in various types of diseases may lead to the adverse reaction and majority of the organisms are resistant to the commonly used anti microbial agents. The many antimicrobial agents are very expensive and toxic.

Now a days Medicinal plants have comes under the focus in terms of conservation and as to whether their traditional uses are evidence based or not (Locher et al., 1995). With the increasing acceptance of herbal medicine as an alternative form of health care, the screening of medicinal plants for bioactive compounds is important.

This has urged scientists all over the world for formulation of new antimicrobial agents, and evaluation of the efficacy of natural plant products as the substitute for chemical antimicrobial agents.

In African, North American and EU, three out of four people living with HIV/AIDS use some form of traditional or complementary treatment for various symptoms and conditions. In India Ayurveda as a CAM (Complementary and alternative medicine) fulfills about 80% needs of the population (Balick, M. J., Arvigo, R., & Romero, L., 1994). There is a preoccupied thought about the plant origin medicines that they are free from adverse effects, but it is important to study their safety as well. In present situation Herb-drug reaction, Herb-food reaction or food –food reaction makes us to think over it again, and to find the efficacy of medicines by using evidence based method only (Cox, P. A., 1994). Adverse effects are most common as they are commonly sold in over the counter or prescribed by traditional practitioners in their practice (Cowan, M. M., 1999). (Mitscher, L. A., Drake, S., Gollapudi, S. R., & Okwute, S. K., 1987).

The present study was undertaken to find out the antibacterial activity of the various dosage modalities of stem bark of Termianlia arjuna and fruit of Terminalia chebula against the known pathogens like E.coli, Staphylococcus aureus, Pseudomonus aeuriguosa etc stains to find their efficacy.

**Termialia spesies**

In my studies *Terminalia species which contain around 200 species* (McGaw, L. J., Rabe, T., Sparg, S. G., Jäger, A. K., Eloff, J. N., & Van Staden, J., 2001). belongs to the family the Combretum and are most widely used in infectious conditions due to thier antibacterial properties. (Eloff, J. N., 1999)( Fyhrquist, P., Mwasumbi, L., Hæggström, C. A., Vuorela, H. I. L. T. U. N. E. N., Hiltunen, R., & Vuorela, P., 2002). In depth research suggest, the case regarding their antifungal properties. Antifungal activity of *Terminalia species* extracts was demonstrated, but no quantitative data or phase 2 data was provided (Bhatt, S. K., & Saxena, V. K., 1979)( Baba-Moussa, F., Akpagana, K., & Bouchet, P., 1999).

In present the main problem is antibiotic resistant strains of pathogens, such as penicillin-resistant *Streptococcus pneumoniae* (PRSP) methicillin resistant *Staphylococcus aureus* (MRSA), genetic mutation in H1N1 and superbug etc subject to concern. and it is therefore extremely important to discover and develop new antimicrobial agent (Tally, F., 1999).( Press, J.B., 1996).( Cox, P.A., 1994).( Watt, J.M., Breyer-Brandwijk, M.G., 1962).( Hedberg, I., Staugaard, F., 1989).

**Objective :**

1. To study of Ethanobotony of Termianlia arjuna and Terminalia chebula.
2. To evaluate the antimicrobial activity of Termianlia arjuna, Terminalia chebula on various bacterial stains Using various dosage modalities.

**Ethanobotony of Terminalia Species and its medicinal uses** (Alexander, D.M., Bhana, N., Bhika, K.H., Rogers, C.B., 1992)
1) **T. chebula**
The plant *T. chebula* (Haritaki) belonging to the combretaceae family is commonly found all over India. It acts as a preventive, curative and rejuvenator. The powder of *T. chebula* used to treat bleeding, ulcerations of the mouth and laxative. Its decoction is used for wound cleaning and unripe fruits are useful in dysentery and diarrhea while ripe fruits are purgative in nature. In Siddha system the fruits of Haritaki are used in various diseases like jaundice, cough, dyspnoea, urinary disorders, and in carcinoma. Even modern research reveals that *Terminalia chebula* is used in treatment of fevers, cough, urinary diseases, piles etc.

2) **T. arjuna**
The plant was mentioned in Atharvaveda. It is found throughout the greater part of India. In cardiac disorders milk processed with arjuna bark should be used. Ancient Indian text “Vranada Madhava” says composition of Arjuna bark with ghee, milk or jaggery-water useful in heart disease, chronic fever, intrinsic hemorrhage and attain longevity. In the Unani system of medicine, it is used as a styptic, tonic, and anthelmintic. While in Siddha system of medicine, it is used in heart diseases, leucorrhoea, stomachache etc.

**Materials and methods.**

**Plant collection.**
Bark are collected from stems of *T. arjuna*. While fruits of *T. chebula*.

**Ethno botanical Survey:** Review on ethno botanical aspect of both plants was carried out.

**Plant drying and storage.**
Bark of *T. arjuna*, and fruits of *T. chebula* are dried under room temperature and shadows. And preserved in airtight container.

**Materials and Method.**

**Materials**

1. **Trial Drugs.**

Three samples of *T. arjuna* bark and *T. chebula* fruits were selected, and prepared by various procedures and techniques, like powder (Hiremath G Shobha, 2000), aqueous extract form (Kokate C.K., 1991) and concentrated form of the drugs in the preparation modality adopted in Ayurveda i.e Ghana (Reddy R. K., 2008).

2. **Microorganisms.**
The samples were tested against standard strains of micro organisms – ATCC Staphylococcus aureus 25923, ATCC Escherichia coli 25922 and ATCC Pseudomonas aeruginosa 27853.

**Antimicrobial assays.**

In general the agar diffusion method used to evaluate the antimicrobial activity in general. Here we employed a Modified Kirby-Bauer’s disk diffusion technique. Lawn culture of the test organisms were inoculated on Mueller-Hinton agar. Wells of diameter 6mm were cut in the agar. Each test compound in the concentration of 0.05 gms were added into the well in a paste form. The plates were incubated at 37°C for 18-24 hrs. Results were interpreted by measuring zones of inhibition of bacterial growth around the well containing the drug.
Result:

T. chebula: Zones of inhibition in mm

<table>
<thead>
<tr>
<th>FORM</th>
<th>S. aureus</th>
<th>E. coli</th>
<th>P. aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder form</td>
<td>26mm</td>
<td>14mm</td>
<td>21 mm</td>
</tr>
<tr>
<td>Water extract</td>
<td>22mm</td>
<td>11 mm</td>
<td>11 mm</td>
</tr>
<tr>
<td>concentrated</td>
<td>21mm</td>
<td>15 mm</td>
<td>8 mm</td>
</tr>
</tbody>
</table>

T. arjuna: Zones of inhibition in mm

<table>
<thead>
<tr>
<th>FORM</th>
<th>S. aureus</th>
<th>E. coli</th>
<th>P. aeruginosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powder form</td>
<td>16mm</td>
<td>10 mm</td>
<td>13 mm</td>
</tr>
<tr>
<td>Water extract</td>
<td>19mm</td>
<td>11 mm</td>
<td>6 mm</td>
</tr>
<tr>
<td>concentrated</td>
<td>23mm</td>
<td>11 mm</td>
<td>7 mm</td>
</tr>
</tbody>
</table>

Arjuna churna against S. aureus

Haritaki churna against S. aureus
Interpretation:
Among the two compounds, T.chebula showed greater zones of inhibition in all the 3 forms than T. Arjuna.

Discussion.
Form centuries, natural products either plant or animal origin have been used in traditional as well as complementary medicine all over the world. Plants which contains chemical constituents like alkaloids, tannins, flavonoids (Lewis, K.; Ausubel, F. M., 2006), saponins and essential oils (Aboaba, O. O., Smith, S. I., & Olude, F. O., 2006) have been proved in vitro antimicrobial properties. Among them T. arjuna, T.chebula were well known Ayurvedic medicinal herbs, are also proven to possess antimicrobial activity (Rani, P., & Khullar, N., 2004). (Miller, A. L., 1998). And T. arjuna which also possesses anti carcinogenic effect as it contains active principles like ethyl gallate, gallic acid, ellagic acid etc (Kandil, F. E.; Nassar, M. I., 1998) (Kaur, S. J., Grover, I. S., & Kumar, S., 2000).

Conclusion.
The results of the study demonstrate the antimicrobial potential of the various dosage modalities of extract of T. arjuna and T.chebula. However, further detailed studies are required to confirm the above findings.

References.


