ABSTRACT

The herbal products today, symbolize safety in contrast to the synthetic drugs that are regarded as unsafe to humans and environment. Of the 2,50,000 higher plant species on the earth, more than 80,000 species are medicinal. Among ancient civilizations India has been known to be a rich depository of medicinal plants. India is one of the world’s 12 biodiversity centres with the presence of over 45,000 different plant species. Anti-microbial & anti-fungal studies of crude drug plays a very important role in identification of purity drugs. The plant *Zizyphus* is commonly called as Chinese date or Indian cherry or Ber belonging to the family Rhamnaceae. The present study shows anti-microbial & anti-fungal activity using *Bacillus cereus*, *Klebsiella pneumoniae*, *Aspergillus niger* & *Candida albicans*. The activity was observed by the agar cup method using standard strains.

KEYWORDS: Anti-microbial, anti-fungal *Bacillus cereus*, *Klebsiella pneumoniae*, *Aspergillus niger*, *Candida albicans*, *Zizyphus jujuba*.

INTRODUCTION

*Ziziphus jujuba* is a medium sized, fast growing, deciduous spiny tree with dense spreading crown belongs to family Rhamnaceae & is commonly called Ber or Bor (Hooker, 1883). Shrubs or small trees with visibly three-parted capsules or berries.

These shrubs have simple, and usually serrated, alternate or opposite leaves. Stipules are present & are modified into spines. Young shoots are more or less densely pubescent (Sharma, 1993).
CHEMICAL CONSTITUENTS

The plant *Ziziphus jujuba* chemically contains flavonoids such as quercetine, kaempferol, Rhamnoside, Isospinin. They are present in the leaves (Singh & Lal, 1982). Terpenoids such as alphitolic acid, caffeoyl alphitolic acid and ceanthoic acid dimethyl ester and phenolic compounds are also found in leaves. (Kapoor, 1990)

USES

The plant *Ziziphus jujuba* is used medicinally for a wide number of ailments. The seeds, fruit of jujuba have been used in traditional medicine for anxiety and insomina, and as an appetite stimulant or digestive aid. Due to this herb’s flavonoid content, it has an antioxidant effect on the body. It is used as a traditional medicine in combination with other herbal medicines to treat flu, cold. The leaves are used for as a diuretic, emollient, expectorant, anti-cancer, sedative, blood purifier, and in treatment of diarrhea. A type of triterpenoid saponin identified is oleanolic acid. This substance is known to be anti-inflammatory and is possibly one of the reasons this herb has been traditionally used to treat aches and pains (Kirtikar & Basu, 2006).

MATERIAL AND METHODS

Collection: The fresh plant material of *Ziziphus jujuba* was collected from Dahanu, District – Thane; Borivali, Mumbai & authenticated.

**Agar cup method:** The agar cup method was used to study the antibacterial activity of the extracts. Bacterial culture from culture plates were scooped using a wire loop and separately mixed with normal saline. A loopful was withdrawn and was mixed with the agar broth and then was poured in petriplate until the agar solidified. Wells of approximately 6mm in diameter and 2.5mm deep were made on the surface of the solid medium using a sterile borer. The extracts were inoculated in the well having the concentration 200, 400, 600, 800 & 1000 µg/mL. Solvent blank was also inoculated. The plates were incubated at 37°C for 24 hours. After 24 hours, the plates were removed and zones of inhibition measured and the results were tabulated. Extracts with zone of inhibition greater or equal to 7mm diameter were regarded as positive.

**The cultures used were:** *Aspergillus niger* (NCIM - 2066), *Candida albicans* (NCIM - 5021), *Bacillus cereus* (NCIM - 2036) & *Klebsiella pneumoniae* (NCIM - 2036) were used as test organisms. All these fungal & bacterial culture were grown at 37°C and maintained at 4°C on nutrient agar slants.
RESULTS

Leaves of *Zizyphus jujube*

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of organism</th>
<th>Blank (DMSO)</th>
<th>200 (ppm)</th>
<th>400 (ppm)</th>
<th>600 (ppm)</th>
<th>800 (ppm)</th>
<th>1000 (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aspergillus niger</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>2.</td>
<td>Candida albicans</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>Bacillus cereus</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>Klebsiella pneumoniae</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>13</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

- Indicates no growth, zone of inhibition in mm
RESULTS
The leaf extract showed both antimicrobial as well as anti-fungal activity. The activity was not visible in 200ppm concentration but was seen in 400, 600, 800 & 1000 ppm concentrations. The activity was almost similar in both the fungi Aspergillus niger & Candida albicans whereas it was more in Klebsiella pneumoniae than Bacillus cereus and increased with increase in concentration.

DISCUSSION
The jujubosides present in Ziziphus are also very useful to assist with relaxation. Taken in smaller doses, this herb can calm anxiety without creating sleepiness. This is perhaps what the ancient Chinese practitioners were referring to when they talking of its ability to “make the body light”.

Antimicrobial activity of aqueous & methanolic extract of young and mature leaves of Psidium guajava (Guava) has been studied by Vaidya, 2013. Vaidya, 2015, has studied antimicrobial activity of Holarrhena antidysenterica along with antimicrobial activity of Helicteris isora. Antimicrobial activity of Eclipta prostrata has recently been studied by Vaidya & Sambhare, 2016. Thus we can conclude that anti-microbial & anti-fungal properties of Zizyphus jujuba can be tapped as a source & used as medicine.

BIBLIOGRAPHY
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