Family Apiaceous, an important source of bioactive compounds, used for the treatment of many diseases for ages. **Objective:** To explore active components of *Cuminum cyminum* essential oil. Endeavor of the current study was to investigate the phytochemical contents and antibacterial assessment of essential oil against gram positive and negative bacteria. **Methods:** Essential oil was extracted from seeds by hydro distillation, dried and stored at -4°C. Physical and chemical characterization was done. Antibacterial activity was also determined. **Results:** GC-MS analysis revealed major components culminal 35%, \( \gamma \)-terpinene 32%, \( \gamma \)-terpinene-al 7%, \( \gamma \)-terpinene 4.45%, daucene 4.3%, and trans-caryophyllene 5.342%, some trace components like myrcene 0.12%, 1-8 cineole, and \( \gamma \)-terpinene-7-al were also present. **Conclusion:** Chemical components (culminal, turpentine, daucene, caryophyllene) present in cumin essential oil are responsible for its biological activities.
of cumin, and these compounds are suggested as primary active antimicrobial agents. However, phytoestrogens present in cumin oil has been reported for anti-osteoporotic effects. Oil extracted from the cumin is also observed to have an anti-epileptic effect, which involved in decreasing the frequency of the impulsive movement in experimental animals that are induced by the pentylenetetrazol (PTZ). It was also found to act as a substantial analgesic by the formalin test in experimental rats. As it is involved in the suppression of morphine tolerance. Furthermore, it also reverses morphine dependence. With the use of Cumin EOS, the catalytic activity of Ca2+-ATPase was found to be lowered or altered in the uterine tissue of ovariectomized rats that indicates the absence of any oxytocic/ebolic effect and this is an important property for the good uterine stimulating agent. Furthermore, studies have shown the estrogenicity of Cumin seed extracts. Further experimentation showed that a higher dose (250 mg) is more effective in eliciting this response in the uterine tissues. Further studies revealed that it also can improve the serum insulin as well as glycogen (liver and skeletal muscle content) in streptozotocin and alloxan-induced diabetic rats. Cumin oil has strong antitussive and antioxidant potential. Cumin oil is needed for inhibition of lipid hydroxyl, scavenging superoxide radicals and inhibition of lipid peroxide in low quantity as compared to that of ascorbic acid. The EOs of cumin have high antioxidant activity primarily due to monoterpene alcohol, which is the main chemical constituent of cumin oil. Cumin, at an optimized dose (0.25g/kg) for forty-five days in rats, exhibited protection against the alcohol-induced iatrogenic hepatotoxicity. Cumin seeds are a rich source of dietary fibers. It has been assessed as a replacement supply of dietary fiber for its chemical characteristics, application potential and quality.

**METHODS**

Cumin seeds, collected from local market of Faisalabad, were dried and stored for essential oil extraction. Small batches of plant materials (1.5 Kg) were introduced in the Lab-scale hydro-distillation apparatus while in the pilot plant, a batch of 3 Kg plant samples was used. The experimental parameters, like temperature and time, were optimized for hydro and steam distillation during the present study. Extracted essential oil was dried and stored in dark colored glass bottles for further experimentation. Percentage yield, color, odor, density, optical activity, and viscosity were determined for evaluation of the quality of the essential oils. The phytochemical analysis was carried out to determine the alkaloids, flavonoids, and phenols. Chemical composition of essential oils as well as the major, minor and trace components were determined by GC-MS coupled with FID. GC only separates the components in this method, while MS analyses the components in complete.

**RESULTS**

Cumin essential oil is nearly colorless with a pleasant smell. Its yield is 2–3%. Its insoluble in water but soluble in organic solvents like CCl4 and alcohol etc.

<table>
<thead>
<tr>
<th>Species</th>
<th>Color in daylight</th>
<th>Odor</th>
<th>Yield %</th>
<th>Specific gravity Kg/m3</th>
<th>Solubility in water</th>
<th>Solubility in alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuminum cyminum cumin</td>
<td>Nearly Colorless</td>
<td>Pleasant and spicy</td>
<td>2.0±0.86</td>
<td>0.79±0.02</td>
<td>Insoluble</td>
<td>soluble</td>
</tr>
</tbody>
</table>

Table 1: Physical characterization of cumin essential oil

*Values represented as the mean± standard deviation. Cumin essential oil has medium thick consistent having viscosity 38.72, optical rotation is 35.5 at 25°C and refractive index value is 1.34. Different tests were...
Cumin oil showed the highest antibacterial activity against P. aeruginosa 22.3 ± 1.2mm value and lowest against Bacillus subtilis. Fractions of cumin were also effective against staphylococcus aureus, and their zone of inhibition values was lower to the values obtained by a standard drug used. The members of Apiaceae plants show intense antimicrobial effect against all the strains of bacteria (gram-positive and gram-negative). Their defense action is due to the property of essential oil being hydrophobic and disrupting the cell membrane. It is generally observed from results that gram-positive are more susceptible to the attack of essential oil, and gram-negative are more resistant. But Apiaceae plant members have proven that they are broad-spectrum and can inhibit the growth of bacteria at even lower concentrations. The resistance of gram-ve bacteria can be due to the complexation of the bacteria’s outer wall with an outer membrane, thereby preventing the passage of the bacterial wall by lipophilic essential oil. In a study on cumin essential oil, it was revealed that Cuminum cyminum possess significant antimicrobial action against pathogenic microbes with the same concentration of extracts (0.5 mg / mL). Another research, the essential oil showed marked inhibition of the Gram-positive Staphylococcus aureus bacteria, Bacillus and Gram-negative Escherichia coli bacteria, and the findings were compared with standard values. The antibacterial effect of the cumin extract was tested against some pathogens. E. coli, S. aureus, and S. fecalis is prone to different concentration of the oil. Which were immune to Pseudomonas aeruginosa and Klebsiella pneumoniae. In another research work average antibacterial/antifungal activity was shown by essential oil, comparable to standard drug. C. cyminum established effectiveness against definite bacterial and fungal strains, respectively. Gram-positive B. subtilis with the largest zone of inhibition of 27.3 mm followed by a minimum MIC value of 1.10 mg / mL. The action was greatly improved than the antibiotic action of Rifampicin, that show the 10.8 mm and 1.72 mg / mL inhibition region. In a different study, in vitro examination of antibacterial activities of different essential oils were carried out against particular microorganisms, and it was found that C. cyminum essential oil was the most successful inhibitor after oregano, showing inhibition zones ranging from 31.23 mm in Lactobacillus sakei to 30.17 mm. Cumin oil demonstrated greater potential as an effective antibacterial agent against Vibrio spp. The oil retarded the growth of these strains and the diameter of inhibition zone was from 12-24 mm and MBC & MIC values (0.078–0.31mg / ml)to(0.34–1.31mg / ml), respectively.

**Conclusion**

Cumin seed essential oil has dietary fibers, alkaloids,
steroids, carbohydrates and many chemical components present.

**REFERENCES**


[22] Jianu, C., et al., Chemical composition and antimicrobial activity of essential oils of lavender (Lavandula angustifolia) and lavandin (Lavandula x intermedia) grown in Western Romania. International


