**Antioxidant and Antimicrobial activity of essential oil extracted from *Trachyspermum ammi* (Ajwain) Seeds: An in-vitro study**

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**Abstract-**

**Background-**The food industry uses essential oils derived from natural sources as flavouring and preservatives. The purpose of this study is to investigate how temperature affects the essential oil extracted from Trachyspermum ammi, seeds which has the best antioxidant and antimicrobial properties, in order to find a green substitute for toxic chemically produced preservatives used in food and pharmaceutical chemistry.

**Results**-Trachyspermum ammi (ajwain seeds) seeds were hydrodistilled at various temperatures (60oC to 90oC). By raising the temperature during extraction, different amounts of essential oil were obtained. Essential oil was not produced at 60oC due to insufficient vaporisation. The amount of essential oil was found to decrease on increasing temperature (2.1ml,1.5 ml and 1.0 ml at 70oC, 80oC, and 90oC respectively). Hence, 70°C was the ideal temperature for extracting the essential oil from ajwain seeds. 25 components were discovered in the essential oil extracted from ajwain seeds by GC-MS technique. The predominant ingredient was shown to be thymol (31.40%). The percentages of scavenger activity against hydrogen peroxide were 70.75%, 86.99%, and 95.28%. Due to the presence of the largest concentration of thymol (67.66%), the results showed that essential oil extracted at 90oC demonstrated the highest level of antioxidant property. By using the disc diffusion method, the antimicrobial activity of an essential oil made from ajwain seeds was evaluated. MIC50 of standard essential oil of Trachyspermum ammi seeds against gram positive strain was observed 10 µL/mL of culture and 25µL/mL of culture was observed against gram negative bacteria. Essential oil extracted at 70°C showed antimicrobial activity by forming zones of inhibition with diameters including discs of 18.3±0.3 mm, 14.36±0.3 mm, and 15.30±0.3 mm against S. aureus and E. coli, respectively. Essential oil extracted at 80°C produced zones of inhibition with diameters of 18.68±0.3 mm, 15.30±0.3 mm, and 18.68±0.3 mm, respectively. In the case of essential oil extracted at 90°C, the zones of inhibition against S. aureus and E. coli had diameters of 18.69±0.3 mm and 15.38±0.3 mm, respectively.

**Conclusions**-As a result, using Trachyspermum Ammi essential oil as a food preservative and the temperature at which it is extracted are unaffected by an increase in extraction temperature. Hence, essential oil obtained from Trachyspermum ammi seeds can be used as green alternative of chemically synthesized toxic preservatives used in food and pharmaceutical chemistry.