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Synergistic Activity of Olive Oil and Sesame Oil on The Sensitivity of Aeromonas Hydrophila to Ceftriaxone

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ABSTRACT

The study was conducted to find out the effect of sesame oil and olive oil in increasing the sensitivity of the local isolate Aeromonas hydrophila to Ceftriaxone (STI 30).

The local isolate was taken that causes tooth decay from the laboratories of the College of Science at the University of Anbar, and the initial and confirmatory diagnosis was diagnosed using the VITEK 2, then its sensitivity was tested by the tablet method towards the Ceftriaxone (STI 30), and then its sensitivity was tested against the oils used under study after saturating the empty tablets with these oils, and then the antibiotic activity of these oils was tested with the antibiotic used under study.

The results showed that the isolate is resistant to STI 30, and that the used oils under study had synergistic activity and a significant difference, as the inhibition diameter increased to 43 mm, 14 mm, and 13mm after it was zero when using olive oil, sesame oil, and their mixture, respectively, in synergy with the STI30 used under study

Keywords: *Aeromonas hydrophila, Olive oil, sesame oil, ceftriaxone, Antimicrobial*

INTRODUCTION

Natural oils, especially sesame oil and olive oil, have many benefits, represented by their use as anti-microbial materials, because they contain unsaturated fatty acids such as oleic and linoleic acid, and flavonoids that act as antioxidants that act synergistically to increase the activity of antibiotics against various microbes (Munshi et al., 2020) It also has an inhibitory effect on the production of capsules, movement, and the production of urease, gelatins, and biofilm (Patel et al., 2010). Jimenez et al, (2020) explained that olive oil contains unsaturated fats composed of essential fatty acids in addition to various flavonoids and phenolic substances, the most important of which is hydroxytyrosol and a small percentage. Both tretiphine work against the growth of resistant Staphylococcus aureus (methylene-resistant Staphylococcus aureus) (MERS) Aeromonas spreads in different environments, such as soil, fresh and salty water, and causes various diseases to the living in these environments, especially fish, warm-blooded and cold-blooded animals. Direct contact with contaminated water and soil is the most common cause of gastrointestinal and wound infections in humans (Hawraa and Hazem, 2014). A. hydrophila (Aeromonas hydrophila) has been reported to cause epidemic blisters and other infections in fish in Southeast Asian countries, Malaysia, Sri Lanka, Japan and India (Surya et al., 2014). Some studies have confirmed that these organisms cause gastroenteritis that ranges from mild diarrhea to life-threatening cholera-like diseases in children and adults, wound infections, bronchopneumonia, meningitis and osteomyelitis (Mishyna et al., 2018), kidney and liver necrosis and multiple ulcerations at different sites of the body (Elad et al., 2019).

Aeromonas are found in some foods through which they are transmitted, causing diseases (Bhowmick & Bhattacharjee, 2018), and what increases their danger is that they contain many virulence factors such as plasmids, cytokines, and B-hemolysin (Murthy , et al. 2019)., and these factors increase their pathogenicity, in addition to their resistance to antibiotics. (Işın and Simge, 2013).

Aeromonas infections are invasive, soft tissue infections, primary bacteremia, and biliary tract infections. Most human diseases are associated with three species, namely A. hydrophila, A. veronii and A. caviae (Chen et al., 2014)

MATERIALS AND METHODS

Samples of olive oil and sesame oil were collected from the offices dedicated to production and obtained the ISO certificate. Isolate Aeromonas hydrophila was taken from the microbiology laboratories in the College of Science at the University of Anbar, and it was re-diagnosed through some culture and microscopic tests using Gram stain and biochemical teste such as the oxidase test, catalase, peroxidase, and fermentation tests for some sugars (Hawraa and Hazim,2014).

Antibiotic susceptibility test

The sensitivity test for antibiotics was carried out according to the Kirby Power method, which included the method of disc diffusion methods, as the sensitivity of the isolate was tested against the antibiotic ceftriaxone containing 30 micrograms (STI-30), and then the sensitivity of the isolate was tested towards the used oils under study and its synergistic activity with the antibiotic ceftriaxone in the same Method (through the use of antibiotic disc that saturated with oil) the results the zone of bacteria growth inhibition for sensitivity based on the size of CLSI, (2010). (Urmi et al.,202)

Statistical analysis

The data were analyzed using one-way analysis of variance by Statistical Package for the Social Science (SPSS) program (Version 19.0)

RESULTS AND DISCUSSION

Isolation and identification

The results of the diagnosis showed that the isolate is negative for Gram-staining bacilli with yellow, round, convex colonies on the surface of the MacConkey media, moving according to the motion detection test, capable of producing acid and gas through its representation of various types of carbon sources such as maltose, sucrose, and dextrose, positive for the oxidase test, and unable to grow at a temperature of 4 °C., 40 °C, and the optimum for its growth is only 37. VITEK 2 compact system tests confirmed that the isolate belonged to the type A. hydrophila.

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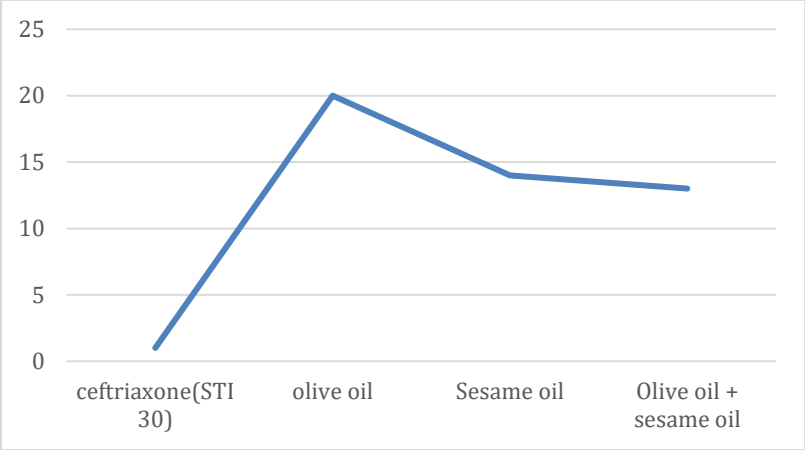
Antimicrobial susceptibility

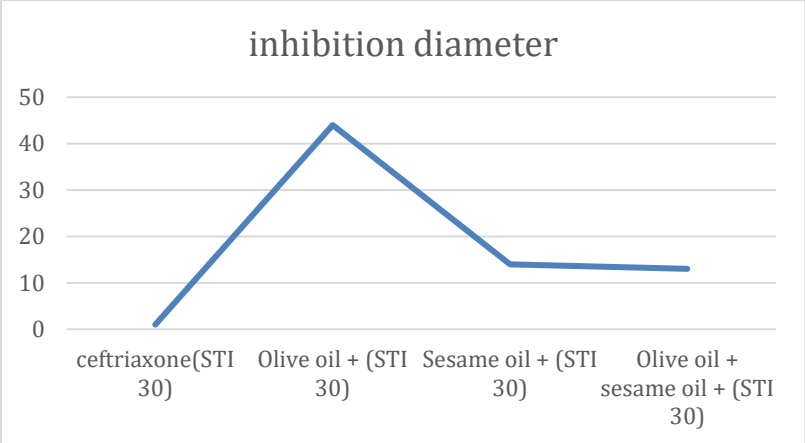
The results of the statistical analysis showed that the use of olive oil had an antibacterial activity for the isolate under study, as the inhibition diameter increased to 20 mm, while the effectiveness of sesame oil or a mixture of sesame oil with olive oil was less effective compared to the effectiveness of olive oil alone or ceftriaxone (STI-30) alone fig. (1).

Figure (1) effectiveness of olive oil, sesame oil and ceftriaxone in the inhibition mean diameter for the growth of Aeromonas hydrophila(mm)



On the other hand, the synergistic effect had a significant and clear difference, as the inhibition diameter increased to 43 mm when using olive oil synergy with the ceftriaxone (STI 30), and this effectiveness was less when compared with the use of sesame oil or oil mixture in synergy with the same ceftriaxone in synergy towards the same isolate. The inhibition diameter reached 14 mm and 13 mm respectively fig. (2)

Figure (2) The synergistic inhibitory activity of olive oil, sesame oil and ceftriaxone in inhibiting the growth diameter of Aeromonas hydrophila isolate (mm)



The results are consistent with (Elshinawy et al., 2018) found, who indicated that olive oil has an effectiveness against Gram-negative bacteria, and the effectiveness may be due to the ability of olive oil to reduce virulence factors such as biofilm and enzymes responsible for resistance to some vital factors. Alheety (2015) added to this the ability of olive oil to change some physiological characteristics of the outer layers and the cytoplasmic membrane, which increases the sensitivity of bacteria due to the increased

permeability of these walls and membranes, which allows the antibodies to reach the target.

Saranraj and Durga (2017(, explained that some natural oils, such as sesame oil, have the ability to increase the response of bacterial isolates by increasing the permeability of the membranes, and may lead to stopping the functions of the membrane due to damage to some of its proteins.

CONCLUSIONS

There is anti-bacterial activity in olive oil and sesame oil as natural products that can be used to increase the effectiveness ceftriaxone.

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