



Republic of Iraq
Ministry of Higher Education
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**A comparative Study for the effect of antibiotics
and *Torilis arvensis* (Huds.) Link leaves extracts on
biofilms formation in gram negative bacteria
isolated from wounds and burns infections**

A Thesis

Submitted to the Council of College of Science/University of
Diyala in Partial Fulfillment of the Requirements for the Degree
of Master of Science in Biology

by

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2022 A.C

1444 A.H

Introduction

Pseudomonas aeruginosa is one of the microorganisms which cause skin diseases ,it is a gram- negative aerobic bacterium which the major cause of opportunistic and nosocomial infections (Al-Mayali and Salman, 2020).

Pseudomonas aeruginosa causes various inflammation and infectious diseases such as burns infections, wounds, urinary tract infection, meningitis, otitis media, eye injuries, respiratory infections pneumonia, especially in people with a cystic fibrosis disease, bone and joints, gastrointestinal and soft skin infections and responsible for morbidity and mortality in immunocompromised patients (McCutcheon *et al.*, 2018; Pedersen *et al.*, 2018; Rocha *et al.*, 2019). *P. aeruginosa* has a very strong relation with it associated sepsis due to more than 50% of fatalities occurs in seriously burned patients (Shehab *et al.*, 2020). *Acinetobacter baumannii* is a gram-negative coccobacillus initially considered to be an opportunistic pathogen, which plays a vital role as a major cause of healthcare- associated infections (Martín-Aspas *et al.*, 2018).

In recent years, *A.baumannii* has become resistant to most effective antimicrobial agents and causing a high incidence rate of morbidity and mortality especially in the intensive care unit in many countries (Moulana *et al.*,2020). *A. baumannii* has become a major cause for concern in conflict zones, and has gained particular notoriety in the resent desert conflicts in Iraq, earning it the moniker “Iraqibacter.” In particular, high incidences of multi drug resistance (MDR) bacteremia (bloodstream infections) have been noted among US Army members (Da Silva *et al.*, 2016).

Emergence of the antibiotic resistance in microorganisms causing infectious diseases has been more problematic for health and economy (Miller *et al.*, 2014). Annually, 100,000 tons of antibiotics are produced to treat bacterial infections. However, these antibiotics have failed to control multidrug- resistant bacteria and

therefore, there is a pressing need of a novel antibiotic which can be effective against MDR bacteria (Magiorakos *et al.*,2012).

Torilis arvensis (Huds.) Link contains bioactive chemicals that have a variety of medicinal benefits, including pain reduction, antioxidant, anti-inflammatory, anti-obesity, and anti-cancer properties, as well as anti-bacterial properties against both gram-positive and gram-negative bacteria (Nam *et al.*, 2019). The mode of action of these herbs (extracts and essential oil) was linked to increased cell membrane permeability, phospholipid bilayer disruption, enzymatic systems, and genetic material degradation (Sadeghian *et al.*,2012).

The aims of study

- Isolation and Identification of gram negative bacteria isolated from burns and wounds infections.
- Study some virulence factors of isolated bacteria.
- Investigate the antibiotics susceptibility test of isolated bacteria by using antibiotic discs diffusion method.
- Detection of the inhibitory effect of plant extract (*Torilis arvensis*) on the growth of bacteria isolates.
- Comparing the effect of antibiotics and plant extract on the formation of biofilms on multi drug resistance bacteria.
- Isolation and Identification of some active compounds present in the plant (*Torilis arvensis*) leaves extracts.

الخلاصة

مليميتر بتراكيز (100 ، 200) ملغم / مل ومستخلص الميثانول اظهرت اقطار تثبيط (14، 27، 32) مليميتر بتراكيز (50، 100، 200) ملغم / مل.

أظهرت النتائج في الزائفة الزنجارية ذات المقاومة المتعددة أن المستخلص المائي لجميع التراكيز ليس له تأثير على العزلات ، بينما أظهر المستخلص الكحولي (الإيثانول والميثانول) أن قطر التثبيط كان (19 ، 25) مليميتر و (23 ، 27) مليميتر بتراكيز (100، 200) ملغم / مل وعند 50 ملغم / مل لا يوجد تأثير لمستخلص الايثانول والميثانول على عزلات الزائفة الزنجارية.

في العزلات الزائفة الزنجارية الحساسة ، تظهر المستخلصات المائية (الباردة والساخنة) بأقطار تثبيط 12 و 14 مليميتر فقط عند 200 ملغم / مل. بينما أظهر مستخلص الإيثانول أقطار تثبيط (14،23،31) مليميتر بتراكيز (50،100،200) ملغم / مل ومستخلص الميثانول أظهرت أقطار تثبيط (15،26،33) مليميتر بتراكيز (50،100،200) ملغم / مل .

فحصت الدراسة الحالية تأثير الحد الأدنى للتركيز المثبط الأدنى للمضادات الحيوية والمستخلصات الكحولية من *Torilis arvensis* على تغيير قدرة عزلات الراكدة البومانية و الزائفة الزنجارية في تكوين الأغشية الحيوية ، وأظهرت النتائج أن الحد الأدنى للتركيز المثبط الأدنى للمستخلصات الكحولية من *Torilis arvensis* اظهر تأثيرًا عاليًا في خفض إنتاج تكوين الأغشية الحيوية لعزلات الراكدة البومانية و الزائفة الزنجارية.