



# EVALUATION OF *IN VITRO* ANTIBACTERIAL PROPERTIES OF THE CRUDE PHENOLIC, ALKALOID AND TERPENOID EXTRACTS OF *CASSIA SENNA* L. AGAINST HUMAN GRAM-NEGATIVE PATHOGENIC BACTERIA

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## Abstract

To uncover the impact of the crude extracts to the phenolic, alkaloid and terpenoid compounds of *Cassia senna* L. against some Human gram-negative Pathogenic Bacteria. Antibacterial properties of the crude Phenolic, Alkaloid and Terpenoid of *Cassia senna* L. was determined *in vitro* using agar well diffusion methods against some human gram-negative pathogenic bacteria. Obtained results showed that active compounds of *Cassia senna* L. possess wide ranges of antibacterial properties against gram-negative bacteria. This investigation exhibits that we can presume that the impact of active compounds in *Cassia senna* L. has a distinctive impact on various pathogenic life forms in various concentrations. Alkaloid compounds extracted from *Cassia senna* L. leaves had shown effective antibacterial activity against gram-negative bacteria except *Shigella* it was more resistant.

**Key words :** Antimicrobial, *Cassia senna* L, pathogenic bacteria, gram-negative bacteria.

## Introduction

The World Health Organization (WHO) assesses that around 80% of individuals living in developing countries depend only on traditional medicines for their essential medicinal services require (Dabriyal and Narayana, 2004). *Cassia senna* L. it's one members of a Leguminosae family and well-known in traditional medicine (Wallis, 2004). Shrubs, 0.3-3m high, much branched, stem and twigs shortly and finely pubescent, glabrescent with age. Leaves on short (1.5-2.5 cm), eglandular petioles, rhachis 3-12cm. Leaflets in (3-) 4-6(-10) pairs, linear-lanceolate to elliptical, 2-4 (-6) × 0.4-1.5cm. The plant has many common names like Sana, Sana makki, Sana hijazi and Sana hindi. The plant cultivated in the desert region of Iraq and in Abu Gharaib city near Baghdad (Townsend and Guest, 1974). *Cassia senna* L. leaves are foreign made into Iran from India, in Tehran they are utilized as purgative, blended with a sweet of rose leaves and tamarind (Hooper and Field, 1937). Leaves are also used for constipation and stomach cramps (Ghazanfar) (Norton *et al*, 2009). This study aimed to evaluate the *in*

*vitro* the possible impact of antibacterial action of active compounds of *Cassia senna* L. against Human gram-negative Pathogenic Bacteria.

## Materials and Methods

**Collection of plant material :** *Cassia senna* L. leaves were collected from Hillah city, center of Iraq in December, 2016. The plant was authenticated by recognized by the taxonomist, Assistant Professor Dr. Huda J. Al-Tameme in plant taxonomy, at the College of Science for women, University of Babylon, Iraq. The leaves were washed completely with running water and once with sterile refined water, leaf material was then air-dried on a sterile blotting surface under a shade.

**Solvent extraction :** Twenty-five grams of shade-dried powder was filled with in the thimble and separated successively with methanol dissolvable in Soxhlet extractor for 24hr. The dissolvable concentrates were thought under reduced pressure and preserved at 5°C in a sealed shut jug until the point that further utilize. One gram of each concentrated dissolvable concentrates were broken up in 9 ml of refined water and utilized for antibacterial tests.

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**Phenolic Extraction :** The Phenolic compounds were extracted according to Ribereau-Gayon, (1972).

**Alkaloid Extraction :** The Alkaloid compounds were extracted according to Harborne, (1973).

**Terpenoid Extraction :** The Terpenoid compounds were extracted according to Harborne, (1984).

**Preparation of inoculum :** The gram negative bacteria were pre-cultured in nutrient broth overnight at 37°C.

**Antimicrobial activity :** The organism to be tested was inoculated into sterile nutrient agar. After an



Fig. 1 : *Cassia senna* L.

**Table 1 :** Antibacterial properties of the crude phenolic, alkaloid and terpenoid of *Cassia senna* L. extract against some human pathogenic bacteria.

Pathogenic Bacteria	Phenolic compounds			Alkaloid compounds			Terpenoid compounds		
	Concentrations(mg/ml)								
	200	300	400	200	300	400	200	300	400
	Inhibition zone/ mm/ diameter								
<i>Escherichia coli</i>	R	R	R	R	R	12	R	R	R
<i>Salmonella</i>	R	R	28	R	12	13	R	R	13
<i>Klebsilla</i>	R	R	21	R	13	18	R	R	R
<i>Shigilla</i>	R	R	R	R	R	R	R	R	R
<i>Proteus</i>	R	R	R	12	15	18	R	R	12

\* R= Resistant.

incubation period of 24 hr at 37°C, a loop of inoculum was transferred into 5 ml of nutrient broth and incubated for 2 hr at 37°C which served as fresh suspension inoculum. Five wells (5 mm diameter) were made in sterile nutrient agar plate by using Cork borer (one in the center and four wells at the corner) and inoculum containing 106 CFU/ml of test bacteria were spread on solid plates with the help of a sterile swab moistened with the bacterial suspension. Then 50 µl of extract of all the leaves were placed in the wells made in inoculated plates. The treatment also includes 50 µl of sterilized distilled water as control. All the plates were incubated for 24 hr at 37°C and zone of inhibition if any around the well were measured in millimetre (mm). For each treatment three replicates were maintained.

## Results

The antibacterial properties of Phenolic, Alkaloid and Terpenoid, compounds extracts of *Cassia senna* L. against human gram-negative pathogenic bacteria are introduced in a table 1.

Activity was dissected at (200, 300 & 400) mg/ ml. the results uncovered that, *Escherichia coli* resistant to Phenolic and Terpenoid compounds at different

concentrations and sensitive to Alkaloid compounds at high concentrations (400mg/ml) under this study .While, *Salmonella* resistant to all active compounds presence in *Cassia senna* L. at low concentrations but, sensitive at high concentrations. The results also revealed that *Klebsilla* resistant to Terpenoid compounds at different concentrations and sensitive to Phenolic and Alkaloid compounds at high concentrations (400mg/ml) under this study, and *Shigilla* resistant to all active compounds presence in *Cassia senna* L. like Phenolic, Alkaloid and Terpenoid compounds. While, *Proteus* resistant to Phenolic compounds at entire concentrations under this study and sensitive to Alkaloid and Terpenoid compounds especially, at high concentrations.

## Discussion

Medicinal plants are viewed as new assets for creating compounds that could act as alternatives to antibiotics in the treatment of antibiotic-resistant bacteria (Al-Mariri and Safi, 2014). The Results of this study demonstrated that active compounds in *Cassia senna* L. exhibited antibacterial activity against the Gram negative bacteria. Findings in this study an agreement with Bameri *et al.* (2013). Al-Marzoqi *et al.* (2015), Al-

Marzoqi et al. (2016) and Hussein et al. (2017) mention that active compounds like Phenolic, Alkaloid and Terpenoid of *Lactuca serriola* L., *Lepidium sativum* L. and *Myrtus Communis* L. extract showed the inhibitory effect on human gram-negative and gram-positive pathogenic bacteria. *Cassia angustifolia* Vahl. Leaves were taken from different region of India found to be most effective against three bacterial strains (*E. coli*, *Bacillus substilis*, *Staphylococcus aureus*) and against two fungal strains (*Aspergillus niger* and *Candida albicans*) (Parul et al., 2012). This may be attributed to the presence of active compounds effect on cell wall, proteins and DNA synthesis. On the other hand, an important property of plant extracts and their active compounds is their hydrophobicity, which enables them to partition the lipids of the bacterial cell membrane and mitochondria, aggravating the cell structures and rendering them more permeable to solutes. Extensive leakage from bacterial cells or the exit of basic molecules and ions will lead to death of pathogenic organisms (Rastogi and Mehrotra, 2002). On the basis of the result obtained in this present investigation, we conclude that the effect of active compounds in *Cassia senna* L. have diverse impact on various pathogenic life forms in various concentrations. The got results may give a help to utilization of the plant in conventional drug. In light of this, further substance and pharmacological examinations to disconnect and distinguish minor compound constituents in *Cassia senna* L. and to screen other potential bioactivities might be prescribed.

### Conclusion

Alkaloid compounds extracted from *Cassia senna* L. leaves had shown effective antibacterial activity in comparison Phenolic and Terpenoid compounds and *Shegilla* the more resistant to all active compounds extracted from *Cassia senna* L. leaves.

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