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Research Article

Antimicrobial Effect of *Acacia Nilotica* on Some Gram Positive and Gram Negative Bacteria

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Abstract

Acacia nilotica is a plant has an inspiring range of medicinal uses. This plant contributes a number of groups among which are alkaloids, volatile essential oils, phenols and phenolic glycosides, resins, oleosins, steroids, tannins and terpenes, this study aims to: examine the antimicrobial action of ethanolic extraction from fruits and seeds of *Acacia nilotica*. Hot ethanol extract (48°C) of fruits and seeds obtained from *Acacia nilotica*, used in minimum bactericidal concentration (MBC), agar diffusion method to detect the antibacterial effect of the extract. Elucidate almost for all bacterial types used in this study, the concentration of 100mg/ml was the mostly effective concentration on bacteria (*Staphylococcus aureus, Streptococcus pneumonia, and Proteus mirabilis*); while the *E. coli* and *Pseudomonas aeruginosa* the concentration of 75 mg/ml was the effective concentration for both of them as an optimum concentration.

Keywords: Antimicrobial effect, fruits and seeds extract, *Acacia nilotica*.

الخلاصة

اكاسيا نيلوتيكا هو نبات يحتوي على مجموعة ملهمة من الاستخدامات الطبية. هذا النبات يمتلك عدد من المجاميع القلوية والزيوت الأساسية المتطايرة والفينولات والكلايكوسيدات الفينولية والراتنجات والأوليوسينات والمنشطات والتانين والتربين. تهدف الدراسة الحالية الى اختبار مدى فعالية المستخلص الكحولي الحار لبذور وثمار نبات الاكاسيا نيلوتيكا كمضاد للاحياء المجهرية. طريقةالعمل: استخراج الإيثانول الحار (48 درجة مئوية) من الفواكه والبذور التي تم الحصول عليها من أكاسيا نيلوتيكا، واستخدمت طريقة نشر ألاكار للكشف عن تأثيرالمستخلص النباتي كمضاد للبكتيريا. اظهرت النتائج ان التركيز 100 ملغم/مل كان الاكثر تاثيرا لبكتريا المكورات العنقودية,والمسبحيات الرئوية ,والمتقلبة الرائعة).في حين اظهرت البكتريا القولونية والزوائف الزنجارية استجابة للتركيز 75 ملغم /مل .

Introduction

Infections with microbes are the mostly trouble in progressing countries,. Antimicrobial substances are used to treat these infections, due to indiscriminative uses of commercial antimicrobial materials.

The occurrence of numerous antimicrobial substances resistances in individual pathogens is rising. Thus scientists have to look for new antimicrobial substances from different sources similar to medical plants. Some plants represent the main source of new pharmaceuticals and medical products [1]. They served human as a basis of medicine from time abysmal.

The good way of getting drugs are those derived from therapeutic plants 80% of populations as of urbanized countries use chemical drug to treat diseases. The phytochemicals obtained from safe usual therapeutic plants act as a guide compounds for discovering a new therapeutic medicines [2] Thus, such plants should be scrutinized to improve their, properties, safety and effectiveness because they are, meditate as, chemical repository as, they have a diversity of multipurpose bioactive, compounds.

Plant extracts and phytochemical have pharmacological properties give high significance in medicine [3][4]. The

phytochemical reveal the pharmacological property of secondary metabolites like phenolic compounds, tannins, essential oils *etc* [5] [6].
Dietary phytochemicals with antioxidant activity decrease the danger of death from numerous diseases like diabetes, acute hypertension, cancer, infectious diseases and cardiovascular diseases [7] [8].
Plant products like: flavonoids, terpenes, alkaloids, α-tocopherol and carotenoids have many interest due to their varied pharmacological properties, including cytotoxic, and chemo deterrent effects [9] [10].
Family-Mimosaceae: *Acacia nilotica* is a multipurpose plant. It is treating many of diseases [11]. It promote as the source of polyphenols.
It contains a summary of a multiplicity of bioactive components [12]; plant bark is used widely for bronchitis, colds, diarrhea, leukoderma and bleeding piles [13]. Tender leaves and pods are given to treat diarrhea and are also well thought-out in folk medicine to heal diabetes mellitus [14].
Reports shows that plant, is plentiful in phenolic consisting of dense of phlobatannin and tannin, gallic acid, catechin, protocatechuic acid, pyrocatechol, epigallocatechin-5epigallocatechin-7gallate, and 7-digallate [15].
This study aims to: examine the antimicrobial action of ethanoic extraction from fruits and seeds of *Acacia nilotica on* different infectious bacterial diseases.

Materials and Methodology

Collection of plant:

Plant fruits and seeds were taken from medical plants market. It was genuine at the institute as *A. nilotica.*

Plant extracts preparation:

Hot ethanol extract (48°C) of fruits and seeds was done depending on the method described by [16], with few modifications. 50 g sample of fruits and seeds of the plant was air-dried and land into powder using an electric blender. Blended material was transferred into a beaker and 100 ml of 98% hot ethanol was added at ambient temperature (28 ± 2°C). Then, agitation was done by rotary shaker. Extraction was allowed to proceed for 48 h. The mixture was let to semi dry yelling thick crude. And a plenty of concentration were prepared from this crude.

McFarland standard solution No. 0.5 (1×10^8cfu/ml) prepared depended to paper [8]**.**

Minimum bactericidal concentration determination (MBC):

After culturing the organisms separately in nutrient broth, various concentration of the leaf and seed mixture of plant extract prepared, the broth was inoculated onto freshly prepared Muller Hinton agar plates to identify the effect of different concentration of plant extract on various genus of infectious bacteria, and then incubated culture at 37°C for 24 h.
All the bacterial isolates (from different infectious bacterial diseases) were identified by VITEK-2 System obtained from the Research Unit in collage of Health and medical technology.

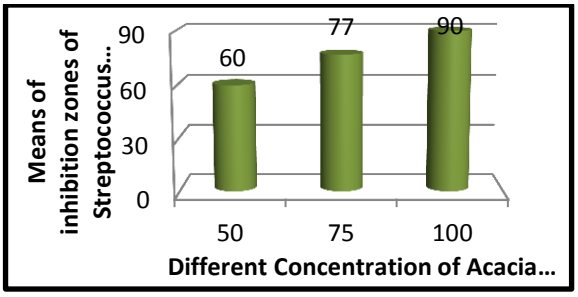
Testing for antibacterial Activity

The agar diffusion method was adopted with some minor modifications to assess the antibacterial activity of the prepared extracts. The agar was left to set and in each of plates (10 mm in diameter) was cut using a sterile pasture pipette and agar discs were removed. Alternate cups were filled with 0.1 ml sample of each extracts using automatic micro liter pipette, and allowed to diffuse at room temperature for two hours. The plates were then incubated in the upright position at 37 ºC for 18 hours. After incubation, the diameters of the resultant growth inhibition zones were measured averaged and the mean values were tabulated.

Results and Discussion

The mean of diameters of the growth inhibition zones (I.Z) produced by extracts of *Acacia nilotica* revealed different measurement in diameters by using different extract concentration against different genus of bacteria:

1- Acacia nilotica against streptococcus pneumonia

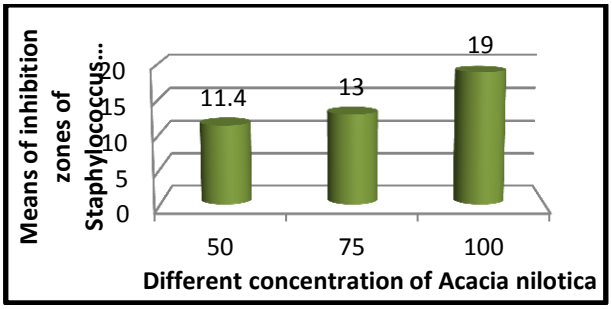


(a)

(b)

Figure 1: (a). Means of inhibition zones (mm.) at 24 hours in 37°C, (b). Inhibition zones (mm.) for *Streptococcus pneumonia* at 24 hours in 37°C.

2- Acacia nilotica against staphylococcus aureus



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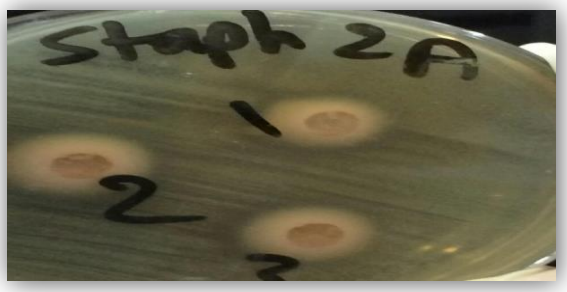
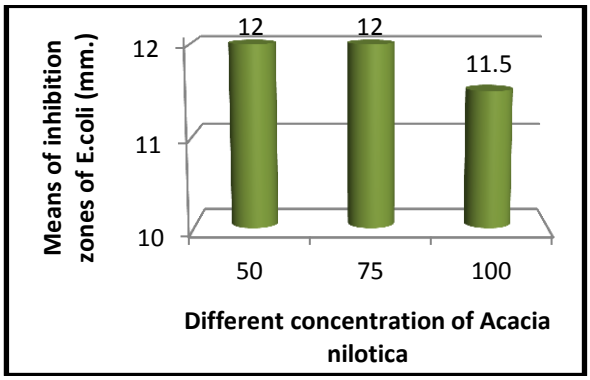


(b)

Figure 2: (a).Means of inhibition zones (mm.) for staphylococcus aureus at 24 hours in 37°C. (b). Inhibition zones (mm.) for *staphylococcus aureus* at 24 hours in 37°C.

3- Acacia nilotica against E.coli

On the other hand; E. *coli* bacteria showed different sensitivity to the different concentration of the extract ,it showed slight influence to the concentration of 50 mg/ml and 75 mg/ml (12 mm)while the 100 mg/ml give less than them (11.5mm).



(a)

(b)

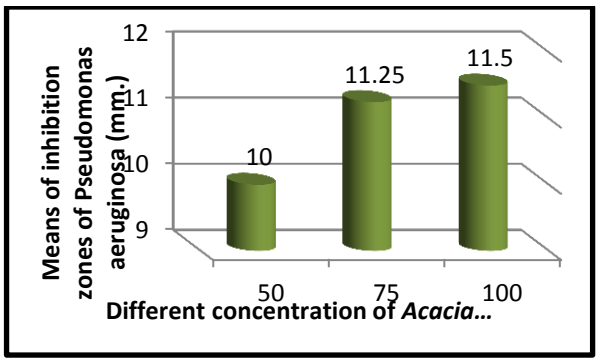
Figure 3: (a). Means of inhibition zones by (mm.) of Escherichia coli at 24 hours in 37°C, (b). inhibition zones by (mm.) of Escherichia coli at 24 hours in 37°C.

4- Acacia nilotica against streptococcus pneumonia

P. aeruginosa revealed high sensitivity to concentrations of 75 mg/ml and 100 mg/ml respectively 11.25 mm and 11.5mm.

5- Acacia nilotica against Proteus mirabilis

For the Proteus *mirabilis*, it was more sensitive to the concentrations of (50, 75) mg/ml respectively; the I.Z. was 9.75 mm and 11.25mm. While the concentration of 100 mg/ml represented less than them [17].



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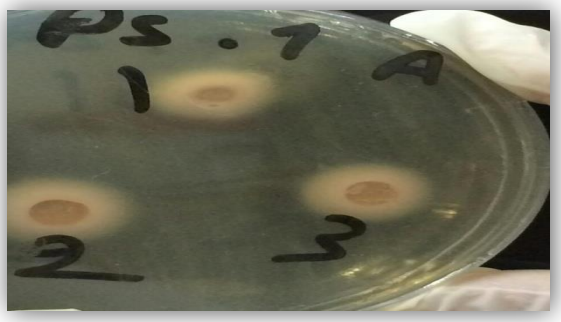
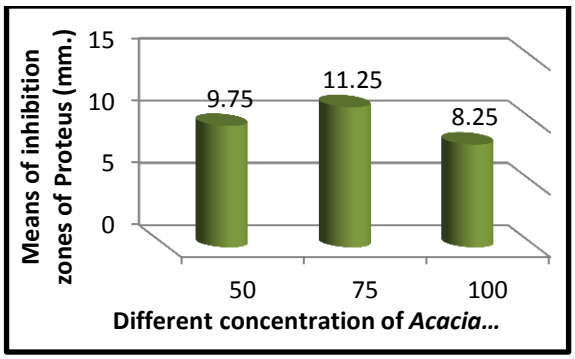


(b)

Figure 4: (a). Means of inhibition zones by (mm.) of *Pseudomonas aeroginosa* at 24 hours in 37°C, (b). Inhibition zones by (mm.) of *Pseudomonas aeroginosa* at 24 hours in 37°C.



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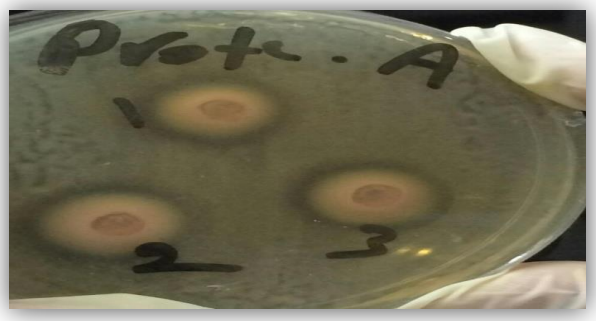

(b)

Figure 5: (a). Means of inhibition zones by (mm.) of *Proteus mirabilis* at 24 hours in 37°C, (b). inhibition zones (mm.) of *Proteus mirabilis* at 24 hours in 37°C.

Antimicrobial drugs provide the essential basic for treatment of various microbial infections instead of the elevated genetic inconsistency of some microorganisms enhance them to quickly develop antimicrobial resistance; therefore, there has been a continuing study for new potent antimicrobials drugs [18].

The present study shows that *A. nilotica* fruit extracts have inhibitory effect on bacterial growth. The plant extracts show varying degrees of action adjacent to gram-negative bacteria, and gram positive bacteria.

Extract of *Acacia nilotica* was investigated, at (50, 75 and 100) mg/ml of plant extract was prepared from the stock and examined as anti-bacteria on different types of bacterial species.

Almost for all bacterial types used in this study, results shows that the concentration of 100mg/ml was the mostly effective concentration on bacteria (*Staphylococcus aureus, Streptococcus pneumonia, Proteus mirabilis*) but for *E. coli* and *Pseudomonas aeruginosa* the concentration of 75 mg/ml was the effective one for both of them because that concentration was the optimum concentration [19].

Al-Yahya *et al*. (1990) found that both ethanol and chloroform extracts from the *A. nilotica* fruit were equally effective against both *Bacillus subtilis* and *Staph. aureus* and that the ethanolic extract was also active against *Proteus vulgaris*. Sotohy *et al*. (1995) reported the effect of ethanol extracts against *Clostridium perfringens* [20].

Mahesh *et al* (2008) has observed antibacterial activity study of methanolic extracts of Acacia nilotica, showed highest antibacterial activity against *Bacillus subtilis* and *Staphylococcus aureus* with inhibition zone 15±0.66mm and leaf extract showed highest activity against *Bacillus subtilis* with inhibition zone 20±1.20mm [21].

Saini *et al* (2008) examined comparative antimicrobial studies of Acacia species and A. nilotica exhibited highest activity against three bacterial (*Escherichia coli, Staphylococcus aureus* and *Salmonella typhi*) [22].

The fruit extracts showed higher activities against *Staph. aureus* compared with other test bacteria (Gram negative) [23].

A. nilotica fruit is used for the treatment of sore throat, cold, bronchitis, pneumonia, ophthalmia, diarrhea, dysentery, leprosy and venereal diseases (El Shanawny, 1996). Some of these diseases such as, diarrhea and gonorrhea are bacterial diseases and may possibly confirm the antimicrobial activity of the plant fruit. Indeed, the ethanol extract from *A. nilotica* fruit was more effective against the test organisms than the test antibiotics used in this study [24].

Scientist conceder Plants as a potentially very significant source of beneficial structures for the progress of new antimicrobial drugs. The first way towards this purpose is in vitro antimicobial interest method. Developing antimicrobials from higher plants appears remunerative as it will lead to improve phyto-medicine to effect to microbes.

The plants contents such as phenolic compounds, tannins, saponins, essential oils and flavonoids have antimicrobial potency [25]. It has been suggested that the mechanism of the antimicrobial effects involves inhibition in different cellular processes, like a raise in plasma membrane permeability and ultimately, ion seepage from the cells [26].

Conclusions

The concentration of 100mg/ml was the mostly effective concentration on bacteria (*S. aureus, St. pneumonia, P. mirabilis*)

The optimum concentration 75 mg/ml was the effective concentration for both *E. coli* and *P. aeruginosa* .

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