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Study effect of medical plant extracts in comparison with antibiotic against bacteria

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Abstract

Ethanolic extracted of Limon (peels), Orange (peels), Apple (peels), Pomegrante (peels), Apricot (seeds), Peach (seeds), Date palm (seeds), Curcuma (stem), Miswak (stem) were tested for antimicrobial activities by paper disk method and compared with Tetracycline as standard antibiotic. The result revealed that the plant extracts more active against gram-positive bacteria (*Staphylococcus aureus*) than against gram-native bacteria (*Escherichia coli*); hence these plant extracts can be vitally used in treating various diseases caused by these pathogens.

Keywords: Medicinal plant extract, Tetracycline, *Escherichia coli*, *Staphylococcus aureus*, Disk diffusion technique, Antimicrobial assay.

Introduction

For over thousands of years now, natural plants have been seen as a valuable source of medicinal agents with proven potential of treating infectious diseases and with lesser side effects compared to the synthetic drug agents. The aim of this research was to study effect of curd extracted of every one of plants, which have been a valuable source of natural products for maintaining human health, with more intensive studies for natural therapies, the use of plants compounds for pharmaceutical purpose has gradually increased in world.[1] Because of the side effects and bacteria resistance against the antibiotics, the scientist developed new drugs from natural sources such as plants, which have been extensively used as alternative treatment for disease[2, 3] as antibacterial[4-7], antifungal, antioxidants[8-9] and anticancer[10] due to that most of these plants contain many active compounds such as flavonoids , tannis, saponins, alkaloids, terpenes, heavy metals.[11]

Material and Methods:

Plant extracts contents:

- The lemon peels (*Citrus limonum*): vitamin C, flavonoids, essential oils, metals: Fe, K, terpens, phenole.
- The organ peels (*Citrus sinensis*): vitamin A, B1, B2, metals: Fe, Ca, Iodine, Manganese nitrate, stearic acid, essential oils, flavonoids, and terpenes.
- The pomegranate peels (*Punica granatum*): tannins, fats, alkaloids, metals: K, Fe, phenols.[12, 13]
- The apple (*Pyrus malus*): vitamin C, sacarides, fibers, metals, phenols.[14]

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- The date seeds (*Phoenixdacty lifera*): moisture, protein, oils, carbohydrate, ash, fatty acids, metals: Fe, Ca, P ,K, carotene, phenol, vitamins: B1, B2.[15]
- The apricot seeds (*Prunus armeniace*): moisture, protein, fatty acids, phenols, amino acids, carbohydrate, metals: K, Mg, Mn, PO4-2, ash, glycosides.[16]
- The peach seeds (*Prunus persica*): moisture, protein, carbohydrate, fatty acids, glycosides, phenols, metals: K, Mn, ash.
- The curcuma rhizomes (Curcuma longa): oils, pigments, vitamins: E, D, A, ketones, lactones, resin, metals: Se, K, antioxidant materials.
- The miswak stems (*Salvadora persica*): amine, alkaloids, chlorine, saponins, resin, sulfur, fluoride, tannins, vitamin: C, sterols.[17, 18]

Preparation of plant extracts:

The nine plant materials were collected from various locations in Iraq. The air dried plant materials were powder using an electric blender, 50 gm of each powdered plant was extracted with 200 ml of 80% ethanol, then shaken at 120 rpm for 30 minutes and kept for 24h, after that, each of the extracts was filtered through whatman no.1 filter paper, after filtration of total extracts, the extracts were evaporated to dryness, then prepare plant extracts in concentration (100mg/ml).

Antibacterial activity:

Antibacterial activities of the plant extracts were determined against two bacterial strains are gram positive (*Staphylococcus aureus*) and gram negative strain (*Escherichia coli*) using disk diffusion technique, 0.1ml of the bacterial suspensions was seeded on agar, a plant extraction was applied to a paper disc, after evaporation of solvent, the paper discs were placed on agar bacterial, incubation was performed at 37ºC for 24h.

A standard 1mg/ml tetracycline disc was used as positive control. Antibiotic microbial was determined by measurement of inhibition zone around each paper disc. For each extract three replicate trials were conducted against each organism.

Results and discussion:

There is relationship between the chemical structures of the most abundant compounds in the plant extracts and microbial activity of tested plants[1], from results which appeared high activity of the miswak due to high percentage of chemical compounds in this plant more than other plants.

The activity of ethanolic extracts of all plants for both bacterial presented in table 1. The results indicated that the crude extracts of selected plants exhibited variable degrees of antimicrobial activity against the gram-positive bacteria (*Staphylococcus aures*) and gram-negative bacteria (*Escherichia coli*).

Table 1: Antibacterial Activity of ethanolic extracts

Plant extracts and antibiotic	Part used	Zone inhibition(mm)	
		Staph-aureus	E-coli
Salvadora pirsica	Stems	26	21
Curcuma louga	Rhizomes	23	20
Citrus limonum	Peels	21	17
Punica granatum	Peels	19	15
Phoenixdacty lifera	Seeds	17	14
Prunus armeuiace	Seeds	16	14
Prunus persica	Seeds	14	10
Citrus sineusis	Peels	10	8
Pyrus malus	Peels	8	7
Tetracyclin	drug	30	23

The ethanolic extracts inhibition the bacterial with zone inhibition ranged (from 7 to 26) mm compared to the tetracycline with zone of inhibition (from 23 to 30) mm.

From the results, we noted that the miswak has high antibacterial activity against *S. aurues* and *E. coli* for the presence of alkaloids, flavonides and saponins in it higher than other extracts which exhibit a broad spectrum of

biological activity.[19, 20] It is not surprising that there are differences in the antibacterial effects of plants extracts due to the phytochemical differences between species.

In general the activities against test bacterial culture used have shown good activity when compared with tetracycline as standard antibiotic. The extracts of miswak and selected plants have various biological properties as antibacterial,[21] antifungal,[22, 23] antitumor[10] and antioxidant.[8, 9]

Conclusion:

Our data express that extracts of selected plants have agreat potential as antibacterial compounds against microorganism. Thus; they can be used in treatment of infectious caused by resistant microbs.

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