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Antiyeasts Activities of Garad (*Acacia nilotica* L.) and Rumman (*Punica granatum* L.) Plants

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Abstract

Medicinal plants are sources of antimicrobial compounds. Some parts of these plants were reported to contain flavanoids, tannins, saponine, sterole and alkaloid. Compounds.. Garad and Rumman were reported to have some antimicrobial activities. The aim of this study is to investigate and analyze the phytochemical compounds and the antiyeasts activities of these two plants. The cup plate Inhibition zone method was used for the solvents tested. The inhibition zone tests showed that the Garad leaves and pods extracts were highly effective against *C. albicans*, and bark extract was highly effective against *C. valida*. The bark and the seeds extracts were effective against *C. tropicalis*, while, the pods extract was more effective against *Pichia* sp. Rumman peels extracts were more effective against *C. tropicalis*. The solvent tests showed that the methanolic pod extracts of Garad were effective against *Pichia* sp. and *C. tropicalis*. The leaves extracts were effective against *C. albicans*. while, the bark extracts were effective against *C. tropicalis* and *C. valida*. However, the seeds extracts were effective against *C. albicans*, *C. valida*, and *C. tropicalis*. The methanolic Rumman peels extracts were effective against *C. valida*. *C. valida* was the only sensitive yeast against the bark and the peel ethanolic extracts of Rumman. All the petroleum ether and hexane extracts of the two plants parts were not effective against all the tested yeasts. Both Garad and Rumman plants were containing inhibitory compounds against different yeasts. The study suggestes that further stidies on the extracts of both Garad and Rumman should be made before being for treating some diseases.

Key words: Antiyeast, Grad, Rumman

INTRODUCTION

Medicinal plants have been identified and used throughout human history. Plants have the ability to synthesize a wide varieties of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals. At least 12,000 such compounds have been isolated so far; a number estimated to be less than 10% of the total. Chemical compounds in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicine to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects (Tapsell *et al*, 2006; Lai and Roy, 2004; Fabricant and Farnsworth, 2001; Swain and Tony,1968).

The use of herbs to treat disease is almost universal among non-industrialized societies, and is often more affordable than purchasing expensive modern pharmaceuticals. The World Health Organization (WHO) estimates that 80% of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care (Internet, 2015a). In

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developing countries, low-income people such as farmers, people of small isolate villages and native communities use folk medicine for the treatment of common infections.

The Garad tree (*Acacia nilotica*) is widely spread in subtropical and tropical Africa from Egypt to Sudan, Mauritania Southwards to South Africa, and in Asia eastwards to Pakistan and India. It has been introduced in China, the Northern Territory and Queensland in Australia (where it is considered to be a best plant of national importance), in the Caribbean, Indian Ocean islands, Mauritius, United States, Central America, South America and the Galápagos I islands). In the Sudan, timber trees are managed on a 15–20 year rotation, primarily for use as railway sleepers. The wood is heavy and durable and is used for heavy construction as well as tool handles and carts. It makes high quality charcoal and fuel wood (Carter, 1994; Fagg, 2001; Spies and March, 2004). Rumman or pomegranate belongs to the family Lythraceae and the scientific or the Binomial name is: *Punica granatum* **L**. It, is a fruit-bearing deciduous

shrub or small tree. Intact fruits or juices, are used in cooking, baking, meal garnishes, juice blends, smoothies, and alcoholic beverages, such as cocktails and wine. The pomegranate is considered to have originated in the region from Iran to northern India and has been cultivated since ancient times throughout the Mediterranean region. It was introduced into Latin America and California by Spanish settlers in 1769 (Morton, 1987). Today, it is widely cultivated throughout the Middle East and Caucasus region, northern Africa and tropical Africa, the Indian subcontinent, Central Asia, and the drier parts of southeast Asia (Morton, 1987 ; Internet, 2015b).

MATERIALS AND METHODS

Fruits (pods and seeds) of Garad (*Acacia nilotica* L.) and fruits of Rumman plants (*Punica granatum* L.) were purchased from Elhasahiesa local market. Other Garad tree parts (Leaves & bark) were collected from nearby Garad tree-in Elhasahiesa Faculty of Education, and Rumman plants parts were collected from faculty of Education- Rufaa, University of albutana- garden. Yeasts (*Candida albicans, Candida valida, Candida tropicalis and Pichia* sp.) were obtained from the Food Science and Technology Laboratory, Faculty of Science and Technology, University of Gezira. The media used in this study were prepared locally, using Oxoid Corporation substances. The medium is:

The Inhibition Zone Method (Cup Plate)was used for measuring the inhibition zone against the growth of *C. albicans*, *C. valida*, *C. tropicalis* and *Pichia* sp., using the PDA media. In this method a standardized cell suspensions of each yeast were prepared and then added to the solidified medium into sterile Petri dishes and spreaded using sterile L-shape glass rod. Sterile Whatman glass fiber disks (No.5) were saturated with each extract, then allowed to dry and transferred centrally on the surface of the solidified medium in each plate. The plates were then incubated at room temperature for 72 hours and the inhibition zones were measured as described by Barry et al., (1970) and Cruickshank et al., (1975). Three replicates were made for each treatment.

RESULTS

The present study investigated the biological activity of the extracts of Garad and Rumman plant parts against four yeasts (*C. albicans, C. valida, C. tropicalis* and *Pichia* sp.).. The cup

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plate inhibition zone methods were used for the comparison between the different solvents extracts (Methanol, Ethanol, Petroleum ether and Hexane).
The effects of the aqueous extracts of the Garad plant parts on inhibition zone of the different four yeasts are shown in Table 1. Table (1a) shows the effect of the Garad aqueous plant parts extracts on inhibition zone of *C. albican*s . From the data it is clear that all the part extracts were effective, while, the leaves and the pods extracts were highly effective at 100% concentration. The effect of the Garad aqueous plant parts extracts on the inhibition zone of *C. valida* (Table, 1b) was also studied. From the results the bark extracts were highly effect followed by seeds. On the other hand, the pods and the leaf extracts were less effect, even att the higher concentration (100%). Table (1c) show the effect of Garad aqueous plant parts extracts on inhibition zone of *C. tropicalis.* From the data it is clear that all the parts extracts were effective, while, the bark and the seeds extracts were highly effective at the two higher concentration (75%,100%) . Table (1d) show the effect of Garad aqueous plant parts extracts on the inhibition zone of *Pichia sp.* the results shows that the pods extract were the most effective followed by the seeds.

The effects of the aqueous extracts of the Rumman plant parts on inhibition zone of the different four yeast are shown in Table 2. That effect on the inhibition zone of *C. albicans* is shown in Table (2a) . The results showed that only the peels extracts were effective. Both the extracts of the bark and flower were less effective. From Table (2b) it is clear that all the aqueous extracts of the Rumman plant parts were not effective against *C. valida* even at their higher concentration. Table (2c) shown the effects of the aqueous extracts of the Rumman plant parts against the yeast *C. tropicalis*. The results indicated that the extracts of all the Rumman parts were effective at all of their concentrations. However, the effect was very high at the higher concentrations, especially the extracts of peels which

were more effective. Table (2d) show the effect of Rumman parts aqueous extracts on the inhibition zone of *Pichia* sp. It is clear that all the extracts were not effective against *Pichia* sp. even at their higher concentrations.
Table (3) shows the effect of the Garad plant part s methanolic extracts on the inhibition zone of some yeasts. The pods were effective against both *Pichia* sp. and *C. tropicalis*, while the leaves were only effective against *C. albicans.* The bark, on the other hand, was only effective against *C. tropicalis.* Table (4) shows the effect of the Rumman plant part methanolic extracts on the inhibition zone of the four yeast.s. Only the peel extracts were found highly effective against *C. valida* only.
Table (5) shows the effect of the Garad plant part ethanolic extracts on the inhibition zone of the four yeasts. Both the bark and the pod ethanolic extracts were effective against *C. albicans.* The pod ethanolic extracts were also effective against *C. tropicalis.* On the other hand, *C. valida* was found resistant to all the ethanolic extracts. Table (6) shows the effect of the Rumman plant parts ethanolic extracts on the inhibition zone of the four yeast. From the results the yeast (*C. valida*) was the most sensitive to the bark and the peel extracts. All the other extracts were not effective.

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Table 1 : Effect of Garad parts aqueous extracts on inhibition zone (cm) of:

a- *C. albicans*

Conc. (mg/ml)	Bark	Seeds	Pods	Leaves
0	0.5	0.5	0.5	0.5
25	0.5	0.5	0.5	0.5
50	0.5	0.5	0.5	0.8
75	0.7	1.00	0.9	1.3
100	1.00	1.4	1.7	2.00

b- ***C. valida***

0	0.5	0.5	0.5	0.5
25	0.5	0.5	0.5	0.5
50	0.7	0.6	0.5	0.5
75	1.2	0.9	0.5	0.5
100	2.00	1.7	0.9	0.8

c- *C. tropicalis*

0	0.5	0.5	0.5	0.5
25	0.7	0.7	0.5	0.5
50	1.5	1.2	0.8	0.5
75	2.00	1.9	1.00	0.5
100	2.9	2.6	1.9	0.9

d- *Pichia* sp.

0	0.5	0.5	0.5	0.5
25	0.5	0.7	1.00	0.5
50	0.5	1.00	2.1	0.5
75	0.5	1.9	2.5	0.7
100	0.5	2.3	3.00	1.00

Table 2: Effect of Rumman parts aqueous extracts on inhibition zone (cm) of:

a- Candida albicans

Conc (mg/ml)	Bark	Flowers	Peels
0	0.5	0.5	0.5
25	0.5	0.5	0.5
50	0.5	0.5	0.5
75	0.5	0.5	0.5
100	0.5	0.5	0.9

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b- ***Candida valida***

0	0.5	0.5	0.5
25	0.5	0.5	0.5
50	0.5	0.5	0.5
75	0.5	0.5	0.5
100	0.5	0.5	0.5

c- ***Candida tropicalis***

0	0.5	0.5	0.5
25	0.8	0.9	1.9
50	1.2	1.5	2.5
75	1.9	2.2	3.00
100	2.5	2.9	3.3

d- ***Pichia* sp.**

0	0.5	0.5	0.5
25	0.5	0.5	0.5
50	0.5	0.5	0.5
75	0.5	0.5	0.5
100	0.5	0.5	0.5

Table 3: Effect of Garad parts methanolic extracts on inhibition zone (cm) of: some yeasts

Organism	Bark	Seeds	Pods	Leaves
Candida albicans	0.5	1.2	0.5	2.00
Candida valida	1.5	1.4	0.5	0.5
Candida tropicalis	1.8	1.00	2.25	0.5
***Pichia* sp.**	0.5	0.7	2.7	1.00

Table 4: Effect of Rumman methanolic extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Flowers	Peels
Candida albicans	0.5	0.5	0.5
Candida valida	0.5	0.5	3.00
Candida tropicillus	0.5	0.5	0.5
***Pichia* sp.**	0.5	0.5	0.5

Table 5: Effect of Garad parts ethanolic extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Seeds	Pods	Leaves
Candida albicans	1.00	0.9	1.5	0.5
Candida valida	0.7	0.5	0.5	0.5
Candida tropicalis	0.8	0.9	1.2	0.5
***Pichia* sp.**	0.5	0.7	0.8	0.5

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Table 6: Effect of Rumman parts ethanolic extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Flowers	Peels
Candida albicans	0.5	0.5	0.8
Candida valida	1.3	0.5	2.2
Candida tropicalis	0.5	0.5	0.7
***Pichia* sp.**	0.6	0.5	0.8

Table (7) show the effect of the Garad plant parts petroleum ether extracts on the inhibition zone of the four yeast. From the data it is clear that all the petroleum ether extracts were not effective against all the tested organisms. Tables (8) show the effect of the Rumman plants part petroleum ether extracts on the inhibition zone of the four yeast. From the data it is clear that all the petroleum ether extracts were not effective against all the tested organisms.

Table (9) show the effect of the Garad plant parts hexane extracts on the inhibition zone of the four yeasts (*C. albicans, C. valida, C. tropicalis* and *Pichia* sp.). From the data it is clear that all the hexane extracts were not effective against all the tested organisms. The hexane extracts of Rumman plant parts were also not effective against the inhibition zones of all the tested yeasts (table 10).

DISCUSSION

The present study was investigated the biological activities of the extracts of Garad and Rumman plants parts against four yeasts (*C. albicans, C. valida, C. tropicalis* and *Pichia* sp.).. The results of the biological activities indicated that the extracts of Garad and Rumman plants parts were showing different effects against the tested organisms. The use of different solvents for the different extracts was also made in the present study. The solvents used include; Methanol, ethanol, petroleum ether and hexane. Only the inhibition zone method was used for this test. From the results it was found that the Methanolic and the ethanolic extracts of both Garad and Rumman were more effective against the tested organism than the other solvents (petroleum ether and hexane). The methanolic extracts of pods were effective against *C. tropicalis, Pichia* sp. On the other hand, the methanolic Garad leaf extracts were only effective against *C. albicans*. The Rumman peels methanolic extracts were effective against *C. valida*. The Rumman peels ethanolic extracts was more effective against *C. valida*, All the other solvents were less effective. Methanol extracts were also reported as the most effective by different investigators (Abdel- Rahim *et al*.,2012; Zainal *et al*., 1988; Ahmed, 2004). Solomon and Shittu (2010) have investigated *in - vitro* antimicrobial activity of the crude ethanolic leaf extract of *Acacia nilotica* against *Campylobacter coli* isolated from goats. The highest zone of inhibition in their study was observed with the 70 mg/ml concentration. Khan *et al* (2009) has explored the antimicrobial activities of the crude ethanolic extracts of five plants against multidrug resistant (MDR) strains of, *Candida albicans*, and different strains of microorganism. They found that Garad (*A. nilotica*) has the minimum Inhibitory concentration range 9.75 – 313 µg/ml (Khan, 2009).

Table 7: Effect of Garad petroleum ether extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Seeds	Pods	Leaves
Candida albicans	0.5	0.5	0.6	0.5

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Candida valida	0.5	0.5	0.5	0.5
Candida tropicalis	0.5	0.5	0.5	0.5
***Pichia* sp.**	0.5	0.5	0.5	0.5

Table 8: Effect of Rumman petroleum ether extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Flowers	Peels
Candida albicans	0.5	0.6	0.6
Candida valida	0.5	0.5	0.5
Candida tropicalis	0.5	0.5	0.5
***Pichia* sp.**	0.5	0.5	0.5

Table 9: Effect of Garad hexane extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Seeds	Pods	Leaves
Candida albicans	0.5	0.5	0.5	0.5
Candida valida	0.5	0.5	0.5	0.5
Candida tropicalis	0.5	0.5	0.5	0.5
***Pichia* sp.**	0.5	0.6	0.5	0.5

Table 10: Effect of Rumman parts hexane extracts on inhibition zone (cm) of some yeasts

Organism	Bark	Flowers	Peels
Candida albicans	0.6	0.5	0.6
Candida valida	0.7	0.5	0.5
Candida tropicalis	0.7	0.5	0.5
***Pichia* sp.**	0.6	0.5	0.6

Dried fruits of *Acacia nilotica* are active against *C. albicans* and used to treat oral candidiasis. Methanolic extract of the plant is active against two animal viruses: (Newcastle Disease and Fowl pox Viruses) as was reported by Mohamed *et al*., (2010). Saini (2008) examined the comparative antimicrobial studies of different *Acacia* species. He found that *A. nilotica* was exhibited the highest activity against the two fungi tested (*Candida albicans* and *Aspergillus niger*) . The *Acacia nilotica* plant extracts were also reported by Shanab (2007) to have potent antibiotic activity against two fungi (*Candida albicans* and *Aspergillus flavus*). Methanolic extracts of the plant were found to contain keampherol which is responsible for the antioxidant activity of the plant (Rajbir and Bikram (2008). Methanol extracts of *Acacia nilotica* pods were found to cause a decrease in arterial blood pressure at dose (3–30 mg/kg). It also produces an inhibitory effect on force and rate of contraction in guinea-pig paired atria (Gilani,1999). Methanol extracts of *Punica. pterocarpum* and *P. granatum* showed an activity against *Candida albicans*. In Sudan many studies were carried out for testing the antimicrobial activity of some medicinal plants (Abdel Daim, 2004; Abdel Rahim and Idris, 2010). Ahmed (2004) tested the extracts of 10 plants against some microorganisms such as *Candida albicans*. He found a marked effect against the Gram positive *Staph. aureus* followed by *E. coli* and *Candida albicans*, respectively.

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