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Antimicrobial Activity of *Caralluma quadrangula* (Forssk) N.E. Br Latex from Al-Shafa Taif, Kingdom of Saudi Arabia

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A B S T R A C T

Caralluma quadrangula (Forssk) N.E. Br belongs to the *Asclepiadaceae* family and was collected from the *Al-Shafa* Mountain in Taif, a city in the Mecca Province of Saudi Arabia at an elevation of 1,879 m (6,165 ft) on the slopes of the Sarawat Mountains. The plant's latex was extracted and dissolved into five different aqueous solutions with the solvents: distilled water, *Zamzam* water, acetone, ethyl alcohol and Tris-HCl to yield five different extracts. The objectives of this research is to extract *Caralluma quadrangula* latex using different aqueous solutions / solvents and to evaluate the inhibition zones using 5 pathogenic and non pathogenic microorganisms using six various concentrations of *Caralluma quadrangula* latex. This study on *Caralluma quadrangula* (Forssk) N.E. Br, obtained from *Al- Shafa*, Taif. The research was conducted at the Department of Biotechnology, Taif University. The bacterial strains from ATCC and the nutrient Hiveg- Agar from Himedia were utilized for the study. The antimicrobial activity was tested against both Fungi, Gram-positive and Gram-negative bacteria using the agar diffusion method. Antimicrobial activities were observed, especially against *Micrococcus luteus*, *Candida albicans*, *Escherichia coli*, and *Pseudomonas aeruginosa* strains. The higher activity was exhibited in the acetonic and ethyl alcohol extract solutions of *Caralluma quadrangula* latex depending upon various concentrations towards the particular organism. These results are encouraging due to the fact that the plants are rich in antimicrobial sources that should be considered; especially antimicrobial peptides from latex extracted in *Zamzam* water and compounds were extracted from latex in solvent, further studies should be carried out to confirm the purification of the antimicrobial compounds.

Introduction

The medically significant genus *Caralluma* is widely studied for its stem and fruits. It belongs to the family Asclepiadaceae, which comprises 200 genera and 2500 species (Rajendra Ramaswamy, Kamala, 2004; Qiu *et al*., 1997). *Caralluma* is a xerophytic genus includes about 120 taxa, with a wide

African, Asian, South African and Southeast European distribution (Mabberley, 1993). About 13 species and seven varieties of *Caralluma* occur in India. Out of the thirteen species, eleven species are solely endemic to south India (Jagatap and Singh, 1999). Rare and endangered species are *C. bhupenderiana, C. sarkariae C. nilagiriana, oucerosiatruncato-coronata, B. procumbens* and *B. pauciflora*. (Nayar, 1996). Anti-obesity drugs and nutraceuticals from species of *Caralluma* were studied (Dutt *et al*., 2012).

Caralluma, on the basis of stem and flower morphology is divided into 4 sub genera. *Caralluma* species are exhibiting more intermediate forms in their habitant due to their inter hybridizable potency (Tariq, 2010). Thirteen species of genus *Caralluma* found from the flora of Saudi Arabia. The medicinally important *Caralluma* R.Br is widely distributed succulent taxon spreaded in dry regions of the world (Deepak *et al*., 1997; Ramesh *et al*., 1999; Zakaria *et al*., 2001; Mahmood *et al*., 2010). In Saudi Arabia *Caralluma* species are available in Hail, Jeddah, Jabel Mershid, Al Medina, Abha and Taif. *Caralluma quadrangula* R.Br are seen in Taif, *Al-Shafa* and *Caralluma Sinaica* (Decane) are found in western Taif and South western Asir. In Saudi Arabia, the genus *Caralluma* found with the species *C. commutata* A. Berger, *C. edulis* Benth. ex Hook. f, *C. penicillata* Defl. N. E. Br., C. *quadrangula* Forssk, *C. russeliana*, Courb. Ex. Brongn. *C.shadhbana* Lavranos var. *barhana* Lavranos & L.E. Newton, *C. tuberculata* N.E.Br., *C. wissmanii* Schwartz, *C. retrospiciens* Ehrenb. N.E. Br.and C. *Sinaica Decne*.

A range of medicinal uses of *Caralluma* species have been documented both in the Arabic and Indian traditional medicine including treatment of diabetes, cancer, tuberculosis, snake and scorpion bites, skin rashes, scabies, fever, and inflammation (De Leo *et al*., 2005; Oyama *et al*., 2007; Aruna *et al*., 2009; Abdel-Sattar *et al*, 2009). *Caralluma* extracts are having pharmacological importance (Waheed *et al*., 2011; AbdurRauf *et al*., 2013). *Caralluma* has significant anti inflammatory and antitumor activity, anticancer, cytoprotective and antiulcer activity, antinociceptive (Abdel- Sattar *et al*., 2007), antioxidant, lypolipidemic (Tatiya *et al*., 2010), antihyperglycemic (Venktesh *et al*., 2003), treating paralysis and joint pains and antipyretic (Khan, 2003) properties. The presence of pregnane glycosides (Braca, 2002), stigmasterol and other further constituents (Bader, 2003) in *Caralluma* species explains a range of biological activities including antimicrobial activity. The juicy stem of *C. hiberculata* is bitter tonic febrifuge stomachic and carminative and it is use full in rheumatism and consume as vegetable especially when cooked with minced meat (Shinwari *et al*., 2006).

Caralluma aucheriana (Saudi Arabia, India, Nigeria, East Africa) stems are used for liver problems and used as cooling agent on sunburns and itchy skin. Young stem ground with onion and tamarind and made into paste for curing digestive problems. For chest pain, drink stems decoction with fresh milk and the Sap is applied for wounds. *Caralluma tuberculata* has significant inflammation inhibitory and andgesic activity (Ahmed *et al*., 1993; Al Yahya, 1983). It is also extensively used for paralysis and joints pain and fever (Khan and Khatoon, 2008).

Caralluma decaisneana areal parts extract used in a treatment for mental problems and epilepsy. Plant sap was applied to teeth with caries. Plant sap considered very toxic and

milk was taken as antidote to poisoning. The dried powdered stems were thrown in water as a fish poison, considered as slow acting. The toxins have not been chemically characterized. *Caralluma umbellata Haw* has been used in traditional treatment for stomach disorder (Pavan *et al*., 2014). In *Caralluma nilagiriana*, the presences of alkaloids, tannins, flavonoids, terpenoids, glycosides, amino acids and carbohydrates were reported (Prabakaran and Kalimuthu, 2013). *Caralluma* spp. is rich in sterols, steroidal glycosides, pregnane glycosides, flavonoid derivatives, and magastigmane glycosides (Braca *et al*., 2002 and Bader *et al*., 2003). *Caralluma penicillata* (defl) from Saudi Arabia has proved to be highly toxic. 51 sheep died from grazing on it was reported (Hans Dieter Neuwinger, 1996). The most common C. species in Yemen is *C. penicillata* that widely is used in folk medicine having an antiulcer effect. *C. penicillata* has been used in Yemeni traditional medicine for the treatment of peptic ulcer and as anti-inflammatory (Nabil *et al*., 2014).

Abdullah *et al.*, 2013 reported that significant in-vitro cytotoxic activity against breast cancer (MCF7) cell line by the chloroform and methanol extract fraction of the aerial parts of *Caralluma quadrangula* (Forssk.) N.E. Br. Hydroalcoholic extracts of *Caralluma arabica* about 200–400 mg/kg in different experimental gastric ulcer models, including indomethacin, phenylbutazone, 80% ethanol, and cold-restraint stress was found active. This plant was able to reduce gastric acidity and secretion and increase mucin production (Zakaria *et al*., 2001 and Dutta *et al*., 2012).

Caralluma usually have small caducous leaves. Among these succulent perennial herbs, some of which are reported as safe to eat species (Naik & Krishnamurthy, 2012). The *Caralluma quadrangula* (Forssk) N.E. Br, the succulent herb in Taif has angular fleshy stems with height 10-40cm, very small, many branched, 2-5cm diameter greenish stems without leaves. The flowers develop singly or in poor clusters atop stems have 2-3 mm long stalks; crown pentamerous, is 15-20 mm in diameter, is divided almost to the base to close triangular, 6-8 mm long lobes (corolla tube is thus short), glabrous, in various shades of yellow. Flowers are in apical umbels with yellow color. Normally flowering and fruiting in October to November and April to May. The flower of other species are deep purple brown (*Caralluma retrospeciens* in north western Saudi Arabia) or yellowish white. *The Caralluma quadrangula* (Forssk) N.E. Br and the *Caralluma penicillata* from Saudi Arabia have the same close yellowish colour flowers. The sap of the *Caralluma quadrangula* (Forssk) N.E.Br solidified faster into milky latex which has economic importance for medicinal uses. The plants under 40cm tall the sap is found watery and over 40cm tall sap found to be milky. Fig. 1. Showed the distribution of *Caralluma quadrangula* (Forssk.) N.E.Br. in the World

The Caralluma quadrangula (Forssk) N.E. Br. was collected from *Al-Shafa* in Taif, Kingdom of Saudi Arabia. A little is known about the antibacterial activity of *Caralluma* extracts of stem and roots of *Caralluma quadrangula*, regarding its latex, not much information available.

Caralluma quadrangula (Forssk) N.E.Br., found in *Al-Shafa*, Taif, lacks planned cultivation and no description on antimicrobial activity, this study was an attempted to figuring out the level of antimicrobial activity. Hence, in the present research, an endeavor is made to spot the antimicrobial activities of the latex extracts using five different solvents (*Zamzam* water;

distilled water; ethyl alcohol; acetone and Tris-HCl at pH 8.7, (100 mM) against Gram positive and Gram negative bacteria. The results are stated and discussed in this paper.

Micro-organisms used in antibacterial assay

The following bacterial strains were employed in the screening: *Bacillus subtilis* ATCC 6633 (gram- positive), *Escherichia col*i ATCC 25922 (gram-negative), *Pseudomonas aeruginosa* ATCC (gram-negative), *Micrococcus luteus* (gram-positive) and *Candida albicans* ATCC (Note, ATCC: American Type Culture Collection).

Materials and Methods

Experimental Materials

Caralluma quadrangula (Forssk) N.E. Br belonging to Asclepiadaceae family was collected from *Al-Shafa* in Taif, The latex was aseptically taken from the young and matured stems of *Caralluma quadrangula.* An experiment was conducted in the Molecular Biotechnology Unit of College of Science, Taif University, Taif, Saudi Arabia.

Preparation of extraction reagent: The solvents that were used prior to the preparation of extract solution were sterilized water and *Zamzam* by autoclaving at 121°C at 15psig for 20min. Purchased Ethanol, Acetone from standard companies (Himedia, Mumbai, India) and Tris-HCl (PH8.7) were prepared in lab.

Nutrient agar and nutrient broth were purchased from Himedia, India Mumbai, India. The composition of Nutrient agar Hiveg Agar (Hiveg peptone 5.00; Hiveg extract 1.50; Yeast extract 1.50; Sodium chloride 5.00; Agar 15.00; Final pH (at 25ºC) 7.4-+0.2. The solutes were shaken until they dissolved and the pH was adjusted to 7 using 1N NaOH (8ml). The volume was then adjusted to 1Liter by adding deionized water. The sterilization was done by autoclaving at 121ºC for 20 minutes at 15psi (1.05kg/cm) on liquid cycle.

Extraction of latex

Caralluma quadrangula stems from *Al-Shafa*, Taif were initially washed with sterilized distilled water. The latex was aseptically taken directly from the plant's young and matured stems.

The solvents of extraction were *Zamzam* water; distilled water; ethyl alcohol; acetone and Tris-HCl at pH 8.7, (100 mM). *The* latex was extracted with 1.5 ml acetone, and the 1.0 ml of extract collected was kept in a shaking incubator at 30°C for 2 hrs. The extract was stored at 4°C until further use. Similarly *Caralluma quadrangula* latex was extracted with 0.75ml of other corresponding solvents (*Zamzam* water, distilled water, ethyl alcohol and 100mM Tris-HCl, pH8.7). After extraction the tubes were kept in shaker at 150rpm at 30°C for 2 hours and then kept in a freezer at -80°C.

Methods

The nutrient agar plates were made by weighing twenty eight grams of nutrient agar (obtained from Himedia, India) and dissolving it in a 1L of sterilized distilled water. The solution was autoclaved after adjusting the pH to 7.4 for 20minutes at 15psi (1.05kg/cm) at 121ºC on liquid cycle. The autoclaved medium was swirled gently to distribute the melted agar evenly throughout the solution and allowed to cool to 50ºC to 60ºC. Then under sterile conditions, 20ml of this medium was poured

on to 90mm Petri dishes and was set to cool. When the medium sets completely, Petri dishes were inverted and stored at 4ºC and took out from storage 2 hours earlier to use (Sambrook and Russell, 2001).

The suspensions of the 5 microbial cultures were covered completely on the agar plates and were allowed to dry. Note 1: The bacterial strains used were *Bacillus subtilis* ATCC 6633; *Candida albicans* ATCC 10231; *Escherichia col*i ATCC 8739; *Micrococcus luteus* ATCC 9341; *Pseudomonas aeruginosa* ATCC 27853 (ATCC: American Type Culture Collection). The five strains were maintained on nutrient agar and freshly prepared sub-cultures in nutrient broth. This was done by transferring two or three colonies (from the old parent glycerol culture of 5 micro organisms) into a bottle containing 20 ml of liquid nutrient broth medium and grown for 24 hours (or overnight) at 37ºC and a small aliquot was poured on plates and dried.

The standard agar-well diffusion method (Collins *et al*., 1995**)** was employed to determine the antimicrobial activities for both acetonic and aqueous *Caralluma quadrangula latex* extracts. The holes (6mm) were made in agar using sterile yellow tip and different concentrations of the test solution of latex (10µl, 20µl, 30µl, 40µl, 50µl and 60µl) were used for different microorganisms. A positive (solvent) and negative control (NS) were also used. All test solutions were added inside the laminar flow cabinet. The solutions were diffused in the wells for 15-20 minutes, the plates were then incubated for 24 hours at 37ºC. After incubation, clear areas in the region of the wells containing antimicrobial peptides/ compounds appeared. This diameter of the clear area (called the inhibition zones) around the wells was measured and recorded. Antimicrobial activities of each solvent extract were expressed in terms of average diameter of the inhibition zone (evaluated in milliliter). Each *Caralluma quadrangula latex* extract was tested in the same manner. The concentration and solvents that give the optimum result were identified.

Note: For 5 different organisms, 6 different concentrations from one particular solvent were used.

Results and Discussion

The evaluation of the anti-microbial activities of all the five extracts obtained from *Caralluma quadrangula latex* by successive five solvent extraction method were examined against all the above mentioned Gram positive (B. subtilis, *Micrococcus luteus*, *Candida albicans*) and Gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) bacteria with six different concentrations (10 to 60 µl of 1:1 mixture) (results are listed in Table 1) by standard agar well diffusion clearing zone method.

The extracts at different concentrations were prepared by different solvents (*Zamzam* water; distilled water; ethyl alcohol, acetone and Tris-Hcl at pH 8.7, (100 mM) and they exhibited varying results with the tested five different microorganisms during the antimicrobial activities study.

The Gram-positive bacteria were more sensitive (stem or root) than Gram-negative bacteria when extracted with different solvents like dichloromethane; methanol; water and also these extracts had no activity against *Candida albicans* was reported (Suresh Babu *et al*., 2014)

The *Caralluma quadrangula* latex extracts were found to be effective against most of the organisms at different

concentrations. All the five extracts were found ineffective against *Bacillus subtilis*, whereas according to Suresh Babu *et al*., 2014, a study on the *Caralluma umbellata* stem or root extracts with solvents like ethyl alcohol and acetone were found to be effective against the tested three Gram positive bacteria (*Bacillus subtilis, S. aureus, Bacillus cereus*) was observed.

The acetone extract of *Caralluma quadrangula* latex exhibited no antibacterial activity against both *Bacillus subtilis and Escherichia coli* (Fig 4). The result was complied with the acetone extracts of *Caralluma ascendance* which did not show any significant antibacterial activity was reported (Naik and Jadge, 2010). But the acetone extract of *Caralluma quadrangula* latex at the concentrations (30 µl to 60µl) was found effective against *Micrococcus luteus, Candida albicans* and *Pseudomonas aeruginosa*. Malaysian sea cucumber species has traditional medicine values; a moderate antibacterial activity against *P. aeruginosa* was reported by Farouk *et al.*, 2007.

Out of the five solvents used for extraction of *Caralluma quadrangula* latex in this study, ethyl alcohol extract showed the highest activity against *Escherichia coli* at the concentration 60µl/ml.

In the case of Gram negative bacteria, only acetone extracts of *Caralluma quadrangula* latex (30 µl to 60µl) were active against P*seudomonas. aeruginosa* and inactive against *Escherichia coli* (Fig 2). An antimicrobial activity was recorded against ethyl alcohol and acetone extracts of *R. damascena* cv. Taifi was reported earlier by Farouk *et al.*, 2014.

Petroleum ether extract of *Caralluma ascendance* Roxb, stem was effective against *Escherichia coli* and n-n butanol extract was effective against *Shigella sonnei* was reported by Kulkarni Aditi, 2012. The non-polar Chloroform solvent extracts of *Caralluma fimbriyata* stem w methanol, ethanol, chloroform, petroleum ether and aqueous extracts shown better activity against *Escherichia coli, Bacillus* sp. was reported by Packialakshmi and Naziya, 2014). Hexane and methanol were inactive against the tested both Gram positive and negative bacteria against *C. umbellata* extracts obtained from root and stem were already reported (Suresh Babu *et al*., 2014). *Caralluma quadrangula* latex when tried to extract with isopropyl alcohol, it was found latex coagulation. Extracts (acetone, methanol, ethanol, and phosphate buffer) from *Eurycoma longifolia* and *Labisia pumila* leaves were evaluated, analyzed and purified for their antibacterial activity against gram negative (*Pseudomonas aeruginosa*) bacteria by agar well-diffusion method was explained by Farouk *et al*., 2007, 2008. So the selection of solvents is an important factor in antimicrobial studies. These various reported and present results showed different solvents of extraction for a particular species, with different concentrations plays vital role against concerned tested organisms.

The genetic composition of the *Caralluma* species in different regions need to be studied since their stem's colour, length, width, surface and scars differs with environment and geographical locations.

The ethyl alcohol extracts of *Caralluma quadrangula* latex (at concentrations of 50 to 60 µg/ml with clearing zone 8mm. in their diameter showed higher antibacterial activity against *Escherichia coli* than *Zamzam* water (4mm) and Tris-Hcl. (3mm) (results are listed in Table 1). The result was complied with the reported results from other *Caralluma* species where 30 µg/ml was found to be significant antimicrobial

activity against *Escherichia coli* (Prabakaran and Kalimuthu, 2013).

The *Zamzam* water extracts of *Caralluma quadrangula* latex (at concentrations of 50µl to 60µl µl/ml) with clearing zone 4mm. in their diameter showed almost similar antibacterial activity against *Escherichia coli* , *Micrococcus luteus and Candida albicans* when compared to 50 µl /ml. water extracts of *Caralluma quadrangula* latex (2 to 3mm).

Table.1 Optimization of the extraction of *Caralluma quadrangla* (Forssk.) N.E.Br for antimicrobial compounds and peptides in five solvents (six varoius concentrations) against five different microorganisams using agar diffusion method.

The Solvents of extraction for *Caralluma quadrangla* (Forssk.) N.E.Br latex	***Caralluma quadrangla* (Forssk.) N.E.Br latex weights in micro liter from 1:1 latex and solvent mixture**	**Five different Bacteria Inhibition zones (mm)**				
		BS	CA	EC	MC	PA
Distilled water	C. Latex +solvent 10µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 20µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 30µl	Nil	Nil	Nil	3±1	Nil
	C. Latex +solvent 40µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent50µl	Nil	2±1	2±1	Nil	Nil
	C. Latex +solvent 60µl	Nil	Nil	Nil	Nil	2±1
	ABNS 20µl	8±1	7±1	10±1	8±1	11±1
Zamzam	C. Latex +solvent 10µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 20µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 30µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 40µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent50µl	Nil	4±1	Nil	3±1	Nil
	C. Latex +solvent 60µl	Nil	Nil	3±1	Nil	Nil
	ABNS 20µl	Nil	9±1	7±1	7±1	5±1
Acetone	C. Latex +solvent 10µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 20µl	Nil	4±1	Nil	3±1	Nil
	C. Latex +solvent 30µl	Nil	4±1	Nil	3±1	4±1
	C. Latex +solvent 40µl	Nil	Nil	Nil	3±1	5±1
	C. Latex +solvent50µl	Nil	5±1	Nil	5±1	6±1
	C. Latex +solvent 60µl	Nil	7±1	Nil	7±1	6±1
	ABNS 20µl	Nil	7±1	Nil	7±1	Nil
Ethyl alcohol	C. Latex +solvent 10µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 20µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 30µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 40µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent50µl	Nil	Nil	8±1	Nil	Nil
	C. Latex +solvent 60µl	Nil	Nil	9±1	Nil	3±1
	ABNS 20µl	Nil	10±1	10±1	9±1	9±1
Tris - HCl	C. Latex +solvent 10µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 20µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 30µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 40µl	Nil	Nil	Nil	3±1	Nil
	C. Latex +solvent50µl	Nil	Nil	Nil	Nil	Nil
	C. Latex +solvent 60µl	Nil	4±1	4±1	Nil	Nil
	ABNS 20µl	Nil	9±1	9±1	Nil	5±1

Table.2 The antimicrobial activity of *Caralluma quadrangla* (Forssk.) N.E.Br selected dilutions in five various aqueous solution/solvents against five different microorganisams as described in Table. 1.

Caralluma quadrangla (Forssk.) N.E.Br latex concentration in microliter from 1:1 milk and solvent mixture	BS	CA		EC			MC		PA	
	(mm)	(mm)		(mm)			(mm)		(mm)	
10µl	0	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
20µl	0	Nil	4	Nil	Nil	Nil		4	Nil	Nil
30µl	0	Nil	4	Nil	Nil	Nil		4	Nil	4
40µl	0	Nil	Nil	Nil	Nil	Nil		3	Nil	
50µl	0	5	4	3	8	8		4	3	6
60µl	0	Nil	4	4	8	4	Nil	7	Nil	6

Nil Water

Acetone

8 Ethyl alcohol

4 *Zamzam*

3 Tris

BS-- *Bacillus subtilis* ATCC 6633 (gram- positive)
EC --*Escherichia col*i ATCC 25922 (gram-negative)
PA --*Pseudomonas aeruginosa* ATCC (gram-negative)
MC--*Micrococcus luteus* (gram-positive) and
CA --*Candida albicans* ATCC

Fig.1 The distribution of *Caralluma quadrangula* (Forssk.) N.E.Br. in the World was labeled in yellow points. (Source: http://eol.org/data_objects/21147410, Discover Life: Point Map of *Caralluma quadrangula* - Encyclopedia of Life)

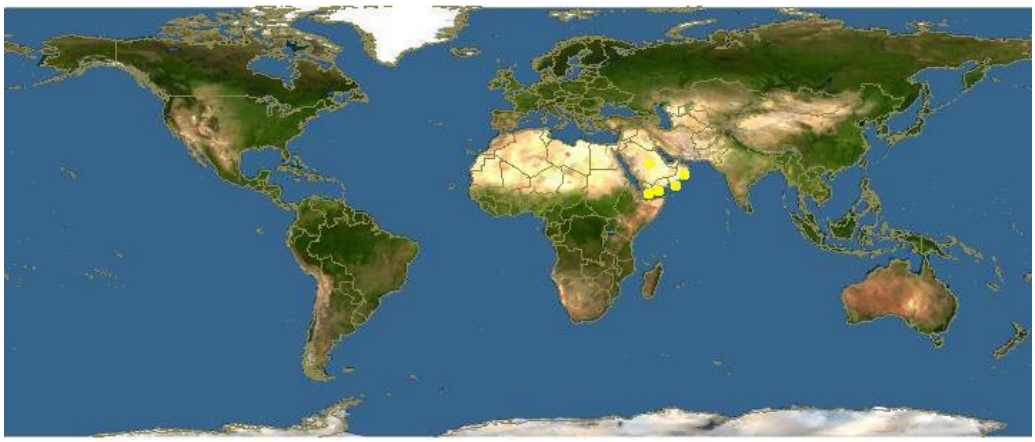


Fig.2 Flowchart of the methodology

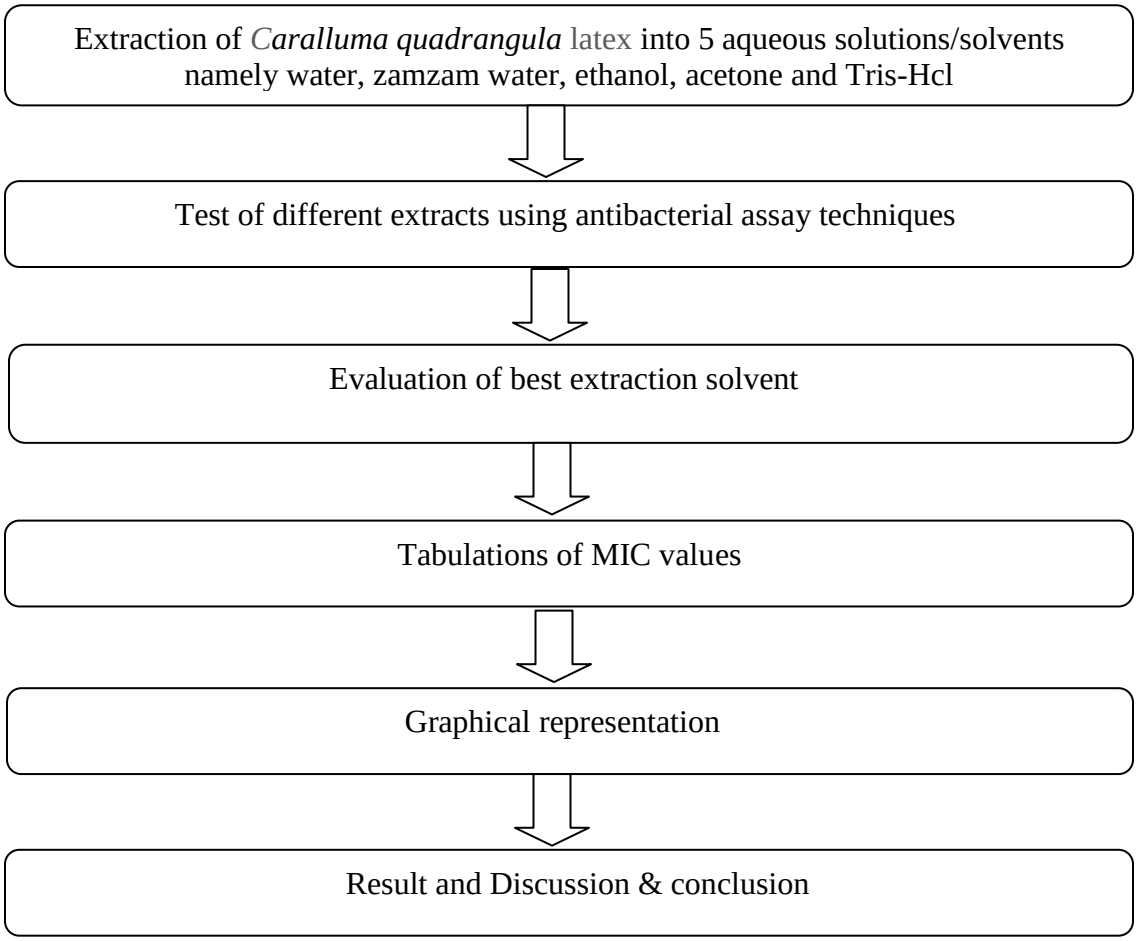
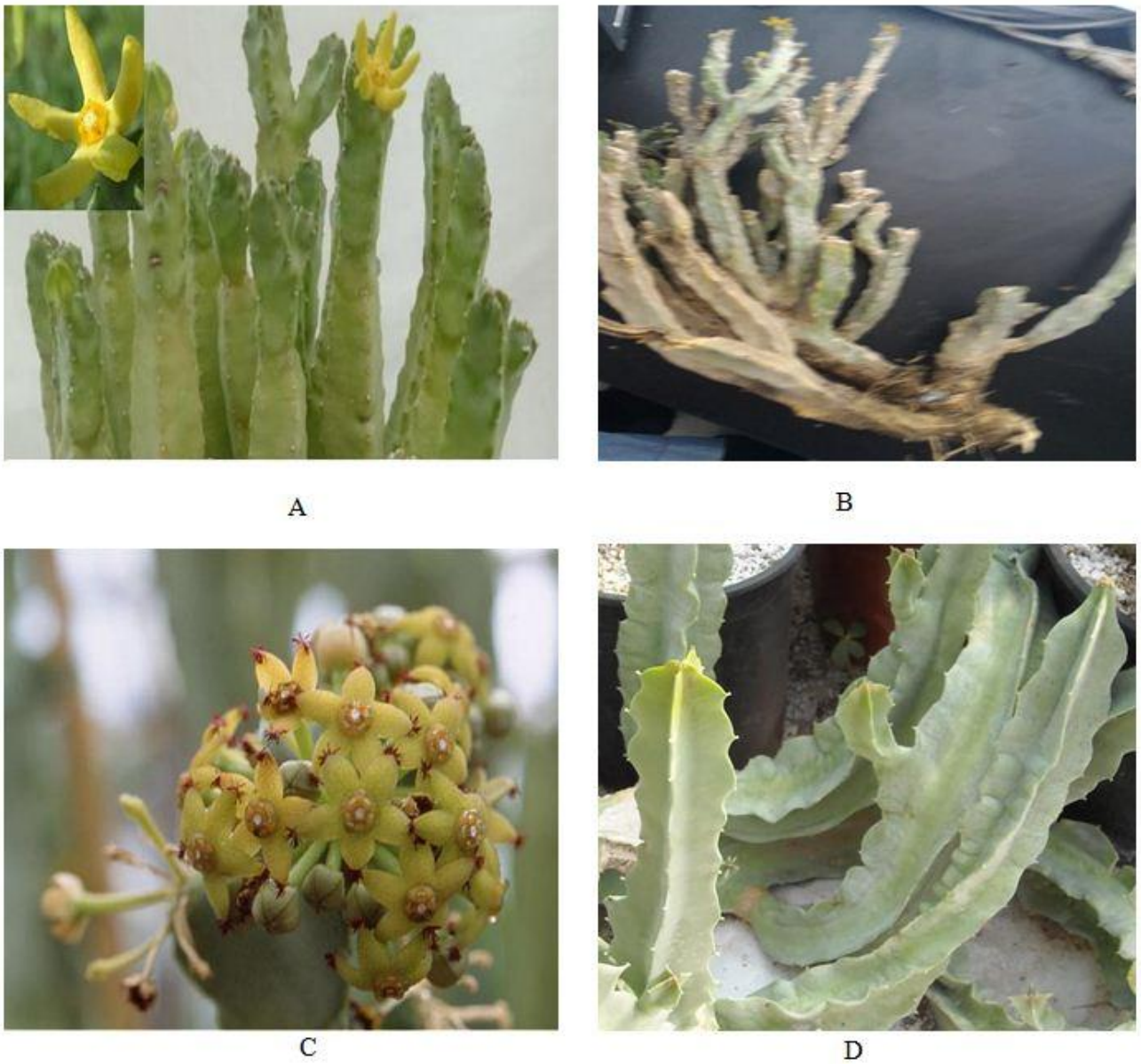
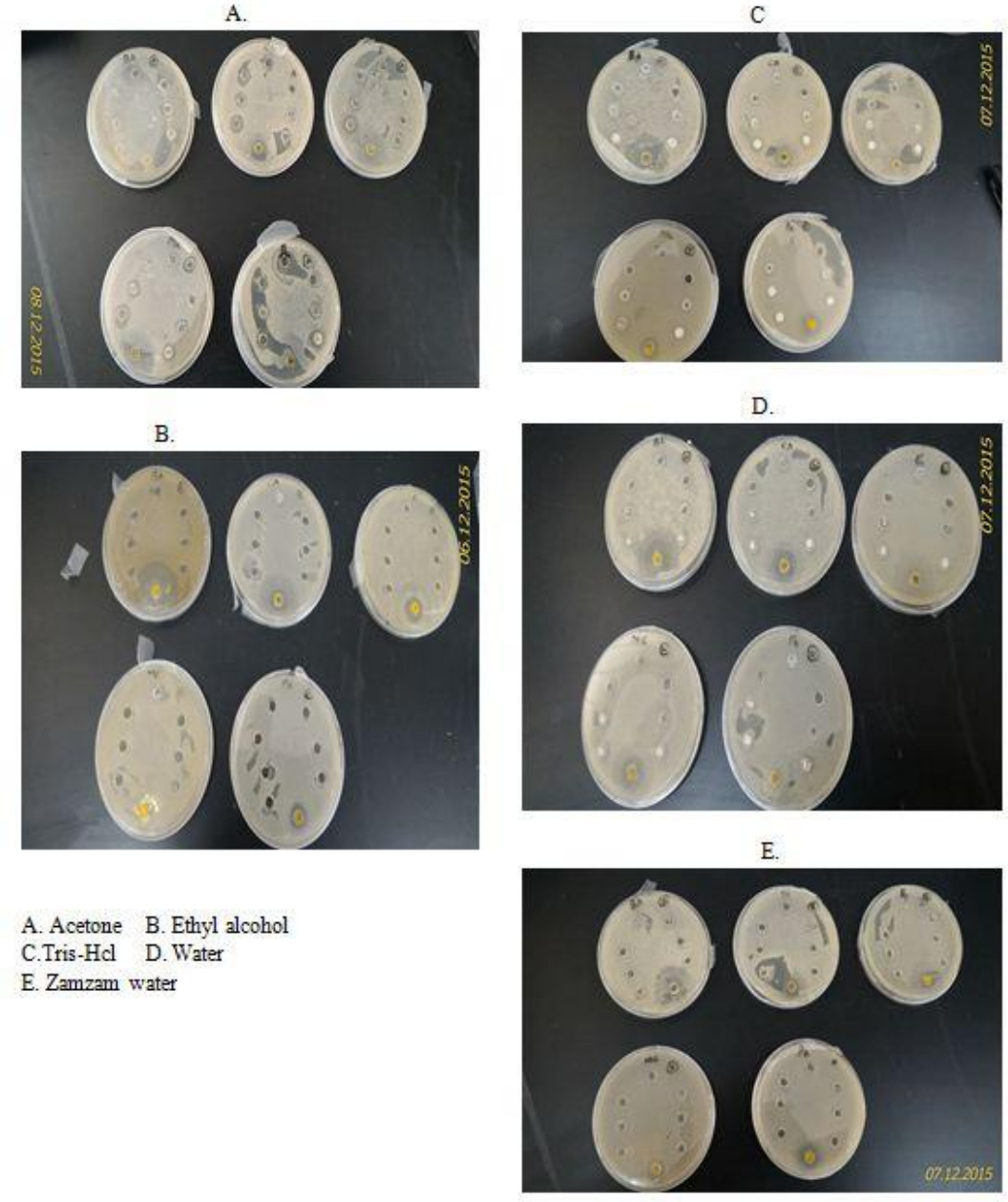


Fig.3 The morphology of various development for different Caralluma.



A. *Caralluma quadrangla* (Forssk.)N.E.Br (From Literature)
B. *Caralluma quadrangla* (Forssk.) N.E.Br (From Al-Shafa ,Taif)
C. *Caralluma penicillata* (From Literature)
D. Greeny Young stem

Fig.4 Antimicrobial activity of *Caralluma quadrangla* (Forssk.) N.E.Br latex extract with five various aqueous solution/solvents with six different concentrations against five micro organisms



The results obtained showed that ethyl alcohol and acetonic extracts (50µl to 60µl/ml) of *Caralluma quadrangula* latex had inhibitory effects (7-10 mm) on the five tested microorganisms while the aqueous extracts (50µl to 60µl/ml) showed comparatively less inhibitory effects on the tested microorganisms (results are listed in Table 1). The Fig.4 shows the antimicrobial activity of *Caralluma quadrangla* (Forssk.) N.E.Br latex extract with five different solvents with six different concentrations againist five micro organisams in agar plates.

However, in this study, acetone extract of *Caralluma quadrangula* latex had shown good antimicrobial activity against *P. aeruginosa* and *E.coli*. (50µl and 60µl). Also the acetone *Caralluma quadrangula* latex showed good antimicrobial activity against *C. albicans* (20, 30 and 50 µl) and *Micrococus luteus (*30µl to 50µl). The ethyl alcohol extract of *Caralluma quadrangula* latex had shown good result against *Escherichia coli (*50µl and 60µl).

The water extract of *Caralluma quadrangula* latex had shown less antimicrobial activity against *C. albicans*, *Escherichia coli* and *Pseudomonas aeruginosa.* At 50 µl concentration, the *Zamzam* water extract of *Caralluma quadrangula* latex had shown little activity against *Micrococus*, *Escherichiacoli*, and *Candida albicans*. At 50 µl concentration, the Tris Hcl extract of *Caralluma quadrangula* latex had shown little activity against *Micrococus luteus* and *Escherichia coli.*

These results are positive and encouraging, due to the fact that the plants are rich antibacterial sources that should be considered; as such, further study should be carried out to confirm the purification of the antibacterial compounds. In this study, the results provide ground information for the potential use of the extracts of *Caralluma quadrangula* latex in microbial infections in traditional way. It is also concluded that different concentration of extracts of *Caralluma quadrangula* latex with its datas proved that *Caralluma quadrangula* latex has medicinal values.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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