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Antimicrobial Potential of Plants *Pedalium murex* (Linn) and *Bryophyllum daigremontianum*

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ABSTRACT: The present investigation has been undertaken to assess the antimicrobial potential of plants *Pedalium murex* (L). Leaf and seed extract and *Bryophyllum daigremontianum* leaf and flower extract. The leaf and seed extracts of *P. murex Linn* and the leaf and flower extracts of *B. daigremontianum* were well-ground into a fine powder and kept at room temperature in airtight polythene bags. Plant material was extracted using the percolation method in 2 ml of methanol, ethanol, and acetone solutions, respectively. The disc diffusion method was used to test antimicrobial activity against Gram-positive bacteria such as *Staphylococcus aureus, Streptococcus mutans, Bacillus cereus, Bacillus subtilis,* and Gram-negative bacteria such as *Klebsiella pneumonia, Proteus mirabilis, E. coli,* and *Pseudomonas aeruginosa*. *B. cereus* was inhibited effectively by *P. murex* (L) leaf ethanol extract and *P. aeruginosa* was effectively inhibited by a methanol extract of *P. murex* (L) seed. The ethanol extract of *B. daigremontianum* flower and leaf showed promising antimicrobial activity against all the tested bacterial cultures. The ethanol leaf extract of *B. daigremontianum* has the highest antimicrobial activity against *S. aureus*, and the ethanol flower extract of *B. daigremontianum* has the highest inhibition activity against *B. subtilis* bacterial culture. The challenge of thecurrent study aimed to investigate the antimicrobial potential of *P. murex* (L) and *B. daigremontianum* by using different solvents. Overall, the findings indicate that *P. murex* (L) and *B. daigremontianum* could be used as alternative antimicrobial drugs against uro-pathogenic bacteria, as well as a treatment for kidney stone management by dissolving the struvite stone in the kidney.

Keywords: Antimicrobial activity, Antibacterial activity, Kidney stones, *Pedalium murex*; *Bryophyllum daigremontianum.*

INTRODUCTION

The emergence of multiple drug-resistant bacteria has become a major threat to the global healthcare system. One of the most dangerous public health issues is the emergence of infectious bacteria that raise resistance to the majority of available antibiotics (Kapil, 2005). In addition, changing susceptibility patterns and finding new antimicrobial agents require scientific research and knowledge to overcome antibiotic-resistant human pathogens (Manyi-Loh *et al*., 2018).

Urinary tract infection (UTI) is the most common health issue worldwide and has become complicated to treat due to the antibiotic resistance nature of pathogens (Thulasi and Amsaveni 2012). Nephrolithiasis, often known as kidney stones, is the presence of renal calculi produced by an imbalance between the solubility and crystallization of salts in the kidneys and urinary tract (Lemann *et al*., 1996). Calcium oxalate and calcium phosphate make up 70–80% of kidney stones. Less than 1% of the remaining stones are formed of cystine or are classified as drug-related stones, with 10% of them being struvite and 10% being uric acid. Men are more likely to develop calcium and uric acid stones than women are to develop struvite stones (Gillams *et al*., 2021).

Struvite stones, also known as magnesium ammonium phosphate crystals, account for 30% of kidney stones and are typically generated by urease-producing organisms in urinary tract infections. Urinary tract infections cause struvite crystals to form, which can cause blockages, immune suppression, renal failure, and the catheter to get bigger. A study suggested that an increase in the super-saturation of various components in urine may be the root cause of struvite stone formation in the ureter (Karki and Leslie 2023).

Several scientific studies show that *P. mirabilis*, *S. aureus*, *K. pneumoniae*, *E. coli*, and Mycoplasma species are common uropathogens that cause urinary tract infections and stimulate the formation of kidney stones which leads to kidney damage and end-stage renal disease (ERD) in severe cases (Ramadevi *et al*., 2020). The modern treatment for kidney stone is expensive and also have severe side effects. Due to the high costs and side effects of many modern drugs, medicinal plants have been used as an alternative source of drugs by the global population for their daily health needs (Ahmad *et al*., 2021).

P. murex belongs to the sesame family. It is commonly found on the African and Asian continents. In India, it is mainly found on the Western and Coromandel coasts. *P. murex* traditionally used as a folk remedy in treatment of demulcent, diuretic and also in the treatment of urinary tract infection (Ramadevi *et al*., 2020; Balamurugan *et al*., 2010). The glabrous, succulent annual perennial herb *Bryophyllum daigremontianum* (Raym.) comes from the Indian Ocean off the coast of western Africa. It is well recognized for its cytotoxic, antibacterial, anti-inflammatory, anti-tumor, and anti-nociceptive properties. The present is to examine the antimicrobial activity of *P. murex* (L)leaf and seed extract and *B. daigremontianum* leaf and flower extract against common uro-pathogens that cause urinary tract infections and stimulate the formation of kidney stones.

REFIVEW OF LITRATURE

Dossou-Agoin *et al.* (2021) studied the aqueous extract of the leafy stem of *P. murex* possess a significantly higher antioxidant potential than the aqueous extract of the fruit. This difference in antioxidant activities of both extracts would stem from their variable amount of phenolics compounds.

Hemalatha *et al*. (2012) analyzed that the aphrodisiac activity of ethanolic extract of *P. murex* fruit and evaluated an oral glucose tolerance test. The results concluded that the fruits of the plant may be used as a good aphrodisiac agent to promote fertility rate of rats.

The petroleum ether, chloroform, acetone and methanolic extract of *P. murex* root were subjected to preliminary phytochemical compounds and antibacterial activity of certain human pathogenic organisms. The extract indicated the presence of flavonoids, glycosides, steroids, phenols, alkaloids and tannins. The highest antibacterial activity was observed in methanolic extract against gram positive bacteria Streptococcus progenes and Enterococcus faecalis than the gram-negative bacteria (Muruganantham, 2011). Shelke *et al*. (2011) reported that the antimicrobial activity of aqueous and ethanolic extract of *P. murex* against *Bacillus subtilis* and *Aspergillus niger*. The ethanolic extract showed the wider zone of inhibition was compared with the standard drug, streptomycin.

Biswas and Sinha (2015) studied showed that the leaf extracts of *B. pinnatum* must be present of various phyto-constituents which might be effective to inhibit microbial growth. The results suggest that solvent extracts of this plant may be a good source of natural treatment of UTI. This study also ascertains the value of *B. pinnatum* used in Unani system of Medicine.

Aruljothi and Vijayarengan (2018) reported methanol leaf extracts of *P. murex* to have antibacterial activity against Staphylococcus aureus at the concentration of 250 µg, where its MIC was found at 7.81 µg/ml and MBC at 62.5 µg/ml against Staphylococcus aureus. Polarity of ethanol has a higher solubility than other solvents, so most of the secondary metabolites of *Pedalium murex* dissolved in ethanol so it had shown excellent antimicrobial activity against postoperative wound pathogens.

Ibikunle *et al*. (2017)**,** Ethanol, methanol and aqueous extracts of the leaves of *B. pinnatum* obtained through cold maceration, were screened for their antibacterial activities against selected multi-drug resistant bacteria (*E. coli, P. aeruginosa, K. pneumoniae, S. typhi S. aureus*) using the agar well diffusion method. The ethanol extract was the most reactive while the aqueous extract showed lesser antibacterial activity. *P. murex* Linn and *B. daigremontianum* is traditionally well-known herb for their therapeutic value in treating a several of human illnesses and infections.

METHODOLOGY

Collection and extraction of plant materials. *P. murex* Linn and *B. daigremontianum were collected from* Parakkai, Kanyakumari District, Tamil Nadu India. The leaves and seeds of *P. murex* Linn (Fig. 1) and *B. daigremontianum* (Fig. 2) leaf and flower were thoroughly washed and homogenized for further experiments. Plant material was extracted using the percolation method in 2 ml of methanol, ethanol, and acetone solutions at room temperature for 24 hrs. After percolation, the extracts were concentrated using water broth, and the final dried extracts were stored in an airtight container and kept in a refrigerator at 4°C.

Fig. 1. *Pedalium murex.*

Fig. 2. *Bryophyllum daigremontianum.*

Preparation of media and inoculums

Preparation of Media. The medium was prepared by dissolving Muller Hinter Agar (Hi media Laboratories Pvt. Ltd.,) in distilled water and was heated with frequent agitation and boiled to dissolve the medium completely. Sterilization was done by autoclaving at 121˚C for 15 minutes. The agar medium was cooled to 40-50ºC. The agar was poured into sterile glass petriplates on a flat surface to a uniform depth of 4mm and allowed to solidify. Before inoculation, the agar plates were covered with lids inverted and kept so that no droplets of moisture fall on the agar surface. (Kohner *et al*., 1994; Mathabe *et al*., 2006). Streptomycin is used as the standard.

Preparation of inoculums. At least four morphologically similar colonies from an agar medium are touched with a wire loop and the growth is transferred to a test tube containing 1.5ml of sterile suitable broth. The tubes are agar incubated for 2 hours at 35˚C to 37˚C to produce a bacterial suspension of moderate turbidity.

Inoculation. Plates are inoculated within 15 Minutes of preparation of the suspension so that the density does not change. A sterile cotton-wool swab is dipped into the swab against the side of the tube above the fluid level. The medium is inoculated by even streaking of the swab over the entire surface of the plate in three directions.

Antibiotic discs. After the inoculum has dried, single discs are applied with forceps, a sharp needle or a dispenser and pressed gently to ensure even contact with the medium. When fastidious organisms are to be tested, touch multiple colonies with a loop and cross streak the appropriate plate for uniform distribution. Discs should be stored at ± 4°C in sealed to come to room temperature before the containers are opened. Discs should be used before the expiry date on the label. In antimicrobial solution prepared in the laboratory are being used proceed as follows. Pick up a 2mm loopful of the standard antibiotic solution and lower carefully onto a paper disc which, when moistened will adhere to loop. Place the moistened disc on the surface of the inoculated plate in the appropriately labeled segment. Repeat for each antimicrobial agent to used, placing the impregnated discs in their respectively labeled segments.

Incubation. Plates are incubated for 16 to 18 hours at 35˚C to 37˚C aerobically or in CO_2 atmosphere for fastidious organisms.

Reading of zones of inhibition. The diameters of zones are measured to the nearest millimeter with vernier calipers (preferably), or a thin transparent millimeter scale. The point of abrupt diminution of growth, which in most cases corresponds with the point of complete inhibitions of growth, is taken as the zone edge. In some batches of media, organisms may show a film of growth within the susceptible zone which may be ignored.

RESULTS

Antimicrobial activity of *P. murex* Linn leaf extract. The ethanol extract of *P. murex* Linn leaf inhibited the growth of all the tested bacteria *B. cereus* (18 mm), *E. coli* (7 mm) *S. aureus* (9mm), *S. mutans* (9 mm), *K. pneumonia* (7mm) and *B. subtilis* (8 mm). The methanol extract of *P. murex* Linn leaf inhibited the growth of all the tested bacteria *Bacillus cereus* (7 mm), *Escherichia coli* (7 mm) *Staphylococcus aureus* (8 mm), *S. mutans* (8 mm), *P. mirabilis* (13 mm), *K. pneumonia* (8mm) and *B. subtilis* (7 mm). The acetone extract of *P. murex* Linn leaf inhibited the growth of all the tested bacteria *E. coli* (7 mm), *S. mutans* (7 mm) and *K. pneumonia* (7mm). (Table 1).

Table 1: Effect of *P. murex* Linn leaf extract on growth inhibition of pathogenic microbes.

Pathogens	Zone of inhibition (mm)			
	Ethanol	Methanol	Acetone	Control
S. aureus	9	7	-	32
S. mutans	9	8	7	10
P. mirabilis	-	13	-	12
K. pneumoniae	7	7	7	10
B. cereus	18	7	-	
E. coli	7	7	7	18
B. subtilis	8	7	-	9
P. aeruginosa	-	-	-	-

Antimicrobial activity of *P. murex* Linn seed extract. The ethanol extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria *E. coli* (9 mm), *S. mutans* (7 mm), *P. mirabilis* (7 mm), *K. pneumonia* (7mm), *B. subtilis* (8 mm) and *P. aeruginosa* (8 mm). The methanol extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria *B. cereus* (7 mm), *E. coli* (7 mm) *S. aureus* (8 mm), *S. mutans* (7 mm), *P. mirabilis* (13 mm), *K. pneumonia* (7 mm), *B. subtilis* (7 mm) and *P. aeruginosa* (10 mm). The acetone extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria *Escherichia coli* (7 mm), *S. mutans* (9 mm), *P. mirabilis* (11 mm) and *P. aeruginosa* (9 mm). (Table 2).

Antimicrobial activity of *B. daigremontianum* leaf extract. The ethanol extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacteria *B. cereus* (6 mm), *E. coli* (9 mm), *S. aureus* (13 mm), *S. mutans* (8 mm), *P. mirabilis* (7 mm), *K. pneumonia* (9mm), *B. subtilis* (8 mm) and *P. aeruginosa* (8mm).The methanol extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacteria *B. cereus* (7 mm), *E. coli* (7 mm) *S. aureus* (8 mm), *Streptococcus mutans* (9 mm), *P. mirabilis* (12 mm), *K. pneumonia* (8mm), *Bacillus subtilis* (7 mm) and *P.aeruginosa* (7mm).The acetone extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacteria *B. cereus* (7 mm), *E. coli* (7 mm) *S. aureus* (8 mm), *S. mutans* (10 mm), *P. mirabilis* (11 mm), *B. subtilis* (7 mm) and *P. aeruginosa* (8 mm). (Table 3)

Table 2: Effect of *P. murex* Linn seed extract on growth inhibition of pathogenic microbes.

Pathogens	Zone of inhibition (mm)			
	Ethanol	Methanol	Acetone	Control
S. aureus	-	8	-	12
S. mutans	7	7	9	10
P. mirabilis	-	7	-	12
K. pneumoniae	7	7	7	10
B. cereus	-	7	-	22
E. coli	9	7	7	18
B. subtilis	8	7	-	9
P. aeruginosa	8	10	9	12

Table 3: Effect of *B. daigremontianum* leaf extract on growth inhibition of pathogenic microbes.

Pathogens	Zone of inhibition (mm)			
	Ethanol	Methanol	Acetone	Control
S. aureus	13	8	8	17
S. mutans	8	9	10	16
P. mirabilis	7	12	11	13
K. pneumoniae	9	8	-	13
B. cereus	6	7	7	12
E. coli	9	7	7	18
B. subtilis	8	7	7	9
P. aeruginosa	8	7	8	10

Antimicrobial activity of *B. daigremontianum* flower extract. The ethanol extract of *B. daigremontianum* flower inhibited the growth of all the tested bacteria *B. cereus* (10 mm), *E. coli* (7 mm), *S. aureus* (13 mm), *S. mutans* (8 mm), *P mirabilis* (12 mm), *K pneumonia* (7mm), *B. subtilis* (22 mm) and *P. aeruginosa* (8mm).The methanol extract of *Bryophyllum daigremontianum* flower inhibited the growth of all the tested bacteria *B. cereus* (11 mm), *E. coli* (7 mm) *S. aureus* (12 mm), *S. mutans* (7 mm), *P. mirabilis* (8 mm), *K. pneumonia* (9mm), *B. subtilis* (20 mm) and *P. aeruginosa* (9mm).The acetone extract of *B. daigremontianum* flower inhibited the growth of all the tested bacteria *B. cereus* (7 mm), *S. aureus* (10 mm), *S. mutans* (7 mm), *P. mirabilis* (9 mm), *B. subtilis* (7 mm) and *P. aeruginosa* (10 mm). (Table 4).

Table 4: Effect of *B. daigremontianum* flower extract on growth inhibition of pathogenic microbes.

Pathogens	Zone of inhibition (mm)			
	Ethanol	Methanol	Acetone	Control
S. aureus	13	12	10	10
S. mutans	8	7	7	22
P. mirabilis	12	8	9	15
K. pneumoniae	7	9	10	17
B. cereus	10	5	6	17
E. coli	7	7	-	18
B. subtilis	22	20	7	32
P. aeruginosa	8	9	10	12

Antimicrobial activity of *P. murex* Linn leaf and seed extract. The ethanol extract of *P. murex Linn* leaf showed maximum inhibition against *B. cereus* as 18 mm inhibition zone and minimum inhibition as a 7mm in *E. coli* and *K. pneumonia*. Whereas the methanol extract of *P. murex* Linn leaf showed maximum inhibition activity against *P. mirabilis* as a 13 mm bacterial inhibition zone and minimum inhibition against three bacterial culture bacteria, *B. cereus*, *E. coli* and *B. subtilis* as a 7mm if inhibition zone respectively. The acetone extract of *P. murex* Linn leaf showed an equal inhibition zone as a 7mm against all the bacterial culture (Table. 1). In the case of *P. murex L.* seed ethanol extract, maximum inhibition was observed in *E. coli* culture as a 9 mm. whereas the acetone extract of *P. murex* seed showed maximum antibacterial activity when compared to the methanol extract. In this case, maximum inhibition activity was observed in *P. mirabilis* at 11 mm of inhibition zone (Table 5, Fig. 3).

Table 5: *P. murex* Linn leaf and seed extract on growth inhibition of pathogenic microbes.

Sample	Solvent	*S. aureus*	*S. mutans*	*P. mirabilis*	*K. pneumoniae*	*B. cereus*	*E. coli*	*B. subtilis*	*P. aeruginosa*
P. murex leaf	Ethanol	9	9	-	7	18	7	8	-
	Methanol	7	8	13	7	7	7	7	-
	Acetone	-	7	-	7	-	7	-	-
	Control	32	10	12	10	22	18	9	-
P. murex Seed	Ethanol	-	7	-	7	-	9	8	8
	Methanol	8	7	7	7	7	7	7	10
	Acetone	-	9	-	7	-	7	-	9
	Control	12	10	12	10	22	18	9	12

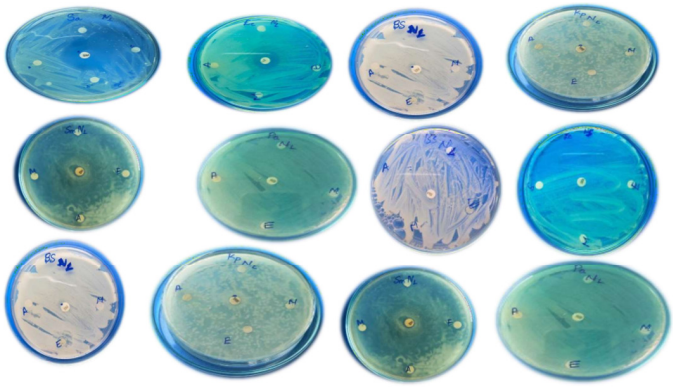

Fig. 3. Effect of *Pedalium murex* Linn Leaf and seed extract on growth inhibition of pathogenic microbes.

Antimicrobial activity of *B. Daigremontianum* leaf and flower extract. The ethanol extract of *B. daigremontianum* leaf showed maximum inhibition against *S. aureus* as a 13 mm inhibition zone and minimum inhibition as a 6 mm in *B. cereus*. Whereas the methanol extract of *B. daigremontianum* leaf showed maximum inhibition activity against *P. mirabilis* as a 12 mm inhibition zone and minimum inhibition against two bacterial culture *B. cereus* and *E. coli* as a 7mm if inhibition zone respectively.

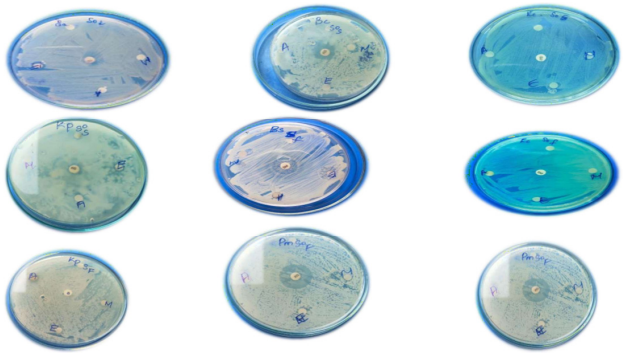

Fig. 4. Effect of *B. daigremontianum* Linn and flower extract on growth inhibition of pathogenic microbes.

Table 6: *B. daigremontianum* leaf and flower extract on growth inhibition of pathogenic microbes.

Sample	Solvent	*S. aureus*	*S. mutans*	*P. mirabilis*	*K. pneumoniae*	*B. cereus*	*E. coli*	*B. subtilis*	*P. aeruginosa*
B. daigremontianum leaf	Ethanol	13	8	7	9	6	9	8	8
	Methanol	8	9	12	8	7	7	7	7
	Acetone	8	10	11	-	7	7	7	8
	Control	17	16	13	13	12	18	9	10
B. daigremontianum Flower	Ethanol	13	8	12	7	10	7	22	8
	Methanol	12	7	8	9	5	7	20	9
	Acetone	10	7	9	10	6	-	7	10
	Control	10	22	15	17	17	18	32	12

The acetone extract of *B. daigremontianum* leaf showed a maximum inhibition zone as a 11 mm against *P. mirabilis* bacterial culture (Table 2). In the case of *B. daigremontianum* flower ethanol extract, maximum inhibition was observed in *B. subtilis* culture as a 22 mm of inhibition zone. whereas the methanol extract of *B. daigremontianum* flower show maximum inhibition against *B. subtilis* culture as a 20 mm. The acetone extract of *B. daigremontianum* flower showed maximum activity against *P. aeruginosa* as 10 mm of inhibition zone (Table 6 and Fig. 4).

DISCUSSION

Ayurveda is the traditional way of medical practice widely used in India, Sri Lanka, and other countries to treat several diseases. Ayurvedic system of medicine has a prominent effect in treating several diseases, including cancer, diabetes, chronic headache, and even pathogenic infectious diseases. Recently, the World Health Organization (WHO) has been encouraging and facilitating the developing countries to implement scientific research on medicinal plants to develop new drugs, which are not well explored systematically. Indian traditional medicine suggests medicinal plants as alternative medicine for the treatment of kidney stones and several other diseases. The use of plants to control diseases, including infectious ones, has been extensively studied by many researchers. *P. murex* is one of the folk medicinal plants. And it is a good source of medicinally useful compounds that have been traditionally used for various ailments (Devanesan *et al*., 2018).

Based on traditional knowledge, the plant *P. murex* L. was used for the dissolution and prevention of kidney

stone formation and also it is used for the treating ailments like incontinence of urine, gonorrhoea, promote Lochiel discharge, antibilious agent, dysuria and control white discharge. However, the whole plant parts could be used for the treatment of urinary problem, diuretic, male fertility disorder and leucorrhoea. Also the fruit were used to treat the diseases like diabetes, demulcent, gonorrhoea, aphrodisiac, antispasmodic property and incontinence of urine, strangury and urinary calculi (Al-Dhabi *et al*., 2015: Barathikannan *et al.*, 2016; Al-Dhabi and Arasu 2016). *P. murex* L. seed was used as a treatment of leucorrhoea, urinary tract disorder, joint pain, lumbago, bladder troubles and gonorrhoea (Cuong *et al*., 2017; Elango *et al*., 2017; Elango *et al.*, 2016; Elango *et al*., 2016a). By using, stem part of *P. murex* used for the treatment of spermatorrhoea, dysuria, ardour urine and gonorrhoea (Imran *et al*., 2015; Glorybai *et al*., 2015; Fowsiya *et al*., 2016; Haritha *et al*., 2016; Abirami *et al*., 2021).

Hence, the present study the antimicrobial activity of the leaf and seed extract of *P. murex* Linn and the leaf and flower extract of *B. daigremontianum* were evaluated by using ethanol, methanol and acetone extract in various fraction by disc diffusion method against *S. aureus, S. mutans*, *P. mirabilis, K. pneumonia*, *B. cereus, E. coli, B. subtilis* and *P. aeruginosa.* The result explores that, ethanol extract of *P. murex* L. leaf inhibited the growth of all the tested human pathogenic bacteria. In that, maximum inhibition activity was observed in *B. cereus* compared to the other microbes. The methanol extract of *P. murex* leaf shows maximum inhibition against *P. mirabilis* when compare to other bacterial culture. The acetone extract of *P. murex* leaf inhibited the growth of all the tested bacteria like *E. coli, S. mutans* and *K. pneumonia*.

The antibacterial efficacy of several medicinal plant blossoms was examined by Abirami *et al.* (2021), against a few infections that cause post-operative wounds. The antibacterial efficacy of flower extracts in aqueous, ethanol, and butyl alcohol against pathogens was tested. The maximum antimicrobial effect against pathogens was reported in the ethanol floral extract of *P. murex* L.

The ethanol extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria, maximum inhibition observed in *E. coli* compared to the other microbes. The methanol extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria, maximum inhibition observed in *P. aeruginosa*. The acetone extract of *P. murex* Linn seed inhibited the growth of all the tested bacteria, maximum inhibition observed *S. mutans* and *P. mirabilis.* The *P. murex* was showed highest inhibitory activity against *E. coli*, *P. mirabilis*, *B. cereus*, *S. aureus*, *B. licheniformis* and *S. typhi* (Kaleeswaran and Ramadevi 2016). The result showed that the inhibitory activity of some active compounds present in that may be responsible for providing resistance against the development of infection caused by the microbes. The flavonoid compound Pedalitin present in *P. murex* may be responsible for the inhibitory activity of *P. mirabilis.*

This was demonstrated by earlier research in diverse plants using different species (Ali *et al*., 2015; Biglar *et al*., 2012). Five different plants such as *Matricaria disciforme*, *Nasturtium officinale*, *Punica granatum*, *Camelia sinensis* and *Citrus aurantifolia* also showed potent antimicrobial activity against urease enzyme of Horse gram. Huyut *et al*. (2012) analysed the phytochemical properties of *P. murex* leafy stem and fruit extracts revealed presence of phenolics compounds renowned for their antioxidant properties such as flavonoids, tannins, lignans and coumarins.

Akinsulire *et al*. (2007) studied the antimicrobial properties of *B. pinnatum* leaves extracts of aqueous, methanol, Palm-wine, Omidun, local gin and fresh leaf juice with varied antibacterial activities against the tested Gram positive and Gram-negative organisms. Among them methanol extract showed marked antibacterial activities against Control strain of *S. aureus*, *E. faecalis*, *B. subtilis* and *P. aeruginosa* with the control antibiotic (Ciprofloxacin). Even the extract from the squeezed leaves of *B. pinnatum* showed significant effect on some of the Gram positive and Gram-negative organisms. The ethanol extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacteria, maximum inhibition observed in *S. aureus*. The methanol extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacteria, maximum inhibition observed in *P. mirabilis.* The acetone extract of *B. daigremontianum* leaf inhibited the growth of all the tested bacterium maximum inhibition observed in *Streptococcus mutans* and *P. mirabilis.*

The ethanol extract of *B. daigremontianum* flower inhibited the growth of all the tested bacteria, maximum inhibition observed in *B. subtilis*. The methanol extract of *B. daigremontianum* flower inhibited the growth of all the tested bacteria, maximum inhibition observed in *B. subtilis*. The acetone extract of *B. daigremontianum* flower inhibited the growth of all the tested bacteria, maximum inhibition observed in *S. aureus* and *P. aeruginosa*. In traditional treatment of kidney stone in our rural villages this two medicinal plants *B. daigremontianum* and *P. murex* L. are used. Therefore, the need to establish favourable conditions that would encourage the mass production of medicinal plants at low cost cannot be overstated given that it has already been established that they possess rich therapeutic properties as an alternate solution to synthetic commercially prepared medicines. The usage of medicinal plants should be encouraged because it is firmly believed that doing so will contribute to lowering the alarmingly high rate of antibiotic resistance crises in the world's hospitals and healthcare facilities.

CONCLUSIONS

This research may hold great promise for the discovery of novel medications to combat antibiotic resistance in uro-pathogens. In order to find the leads with antibacterial activity, additional research on the chemical properties of the extract is currently being conducted.

FUTURE SCOPE

The antibiotics are important in agriculture and poultry is stating that also one of the important factors for the emergence of antibiotic-resistant strains in the range of human pathogens, placing healthcare systems at serious risk. In the search for new pharmaceuticals, screening of such different natural organic compounds and the proper identification of bio-active agents must be considered as a fruitful approach. Both *P. murex* and *B. daigremontianum* have the potential to be employed as antibacterial substances. Its potency and safety must be determined through laboratory and clinical research. The appropriate identification of bioactive agents and the screening of so many diverse natural organic compounds must be regarded as a beneficial strategy in the hunt for novel medications.

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Conflict of Interest. None.

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