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TWINNER AND TENDRILLAR CLIMBER WEALTH OF VARANASI DISTRICT, UTTAR PRADESH, INDIA WITH THE ALTERNATIVE RESOURCES WITH SPECIAL EMPHASIS ON CLIMBER-BASED ANTIMICROBIALS

Vinay Kumar Singh[1], Soumyadeep Rajwar[1], Raghvendra Singh[1]* and Balmukund Chaurasia[2]

[1]Centre of Advanced Study in Botany, Institute of Science, Banaras Hindu University, Varanasi - 221 005, Uttar Pradesh, India.

[2]H.N.754 D, Ramjankinagar, Mirzapur Pachpedwa, West Basaratpur, Gorakhpur - 273 004, U.P., India.

*Corresponding author E-mail : drsinghtaxon@gmail.com, singhr.bot@bhu.ac.in

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ABSTRACT

The survey of twinner and tendrillar type of herbaceous and woody climbers was done in Varanasi district, Uttar Pradesh, India. During this survey we found twinner and tendrillar plants belong to 13 Dicotyledonous families (Acanthaceae, Apocynaceae, Aristolochiaceae, Bignoniaceae, Celastraceae, Convolvulaceae, Cucurbitaceae, Fabaceae, Menispermaceae, Passifloraceae, Polygonaceae, Ranunculaceae and Vitaceae) and 3 Monocotyledonous families (Asparagaceae, Dioscoreaceae and Smilacaceae). Most of the climbers are recorded from Convolvulaceae, Cucurbitaceae and Fabaceae. Herbaceous vines are more abundant than woody climbers (lianas). Most of the plants show twinning type of climbing habit. These climbers have immense potential to combat bacterial, fungal, protozoan and viral disease without any known side effect. This present communication might be useful to researchers and policymakers to develop an alternative and effective strategy to develop drug against pathogens.

Key words : Angiosperm, Antimicrobial activities, Climbers, Varanasi.

Introduction

India is one of the seventeen mega-diverse countries in the world. It is also one of the richest hotspot in the world in regard to the genetic resources of medicinal plants (Bagyalakshmi *et al.*, 2009). To available estimates, the total number of higher plant species (Angiosperms and Gymnosperms) in the world is approximately 250,000 species. Of them, only 6% have been reportedly screened for their biological activities (Katiyar *et al.*, 2012). Plants, on the basis of their growth habit, can be classified into several types e.g. herbs, shrubs, trees, climbers, etc. Climbers are plants rooted in the ground but their weak stem depends on the availability of external physical support to enhance light acquisition by preventing shading by neighboring plants (Gianoli, 2004; Suthari *et al.*, 2014). There are mainly two subdivisions of climbers: herbaceous and woody climbers. The technical term for herbaceous climber is 'Vine', whereas for a woody climber 'Liana', which people often incorrectly used as a synonym. Climber plants also show enormous diversity in their climbing mechanisms (Putz, 1984; Bongers *et al.*, 2005). They include twinners, tendril climbers, root climbers and scramblers (Dvivedi *et al.*, 2016). A number of families such as Convolvulaceae, Cucurbitaceae and Dioscoreaceae are exclusively climbers, while more than 50 plant families like Apocynaceae, Celastraceae, Fabaceae and, Rubiaceae etc. are also have good number of climber plant species. Besides their aesthetic use, these climbers are of high medicinal value as almost all contain pharmaceutically active bio-compounds (Ali *et al.*, 2016).

Systematic investigations have been undertaken by several workers to screen the antimicrobial activities of various climber plants against numerous clinically

important infectious micro-organisms. In this present study, we surveyed and reviewed the wealth of herbaceous and woody climbers with twinning and tendrillar type of climbing patterns from Varanasi district, Uttar Pradesh, India. Their antimicrobial properties are also mentioned against highly infectious micro-organisms (Table 1), which will be extremely valuable for undertaking advance studies. The key objective of this review is to add information about twinner and tendrillar type of climber wealth of Varanasi district and to emphasize on the usage of these climbers in the selection of candidate plant species in antimicrobial research as well as to provide reference resource materials to researchers, students and policymakers in the field of drug discovery.

Materials and Methods

Varanasi is an ancient city situated on the bank of the river Ganges, located in the southeastern part of Uttar Pradesh, India. It lies at 25.20' North latitude and 83.00' East longitude, approximately 79.1 meters above the sea level. The climate of Varanasi district is of tropical monsoonal type and experience three distinct seasons *viz.*, cold winter (November–February), hot summer (March–June) and warm rainy seasons (June–September). The soil is of alluvial type.

The rigorous field survey was done during the year 2018–2019 for the observation of twinner and tendrillar climber plant species of Varanasi district. A thorough survey of literature was also done for taking an account of the previously reported twinner and tendrillar plant species for Varanasi districts (Bajpai *et al.*, 1995; Dubey, 2004; Singh, 2015). Previously unreported plants species were collected and herbarium sheets were prepared using standard methods (Jain and Rao, 1978). All the taxon names were thoroughly checked for their current status using http://plantsoftheworldonline.org/ and http://www.theplantlist.org/. The antimicrobial properties of these plants from various sources are summarized in this communication.

Results and Discussion

This survey of twinner and tendrillar plant species covers about total 16 families, out of which 13 belongs to Dicotyledonous families (Acanthaceae, Apocynaceae, Aristolochiaceae, Bignoniaceae, Celastraceae, Convolvulaceae, Cucurbitaceae, Fabaceae, Menispermaceae, Passifloraceae, Polygonaceae, Ranunculaceae and Vitaceae) and from 3 belongs to Monocotyledonous families (Asparagaceae, Dioscoreaceae and Smilacaceae). There are 46 herbaceous climbers (vines) and 20 woody climbers (lianas). Maximum number of climbers present in Convolvulaceae (17) followed by Cucurbitaceae (15) and Fabaceae (12). All the climbers show twinning pattern of climbing in the family Convolvulaceae, whereas tendrillar mode of climbing pattern was observed in Cucurbitaceae. The third largest climber plant family Fabaceae shows twinning climbing pattern except, *Vicia hirsuta* and *V. sativa*, where tendrillar nature are found. Moreover, climbers show exclusively twinning climbing pattern in the family Acanthaceae, Apocynaceae, Aristolochiaceae, Asparagaceae, Celastraceae, Dioscoreaceae, Menispermaceae, Passifloraceae and Ranunculaceae, whereas, tendrillar climbing pattern was solely found in the family Bignoniaceae, Polygonaceae, Vitaceae and Smilacaceae. Therefore, Fabaceae is the only family where both type of climbing pattern are found, while rest either has exclusively twinners or tendrillars.

This study with the findings in Fatehpur district (Agarwal, 2013) and in north-eastern district of Uttar Pradesh (Dvivedi *et al.*, 2016) concluded that maximum number of climber species with twinners and tendrillar climbing habit are from Convolvulaceae, Cucurbitaceae and Fabaceae families. This study also concluded that like Fatehpur district and north-eastern districts of Uttar Pradesh, in Varanasi (species with twinners and tendrillar climbing habit) woody climbers (lianas) are very less

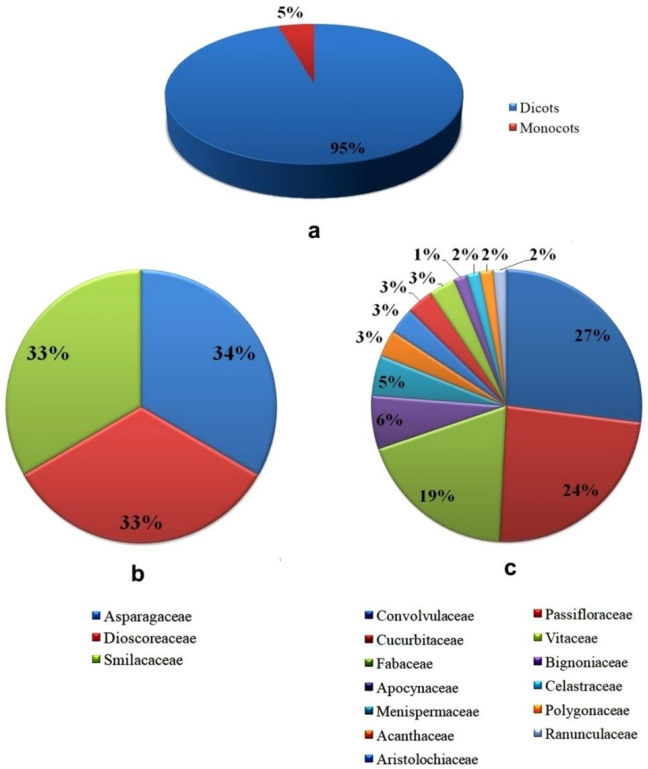

Fig. 1 : Status of climbers. (**a**), Percent distribution of climbers as Monocot and Dicot (**b**), Percent distribution of climbers within Monocot families (**c**), Percent distribution of climbers within Dicot families.

Table 1 : Climbers from Varanasi district of Uttar Pradesh, India, with their climbing category, climbing mode and antimicrobial activities.

S. no.	Family	Species	Climbing category	Climbing mode	Antimicrobial activities with references
Dicotyledons					
1.	Acanthaceae	*Thunbergia fragrans* Roxb.	Liana	Twinning	Decoction of leaves shows antifungal activities (Sultana *et al.*, 2015).
		Thunbergia grandiflora (Roxb. *ex* Rottler) Roxb.	Liana	Twinning	Methanolic extract of flower has antibacterial activities against *Bacillus cereus, Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Staphylococcus aureus* and *Streptococcus pyogenes*. Methanolic extract of leaves shows antifungal activities and anthelmintic activities against *Tubifex tubifex* (Sultana *et al.*, 2015).
2.	Apocynaceae	*Hemidesmus indicus* (L.) R. Br.	Liana	Twinning	Aqueous extracts from roots has significant antibacterial activity against *Klebsiella pneumonia, Pseudomonas aeruginosa* and *Stahylococcus aureus* (Gayathri and Kannabiran, 2009).
		Ichnocarpus frutescens (L.) W.T.Aiton	Liana	Twinning	Chloroform root extract has significant antimicrobial activity against *Aspergillus flavus, A. niger, Bacillus pumilis, Eschericia coli* and *Staphylococcus aureus* (Malathy and Sini, 2009).
		Pergularia daemia (Forssk.) Chiov	Vine	Twinning	Methanol extract has antimicrobial activity against *Escherichia coli* and *Staphylococcus aureus* (Doss and Anand 2013). Ethyl aceate and ethanol extracts have antibacterial activity against *Aeromonas hydrophila, Escherichia coli, Pseudomonas aeruginosa, Salmonella typhi* and *Staphylococcus aureus* (Karthishwaran and Mirunalini, 2010).
		Telosma pallida (Roxb.) Craib	Vine	Twinning	Isolated alkaloids have potential antimicrobial activity (Rao and Venkatachalam, 2000).
3.	Aristolochiaceae	*Aristolochia indica* L.	Liana	Twinning	Extract has antimicrobial activities against *Aspergillus niger, Escherichia coli* and *Pseudomonas aeruginosa* (Kumar *et al.*, 2006).
		Aristolochia littoralis Parodi	Liana	Twinning	Extract has antimicrobial property against *Entamoeba histolytica, Giardia lamblia* and *Mycobacterium tuberculosis* (Jiménez-Arellanes *et al.*, 2012).
4.	Bignoniaceae	*Dolichandra unguis-cati* (L.) L. G. Lohmann	Liana	Tendrillar	Decoction of entire plant is antimycotic for vaginal mycosis (Rondina *et al.*, 2010). Dichloromethane extract of plant is effective against *Staphylococcus aureus* (Haag *et al.*, 2014).
5.	Celastraceae	*Celastrus paniculatus* Willd.	Liana	Twinning	Ethanolic extracts are effective against *Staphylococcus aureus* (Dubey *et al.*, 2012; Harish *et al.*, 2007).
6.	Convolvulaceae	*Convolvulus arvensis* L.	Vine	Twinning	Extract shows significant antifungal activity against *Candida albicans* (Hassawi and Kharma, 2006). Stem and leaf extracts have antibacterial activity against *Escherichia coli* (Khan and Hayat, 2015).

Table 1 continued...

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		Cuscuta campestris. Yunck	Vine	Twinning	Lupeol epoxid isolated from this plant shows week anti HIV activity (Etedali *et al.*, 2014).
		Cuscuta reflexa Roxb.	Vine	Twinning	It has antimicrobial property against the growth of *Staphylococcus aureus* (Kalita and Saikia, 2012). Methanol fraction of stem shows significant antibacterial activity against *Escherichia coli, Shigella boydii, S. dysenteriae, Pseudomonas aeruginosa* and *Staphylococcus aureus* (Pal *et al.*, 2006).
		Ipomoea batatas (L.) Lam.	Vine	Twinning	Extract is effective in inhibition on the growth of *Salmonella enteritidis* (Cevallos-Casals and Cisneros-Zevallos, 2001).
		Ipomoea cairica (L.) Sweet	Vine	Twinning	Methanol extract of leaves has significant antibacterial property against *Bacillus subtilus, Escherichia coli, Klebsiella pneumonaie, Salmonella typhi* and antifungal property against *Aspergilus nigar, Candida albicans, Penicillium chrysogenum* and *Sacchromyces cerevesie* (Srivastava and Shukla, 2015).
		Ipomoea coptica (L.) Roth ex Roem. & Schult.	Vine	Twinning	N/A
		Ipomoea dichroa Hochst. ex Choisy	Vine	Twinning	N/A
		Ipomoea eriocarpa R. Br.	Vine	Twinning	Chloroform extract shows antimicrobial activity against *Aspergilus niger* and *Escherichia coli* (Das *et al.*, 2015).
		Ipomoea muricata (L.) Jacq.	Vine	Twinning	Hydroalcoholic extract of the seeds has antibacterial activity against *Bacillus subtilis, Mycobacterium* sp., *Staphylococcus aureus, S. saprophyticus* and *Streptococcus viridians* (Cardona and Ysrael, 2012; Solevilla and Guevara, 1991).
		Ipomoea pes-tigridis L.	Vine	Twinning	The ethyl acetate extract and n-hexane extract has antimicrobial activity against *Bacillus subtilis, Staphylococcus aureus* and *Vibrio cholera* (Chowdhury *et al.*, 2014). Alkaloids and flavonoids of aerial parts have potential inhibitors of *Propionibacterium acnes* and *Staphylococcus epidermidis* (Sandhya *et al.*, 2012).
		Ipomoea quamoclit L.	Vine	Twinning	Ethanol extract has antimicrobial activity against gram positive bacteria (*Bacillus subtilis, Staphylococcus aureus* and *S. warneri*), gram negative bacteria (*Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa* and *P. putida*) and fungal strain (*Candida albicans*) (Paul and Sinha, 2016).
		Merremia emarginata (Burm.f.) Hallier f.	Vine	Twinning	Methanol extract of leaves is effective against *Bacillus cereus* and *Escherichia coli*, whereas aqueous extract is effective against *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Elumalai *et al.*, 2011).
		Merremia hederacea (Burm.f.) Hallier f.	Vine	Twinning	N/A

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		Operculina turpethum (L.) Silva Manso	Liana	Twinning	The extract has slight antimicrobial activity against *Staphylococcus aureus* (Ahmed *et al.*, 2013).
		Poranopsis paniculata (Roxb.) Roberty	Liana	Twinning	N/A
		Rivea hypocrateriformis (Desr.) Choisy	Vine	Twinning	Crude plant extract has antimicrobial activity against *Bacillus cereus, Bacillus subtilis, Escherichia coli* and *Pseudomonas aeruginosa* (Venkata *et al.*, 2012). Aqueous extract has strong inhibitory effect against *Aspergillus flavus*, *A. niger* and *Candida albicans* (Saboo *et al.*, 2014).
		Merremia tridentata (L.) Hallier f.	Vine	Twinning	Methanol extracts have antimicrobial activity against *Aspergillus niger, Bacillus subtilis, Escherichia coli*, and *Staphylococcus aureus* (Kaladhar *et al.*, 2009).
7.	Cucurbitaceae	*Benincasa hispida* (Thunb.) Cogn.	Vine	Tendrillar	Seed oil has antibacterial activity against *Bacillus subtilis* and methanolic extract has significant inhibition activity against *Candida albicans* (Al-Snafi, 2013).
		Bryonia cretica L.	Vine	Tendrillar	Root lipid extracts has antibacterial activity against *Enterococcus feacium* and *Streptococcus agalactiae* (Dhouioui *et al.*, 2016).
		Citrullus colocynthis (L.) Schard.	Vine	Tendrillar	Ethanolic extract has inhibitory activity against *Staphylococcus aureus* (Najafi *et al.*, 2010). Antimycotic activities of the ethanol extracts are effective against *Alternaria alternata* and *Rhizoctonia solani* (Hadizadeh *et al.*, 2009).
		Coccinia grandis (L.) Voigt	Vine	Tendrillar	Ethanolic extract has remarkable antifungal activities against *Aspergillus niger* and *Candida albicans*. Aqueous extract has remarkable antibacterial activities against *Bacilius subtilis, Escherichia coli, Salmonella choleraesuis, Shigella dysenteriae* and *S. flexneri* (Bhattacharya *et al.*, 2010).
		Mukia maderaspatana L.	Vine	Tendrillar	Chloroform and ethanol leaf extract has antimicrobial activity against *Aspergillus flavus, Klebsiella pneumoniae* and *Rhizopus* sp. Acetone and ethanol stem extracts have antimicrobial property against *Escherichia coli, Klebsiella pneumoniae* and *Pseudomonas putida* (Sagayaraj *et al.*, 2011).
		Cucumis melo L.	Vine	Tendrillar	N/A
		Cucumis sativus L.	Vine	Tendrillar	Phosphate buffered saline (PBS) peel extract has active agents against *Staphylococcus aureus*. PBS pulp extracts has antimicrobial action against *Klebsiella pneumonia* (Foong *et al.*, 2015).
		Cucurbita maxima Duchense	Vine	Tendrillar	Ethyl acetate extract of flowers has antimicrobial activity against *Bacillus cereus, Candida albicans, Cochliobolus lunatus, Escherichia coli, Enterococcus faecalis* and *Salmonella typhi* (Muruganantham *et al.*, 2016).
		Cucurbita moschata Duchense	Vine	Tendrillar	Methanolic seed extracts have antibacterial action against *Bacillus subtilis, Escherichia coli Klebsiella pneumonia* and *Staphylococcus aureus*. Methanolic extracts of oil from seeds have antifungal activity against *Aspergillus parasiticus, Candida albicans, Penicillium chrysogenum* and *Rhodotorula rubra* (Abd EI-Aziz and Abd EI-Kalek, 2011).

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		Lagenaria siceraria (Molina) Standl.	Vine	Tendrillar	Phosphate buffered saline (PBS) seed extracts has antimicrobial action against *Escherichia coli, Fusarium oxysporium, Serratia marcescens, Streptococcus thermophilous* and *Trichoderma reesei* (Sood *et al.*, 2012).
		Luffa acutangula (L.) Roxb.	Vine	Tendrillar	Methanol fruit powder extract has antimicrobial activity against *Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa*, and *Staphylococcus aureus* (Mustarichie *et al.*, 2012).
		Momordica balsamina L.	Vine	Tendrillar	Both aqueous and alcohol extract has antimicrobial activity against *Salmonella typhi* and *S. paratyphi* (Akinyemi, 2000). It also shows antiplasmodial activity (Benoit-Vical *et al.*, 2006).
		Momordica charantia L.	Vine	Tendrillar	Seed essential oil has high antimicrobial activity against *Staphylococcus aureus* and low antimicrobial activity against *Candida albicans* and *Escherichia coli* (Braca *et al.*, 2008).
		Trichosanthes cucumerina L.	Vine	Tendrillar	Cold ethanolic extract significantly inhibits the growth of *Escherichia coli, Pseudomonas aeroginosa, Staphylococcus aureus* and *Streptococcus pyogenes* (Arawwawala *et al.*, 2011).
		Trichosanthes dioica Roxb.	Vine	Tendrillar	Leaf, fruit and seed extract has antimicrobial activity against *Escherichia coli, Klebsiella pneumoniae, Mycobacterium smegmatis, Pseudomonas aeruginosa* and *Staphylococcus aureus* (Rai *et al.*, 2010).
8.	Fabaceae	*Cajanus scarabaeoides* (L.) Thouars	Vine	Twinning	Chloroform and ethanolic extracts have considerable antimicrobial activity against *Aspergillus niger, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa* and *Staphylococcus aureus* (Pattanayak *et al.*, 2009).
		Canavalia gladiata (Jacq.) DC.	Vine	Twinning	Ethanol/ methanol extracts have antimicrobial activity against *Klebsiella pneumonia* (Parekh and Chanda, 2007). Ethanol/ methanol extracts show antimicrobial activity against *Shigella sonnei* and *Vibrio parahemolyticus* (Chung *et al.*, 2014).
		Clitoria ternatea L.	Liana	Twinning	Extracts has inhibitory effects against *Aeromonas formicans, A. hydrophila, Bacillus subtilis, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa,* and *Streptococcus agalactiae* (Al-Snafi, 2016).
		Derris scandens (Roxb.) Benth.	Liana	Twinning	Aqueous extract has antimicrobial activity against *Escherichia coli, Staphylococcus aureus* and *S. epidermidis* (Sittiwet and Puangpronpitag, 2009).
		Lablab purpureus (L.) Sweet	Vine	Twinning	Extracts has moderate to good antimicrobial activity against *Aspergillus niger, Bacillus megaterium, B. subtilis, Candida albicans, Escherichia coli, Saccharromyces cerevaceae, Salmonella paratyphi, S. typhi, Sarcina lutea, Shigella boydii, S. dysenteriae, Staphylococcus aureus, Vibrio mimicus* and *V. parahemolyticus* (Al-Snafi, 2017).

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		Mucuna pruriens (L.) DC.	Liana	Twinning	Leaf extract has strong antibacterial activity against *Bacillus subtilis, Escherichia coli, Proteus mirabilis Pseudomonas aeruginosa* and *Staphylococcus aureus* (Salau and Odeleye, 2007).
		Phaseolus lunatus L.	Vine	Twinning	N/A
		Rhynchosia capitata (B.Heyne ex Roth) DC.	Vine	Twinning	N/A
		Rhynchosia minima (L.) DC.	Vine	Twinning	N/A
		Vicia hirsuta (L.) Gray	Vine	Tendrillar	N/A
		Vicia sativa L.	Vine	Tendrillar	n-hexane extract has antibacterial activity against *Bacillus atrophaeus*, *Escherichia coli*, *Staphylococcus aureus*, and *S. epidermidis* (Saleem *et al.*, 2014).
		Vigna unguiculata (L.) Walp.	Vine	Twinning	Acetone extracts have antimicrobial activity against *Bacillus cereus, B. subtilis, Enterobacter cloacae, Enterococcus faecalis* and *Staphylococcus aureus* (Kritzinger *et al.*, 2005).
9.	Menispermaceae	*Cissampelos pareira* L.	Liana	Twinning	Methanol root extract has a broad spectrum inhibition activity for gram positive (*Staphylococcus aureus, S. pneumoniae*) and gram negative bacteria (*Escherichia coli, Klebsiella pneumoniae, Proteus vulgaris* and *Salmonella typhimurium*) (Ngoci *et al.*, 2014).
		Cocculus hirsutus (L.) W.Theob.	Liana	Twinning	Petroleum ether extract from dried leaf is effective against *Escherichia coli* (Satish *et al.*, 2010). Activity against *Salmonella typhi* and *Staphylococcus aureus* were also reported to be high from dried root petroleum ether extract (Nayak and Singhai, 2003).
		Tinospora cordifolia (Willd.) Hook.f. & Thomson	Liana	Twinning	The ethanolic extract has significant antibacterial activity against *Escherichia coli* and *Proteus vulgaris* (Jeyachandran *et al.*, 2003).
10.	Passifloraceae	*Passiflora edulis* Sims	Vine	Twinning	Ripe and unripe fruit peel extract has antimicrobial activity against *Bacillus subtilis, B. cereus, Escherichia coli, Lactobacillus bulgaricus, Proteus vulgaricus, Pseudomonas aeruginosa, Salmonelli typhi* and *Staphylococcus aureus* (Mohamed *et al.*, 1994).
		Passiflora foetida L.	Vine	Twinning	Leaf extracts have remarkable activity against *Pseudomonas putida, Shigella flexneri, Streptococcus pyogenes*. and *Vibrio cholera* (Mohanasundari *et al.*, 2007).
11.	Polygonaceae	*Antigonon leptopus* Hook. & Arn.	Vine	Tendrillar	Leaf extract has significant antibacterial effect against *Bacillus licheniformis, B. subtilis, Streptococcus pneumonia* and antifungal activity against *Aspergillus flavus, A. niger* and *Candida albicans* (Sravanthi *et al.*, 2017).
12.	Ranunculaceae	*Clematis gouriana* Roxb. ex DC.	Liana	Twinning	Methanol extract has significant antimicrobial activity against *Candida albicans, Microsporum gypseum, M. audouini, Pseudomonas aeruginosa, Staphylococcus aureus, Trichophyton rubrum* and *T. tonsurans* (Naika and Krishna, 2007).

Table 1 continued...

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13.	Vitaceae	*Cayratia trifolia* L.	Vine	Tendrillar	The plant is reported to have antibacterial, antifungal and antiprotozoal activities (Kumar *et al*., 2011).
		Vitis vinifera L.	Liana	Tendrillar	Aqueous and ethanolic extracts have antimicrobial activities against *Alcaligenes faecalis*, *Bacillus cereus*, *B. subtilis*, *Klebsiella aerogenes*, *K. pneumoniae*, *Proteus mirabilis*, *Pseudomonas pseudoalcaligenes*, *Staphylococcus aureus*, *S. epidermidis* and *S. subfava* (Parekh and Chanda, 2006).
Monocotyledons					
14.	Asparagaceae	*Asparagus racemosus* Willd.	Vine	Twinning	Methanolic extract of leaves have antimicrobial activity against *Bacillus subtilis*, *Candida utilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Patel and Patel, 2013).
15.	Dioscoreaceae	*Dioscorea bulbifera* L.	Liana	Twinning	Petroleum ether and chloroform extracts has significant antimicrobial activity against *Aspergillus fumigates* and *Rhizopus nigricans*. It has also good activity against *Klebsiella pneumoniae*. The chloroform extract has weak activity against *Staphylococcus aureus* (Seetharam *et al*., 2003).
16.	Smilacaceae	*Smilax zeylanica* L.	Liana	Tendrillar	Leaves have antibacterial activity against *Escherichia coli*, *Salmonella typhi*, *S. paratyphi*, *Shigella dysenteriae* and *Staphylococcus aureus* (Hossain *et al*., 2013). It was also found to be antimicrobial against *Aspergillus niger Bacillus cereus* and *Bipolaris* sp. (Shree *et al*., 2018).

abundant than herbaceous ones (Vines). This study extends it support to the findings of Suthari *et al.* (2014) in northern Telangana that is most of the plants in Varanasi show twinning climbing habit like northern Telangana.

Review of literatures showed that these climbers have significant antimicrobial property against numerous highly infectious bacteria (*Bacillus cereus*, *B. pumilis*, *B. subtilus*, *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Mycobacterium tuberculosis*, *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *S. typhi*, *Shigella boydii*, *S. dysenteriae*, *S. flexneri*, *S. sonnei*, *Staphylococcus aureus*, *Streptococcus pyogenes* and *Vibrio cholera* etc.), fungi (*Alternaria alternata*, *Aspergillus flavus*, *A. fumigates*, *A. niger*, *A. parasiticus*, *Candida albicans*, *C. utilis*, *Fusarium oxysporium*, *Microsporum audouinii*, *Penicillium chrysogenum*, *Rhizoctonia solani*, *Rhizopus nigrican*, *Trichoderma reesei*, *Trichophyton rubrum* and *T. tonsurans* etc.) and protozoans (*Entamoeba histolytica and Giardia lamblia*, etc). Following nine climbers *viz*., *Cucumis melo*, *Ipomoea coptica*, *I. dichroa*, *Merremia hederacea*, *Phaseolus lunatus*, *Poranopsis paniculata*, *Rhynchosia capitata*, *R. minima* and *Vicia hirsuta* don't have any record of antimicrobial property. They may have antimicrobial property and they have not been screened so far.

From the study, it is very clear that these climbers have immense potential to combat bacterial, fungal, protozoan and viral disease without any known side effect. This present communication might be useful to researchers and policymakers to develop an alternative and effective strategy to develop drug against pathogens.

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