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Plant Derivatives Contributing to UTI Treatment

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Abstract: ***Urinary tract infections (UTIs) are amongst the most common microbial infections worldwide, with ~11% of the world's population. Several plants parts are used in traditional healing systems to treat UTIs, yet the therapeutic potential of these plants against bacteria that cause UTI remains poorly explored. Approximately, 153 plant species identified and uses to treat UTIs. Several studies described toxic, carcinogenic, and mutagenic properties for extracts prepared from plants conventionally used as medicines.***

I. INTRODUCTION

Urinary tract infection (UTI) is a disorder in which any part of the urinary tract (urethra, bladder, ureter, and kidney) gets infected with bacteria or fungus that colonize the urinary tract. The effect of UTI ranges from a mild self-limiting illness to serious sepsis, with 20-40% mortality rate (Wagenlehner 2013). Both the sexes are affected by UTI with a female to male ratio of 2:1 and it is the second most common infection after respiratory tract infections. UTI is the most frequently treated with antibiotics but presently many new alternative therapies are also used.

Therapeutic botanicals are defined as plants and their products with medicinal value and these natural products are rich in diverse bioactive compounds, which form the basis for the development of new pharmaceuticals. There are immense advantages of using therapeutic botanicals like lesser side effects, more patient approval, less costly, and can be renewed naturally.

Cranberry, mannose, and probiotics are frequently used for recurrent UTI, and berberine and uva ursi are prescribed for acute UTI. Application of estriol cream and supplement of vitamins A and C were considered to be effective to prevent UTI (Head KA 2008).

The anti-uropathogenic and bactericidal activity of many plant extracts was reported by many researchers, which involves only preliminary antibacterial studies using different basic techniques like disk diffusion, agar well diffusion, or minimum inhibitory concentration (MIC) of the crude plant extracts, but reports on the specific action of the phytoconstituents against uropathogens are limited.

Vaccinium macrocarpon Aiton (cranberry) is the best-studied home remedy for UTI. Proanthocyanins present in cranberry, prevent bacteria from adhering to the walls of the urinary tract, subsequently blocking the further steps of uropathogenesis.

Supplement of aqueous extract of corn (Zea mays L.) silk (outer thread-like part) to UTI patients significantly reduced the symptoms by reducing the number of RBCs, pus cells, and crystals in urine without any side effects (Sahib AS 2012). Plants belonging to family Apiaceae, Fabaceae, Malvaceae followed by Asteraceae and Cucurbitaceae were found to be very effective against UTI (Pattanayak S 2017)(Table 1).

Table 1
Some important medicinal plants and plant parts used for UTI

Plant species	Botanical name	Parts used	Disorder/disease	Reference
Juniper	Juniperus spp	Leaf	Excrete antimicrobial compounds	Yarnell E 2002
Oregon grape	*Mahonia aquifolium*	Roots	Rich in berberine, preventing the bacteria	Yarnell E 2002
Sweet Acacia	*Acacia farnesiana*	Roots	Burning sensation in the urinary tract, UTI oliguria and polyuria	Hossan MS 2010
Holy mangrove	*Acanthus ilicifolius L.*	Roots	Unclear urine in women	Sarita Das 2020
Mexican Poppy	*Argemone mexicana L.*	Root	Urinary trouble	Nayak A 1998
Cucumber	*Cucumis sativus L*	Seed	Urinary tract infection	Satapathy 1996

Chhoti Dudhi Asthma Plant	*Euphorbia thymifolia*	Whole plant	Blood in urine	Aminuddin GRD 1993
Mango	*Mangifera indica L*	Branch	Urinary diseases, kidney diseases	Prachi CN 2009
Gilo	*Tinospora sinensis*	Whole plant	Urinary troubles, diuretic	Prachi CN 2009
Shyonak Tree	*Oroxylum indicum*	Bark, fruit	Difficulties in urination, burning sensation, red urination, polyuria, lower abdominal pain	Sarita Das 2020
Cranberry	*Vaccinium macrocarpon*	Fruit	Excrete antimicrobial compounds, which kill microbes	Yarnell E 2002
Goldenro	Solidago spp	Root	Diuretics	Sarita Das 2020
Lovage	*Levisticum officinale*	Root	Increase urine volume	Sarita Das 2020
Parsley	*Petroselinum crispus*	Fruit	Diuretics	Sarita Das 2020

Probiotics such as *Lactobacillus* and *Bifidobacterium* are beneficial microorganisms that may act by the competitive exclusion principle to defend against infections in the urogenital tracts.

These plants and plant derivatives have been able to show effect during the different stages of UTIs across wide range of patients.

It is the presence of the active pharmaceutical ingredients which show the impact of these plants and their products, following are the components which are found to actively involved in easing out the symptoms of UTI (Hudson et al 2022).

The presence of A-type proanthocyanidins (PACs), D-mannose, Arbutin (Uva ursi- Arctostaphylos uva ursi or bearberry leaf), hippuric acid, epigallocatechin (EGC)(compound present in green tea leaves of Camellia sinensis) (Table2). Other than these intravesical glycosaminoglycans and immunostimulants also contribute to minimising the impact of UTI (Sihra et al 2018)(.

Table 2
Important compounds extracted from plant used for treatment of UTI

Name of compound effective in treating UTI	Plants from which it can be extracted	References
tannins, terpenoids, alkaloids and flavonoid	*Vaccinium macrocarpon*	Sahib et al 2012
D- mannose	*Vaccinium macrocarpon, Hibiscus sabdariffa, Morinda citrifolia*	Ala-Jaakkola et al 2022, Marchiori et al 2017
Arbutin	*Vaccinium macrocarpon*	Das S, 2020
Proanthocyanidins	*Vaccinium macrocarpon, Oroxylum indicum*	Das S, 2020
Hippuric acid	*Vaccinium macrocarpon, Oroxylum indicum*	Das S, 2020
Epigallocatechin	*Camellia sinensis*	Sihra et al 2018

It is evident that conventional mode of treatment has been preferred by many patients. The above study further emphasized on the fact that wide range of plant products can be used to reduce the symptoms of UTI and further reverse the damage caused by the uropathogens.

Bioinformatics based analysis can explain how the different target molecules interact with these plant extract, and how we can further enhance or subside the interaction of these compounds to have a better therapeutic impact. The three-dimensional structure-based study can be validate and the associated biological activity can also be evaluated using the quantitative structure activity relationship.

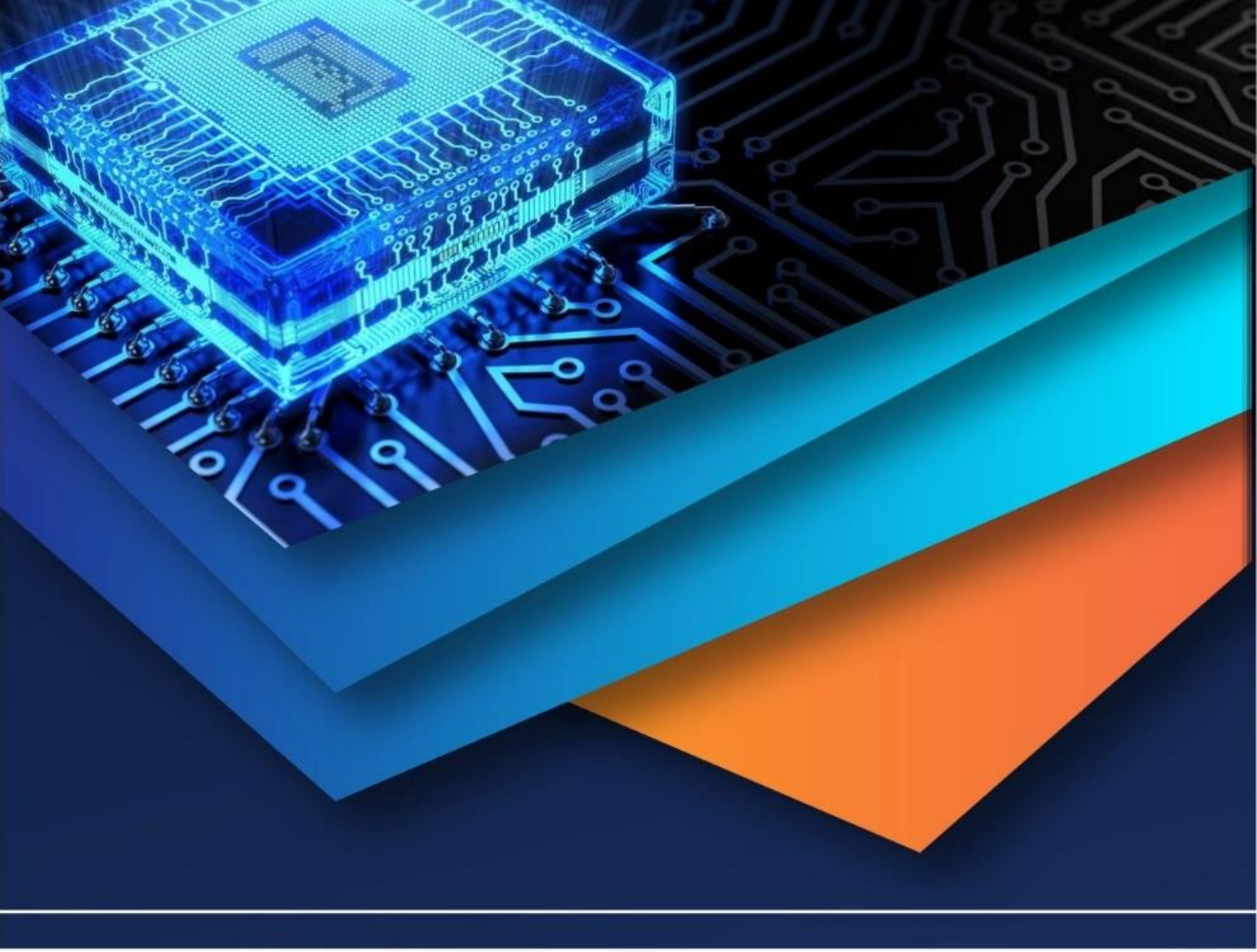
The biological pathways involved, the interactions in terms of reaction and their role in respective pathway, all these can be studied using in-silico approaches. Pathway analysis can throw light on the possible genes involved and how some people are more to certain infections in comparison to others, moreover individual response to the alternate mode of UTI treatment and its efficacy can also be studied using the same.

II. CONCLUSION

This study is an indication that the role of alternative mode of treatment can yield promising result, as the presence of phyto-medicine will improve minor adverse effects in comparison to the antibiotics and the using case of multi drug resistant microbes. Therefore, various phytochemicals present in plant extracts used against in both acute and recurrent UTI.

REFERENCES

[1] Ala-Jaakkola R, Laitila A, Ouwehand AC, Lehtoranta L. Role of D-mannose in urinary tract infections - a narrative review. Nutr J. 2022;21(1):18. Published 2022 Mar 22. doi:10.1186/s12937-022-00769-x
[2] Aminuddin GRD. Observations of the ethnobotany of the Bhunjia – a tribe of Sonabera plateau. Ethnobot. 1993;5:83–86
[3] Head KA. Natural approaches to prevention and treatment of infections of the lower urinary tract. Altern Med Rev. 2008;13(3):227–244.
[4] Hossan MS, Hanif A, Agarwala B, Sarwar MS, Karim M, Rahman MTU, Jahan R, Rahmatullah M. Traditional use of medicinal plants in Bangladesh to treat urinary tract infections and sexually transmitted diseases. Ethnobot Res Appl. 2010; 8:61–74
[5] Hudson, Rachel E et al. “Examination of Complementary Medicine for Treating Urinary Tract Infections Among Pregnant Women and Children.” Frontiers in pharmacology vol. 13 883216. 27 Apr. 2022, doi:10.3389/fphar.2022.883216.
[6] Marchiori D, Zanello PP. Efficacy of N-acetylcysteine, D-mannose and Morinda citrifolia to treat recurrent cystitis in breast Cancer survivals. In Vivo. 2017;31(5):931–936.
[7] Nayak A, Das NB, Nanda B. Utility of some tribal drugs of Keonjhar and Similipal area. JTR Chem. 1998;5(2):53–59
[8] Pattanayak S, Das DC, Sinha NK, Parida S. Use of medicinal plants for the treatment of urinary tract infections: a study from Paschim Medinipur district, West Bengal, India. Int J Pharm Bio Sci. 2017;8(3):250–259.
[9] Prachi CN, Kumar D, Kasana MS. Medicinal plants of Muzaffarnagar district used in treatment of urinary tract and kidney stones. Ind J Trad Med. 2009; 8(2):191–195.
[10] Sahib AS, Mohammed IH, Hamdan SJ. Use of aqueous extract of corn silk in the treatment of urinary tract infection. J Intercult Ethnopharmacol. 2012;1(2):93–96.
[11] Sarita Das Natural therapeutics for urinary tract infections—a review Futur J Pharm Sci. 2020; 6(1): 64.
[12] Satapathy KB, Brahmam M. Some medicinal plants used by the tribals of Sundargarh district, Orissa, India. In: Jain SK, editor. Ethnobiology in Human welfare. New Delhi: Deep publications; 1996. pp. 153–158.
[13] Sihra, N., Goodman, A., Zakri, R. et al. Nonantibiotic prevention and management of recurrent urinary tract infection. Nat Rev Urol 15, 750–776 (2018). https://doi.org/10.1038/s41585-018-0106-x.
[14] Wagenlehner FM, Lichtenstern C, Rolfes C, Mayer K, Uhle F, Weidner W, Weigand MA. Diagnosis and management for urosepsis. Int J Urol. 2013; 20:963–970.
[15] Yarnell E. Botanical medicines for the urinary tract. World J Urol. 2002;20(5):285–293.



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