



A study on the efficacy of locally available vitamin c rich fruit extracts in the treatment of urinary tract infections in young girls of rural Eluru, Andhra Pradesh, India.

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Abstract: The present study is conducted on college going adolescent girls to identify the prevalence of urinary tract infection and to understand the role of vitamin-C rich fruits like amla (Local name)(Phyllanthus emblica), sweet lime(Citrus sinuses), lemon (Citrus aurantium), sour Orange(Citrus Aurantium) extracts in the treatment of urinary tract infections. Since most of the young girls often suffer from UTI due to unhygienic conditions prevail and practices, the research focused on whether these fruit extracts rich in vitamin C can be used as natural remedy. This study was conducted by simple well diffusion method to identify the efficacy of these fruit extracts. It was observed that Indian gooseberry has shown higher antibacterial activity with 20mm zone of inhibition at 20micro liter concentration, where as Lemon showed second higher antibacterial activity with 18mm inhibition zone at the same concentration.

Key words: Indian gooseberry, urinary tract infection, renewable,

1.Introduction:

Since pre-Historic times, man has used different natural sources against common illness prevailing in the society with varying degree of success. Natural substances are known to act synergistically with antibiotics, and resistance has not been reported against them. There are some advantages of using antimicrobial compounds of natural sources such as easily available, relatively less expensive and very effective, often fewer side effects, better patient tolerance and acceptance due to long history of use and being renewable in nature.(1)

One of the oldest fruit crops cultivated in India was citrus fruits, among these most commonly consumed and locally available citrus fruits are Amla, sweet and sour oranges, lemon, this fruits are freshly consumed. These fruits are good sources of vitamin C and they even contain impressive levels of other essential nutrients like potassium, folate, calcium, thiamin, niacin, phosphorous, pantothenic acid and a variety of phyto chemicals (xin miao LV et.al., 2015). In several serious diseases and disorders it is proved through various studies, that citrus rich fruits play a crucial role in reducing and retarding the severity of the diseases.(Benony NS, et.al., 2016).

UTI: A urinary tract infection is an infection in any part of the urinary system which can affect kidneys, bladder, ureters and urethra. The main cause for the infection is due to the entry of bacteria through the tube that carries urine out of the body. Women are more prone to UTI than men as they have shorter urethra than men. 60% of Women in the lifetime suffer with UTI, and roughly 20-30% of women suffer with repeated infection (Drakshayanidevi K et.al., 1994). Escherichia coli, Proteus, Klebsiella, Enterococcus and Enterobacter species bacteria are mostly involved in causing UTI (Efstratios Demetrious et.al., 1982). According to Johns Hopkins medicine, drinking of plenty of water and consuming large amounts of vitamin-C limits the growth of bacteria by acidifying the urine.

There is an established link between vitamin C and immune system function. While a healthy vitamin C intake is essential for fighting infection, we also know that for many with inflammation in the bladder, certain types of vitamin C supplements can trigger bladder symptoms.(2) .

Our present study is to focus on the causes of UTI in college going girls whose age group is between 19-21yrs, and to identify the effect of vitamin-C rich fruits on the cultured bacteria causing UTI.

2. Material and methodology:

2.1 Apparatus: Beakers, Conical flask, Measuring Cylinder, Micro-pipettes Petri-plates, test tubes.

2.2 Reagents: Fruit extracts, Distilled water, Nutrient Agar, Gram staining reagent.

2.3 Survey method: 100 college girls aged between 19-21yrs were selected for the present study from local colleges in Eluru, were given questionnaire to know the severity of the condition by using UTI symptom assessment questionnaire. (Darren Clayson et al., 2005).

2.4 Urine sample collection: The urine samples are collected from the adolescent girls who are suffering with UTI through MID-STREAM Clean catch method, this method is strongly recommended for microbiology culture and antibiotics susceptibility testing because of reduced incidence of cellular and microbial contamination, the sample can be preserved in the refrigerator after clear labeling and can be used within 2hrs

2.5 Fruit extract Preparation: Fresh fruit juices of Alma, Sweet and Sour Oranges, Lemon and Mosambi were taken and their juices were extracted by squeezing and crushing them mechanically, and this undiluted extracts are used for the testing.

2.6 Preparation of inoculums: An inoculating loop was sterilized by showing it over the Bunsen burner flame, and then a loop full of urine sample was taken and inoculated into a bacterial broth. When the growth is noticed after 24hrs of incubation, then the cultured bacteria is sub cultured on a Nutrient Agar plates for Antibacterial activity.

2.7 Determination of antibacterial activity: The antimicrobial activity was assayed by a Well diffusion method. According to National Committee for clinical laboratory standards, Inoculum containing bacterial culture to be tested was spread on Nutrient agar Plates with a sterile Swab Moistened with the bacterial suspension. Subsequently, wells of 8mm diameter were punched into agar medium and filled with testing undiluted fruit extracts and allowed to diffuse at room temperature for 2hrs. The plates were then incubated in upright position at 37° for 24hrs

3. Result and discussion:

3.1 survey method:

Totally 100 college going girls were included in the study with the age group between 19-21yrs. The UTI symptoms questionnaire method survey revealed that 2 out of 5 are suffering with UTI, which is mainly due to mal-nourishment, unhygienic use of toilets, presences of virginal discharge and use on un hygienic sanitary pads.

3.2 pH of various fruit extracts:

Fruit sample	pH
Amla	1
Sour lemon	1
Sweet lemon	4
Mosambi	3

Antibacterial 3.3 activity:

S.No	Name of the fruit	Zone of inhibition Conc. 10ul/mm	Zone of inhibition Conc.20ul/mm
1	Amla(Indian gooseberry)	15mm	20 mm
2	Sour Orange	12mm	15mm
3	Sweet Orange	11mm	14mm
4	Lemon	13mm	18mm
5	Mosambi	06mm	10mm

In the present study the highest antibacterial activity was shown by undiluted Alma extract with the zone of 20mm against the bacteria cultured using UTI infected urine sample, followed by the undiluted lemon extract with zone of 18mm, and sour and sweet Oranges showed of zone of inhibition 15mm and 14mm respectively and the least antibacterial activity was showed by undiluted Mosambi fruit extract with zone of 10mm. when all the extract are compared with the Vitamin –C (500mg) tablet antibacterial activity, Amla and Lemon extract showed equal antibacterial zone with the tablet.

Discussion:

In the present study the highest antibacterial activity was shown by Amla when compared with Lemon, Mosambi, Sweet and Sour Orange against the bacterial culture isolated, in a dose dependent manner.

In this study Amla showed 20mm with 20ul/mg concentration .

Conclusion:

Vitamin C is an important part of a healthy diet as it plays a vital role in many areas of human physiology. It is essential for tissue health and wound healing, as it's necessary to make collagen, an important support protein. Vitamin-C is considered safe, even in the large doses often found in dietary supplements. This is because of its water solubility, which means it is readily eliminated from

the body in the urine. Because vitamin-C makes its way to the urine, it's believed to have the ability to act directly on the pathogens that cause UTI.

References:

1. Benomy N S, et al 2016: Citrus : An ancient fruits of promise for health benefits. <https://pubmed.ncbi.nlm.nih.gov>
2. Darren Clayson et al., 2005: Validation of patient-administered questionnaire to measure the severity and bothersomeness of lower urinary tract symptoms in uncomplicated urinary tract infection(UTI):the UTI symptom assessment questionnaire. BJUI first published 24 July, 2005. <https://doi.org/10.1111/j.1464410x.2005.05630.x>
3. Drakshayani Devi K et al 1994: A study on menstrual hygiene among rural adolescent girls; India J Med Sci 1994 June 48(6)139-43
4. Efstratios Demetrious et al 1982: Dysuria in adolescent girls: Urinary tract infection or vaginitis? Pediatrics August 1982, 70(2)299-301
5. K. Vermani, S. Garg and L.J. Zaneveld; "Assemblies for in vitro measurement of bio adhesive strength and retention characteristics in simulated vaginal environment", Drug Dev. Ind. Pharm., Vol. 28(9), pp. 1133-1146, 2002.
6. <https://liveutifree.com/vitamin-c-for-uti/>
7. NCCLS GP-16A2 volume 21, No.19 Urinalysis and collection transportation and preservation of urine specimens; Approved Guidelines-Second Edition, p4-21.
8. Xinmiao LV et al 2015: Citrus fruits as a treasure trove of active natural metabolites that potentially provide benefits for human health Chem Cent J 2015 Dec 24 Doi.10.1186/s13065-015-0145-9.

