

COMPARATIVE ACTIVITY OF CRANBERRY AND ANTIBIOTICS IN COMMUNITY ACQUIRED URINARY TRACT INFECTION

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ABSTRACT

Background and Objectives: Urinary tract infection is the most common disease in the community throughout the world and mostly caused by *E-coli*. Recurrence and antimicrobial resistance are the main associated factors making it problematic for the patients especially the women in all aspects i.e., medically, socially and economically. To minimize the problems of antibiotic resistance and recurrence other remedies have been introduced. Cranberry extract is an alternative herbal preparation free from the side effects of antibiotics, is safe and comparatively cheaper. It is marketed and widely used in the prophylaxis of urinary tract infection in various forms. Its anti microbial activity has also been unmasked. The objective of this study was to compare its anti microbial effect with some common antibiotics, used in the treatment of urinary tract infection.

Methods: This study (in vitro) was performed in Ayub Medical College. Urine samples from symptomatic patients of urinary tract infection were collected in sterile containers. Since *E-coli* is the main causative organism in community acquired urinary tract infection, therefore it was selected for the study. After microscopy 35 culture positive cases of *E-coli* were isolated on CLED media. Sensitivity against cranberry concentrate was performed by putting its standard solution of 25, 50 and 100 µg dilution in 3 punched holes made in nutrient agar media. Sensitivity procedure of the *E-coli* isolates against antibiotics was performed by using the standard procedure of Kirby Bauer disc diffusion. Antibiotics used for sensitivity were co-amoxiclav, ciprofloxacin, pipemedic acid and co-trimoxazole. The susceptibility was noted after 24 hours incubation and was measured in the form of zone of inhibition in mm.

Results: The antimicrobial activity of cranberry was higher with 100 µg against *E-coli* than 25 and 50 µg. 100 µg of cranberry revealed significantly high activity than co-trimoxazole and pipemedic acid ($p < 0.001$ and 0.000). The activity of cranberry was significantly low as compared to co-amoxiclav and ciprofloxacin (0.000 each).

Conclusion: The present study concludes after comparison that cranberry has better anti bacterial effect on *E-coli* than co-trimoxazole and pipemedic acid in vitro, however, it was less effective than co-amoxiclav and ciprofloxacin.

Key words: Urinary tract infection, cranberry, co-trimoxazole, pipemedic acid, ciprofloxacin, co-amoxiclav.

INTRODUCTION

Urinary tract infection is a serious health problem and is caused by a range of organisms.¹ *E-coli* are collectively responsible for a large proportion of urinary tract infection with different antibiotic susceptibility pattern.² Community acquired urinary tract infection is uncomplicated and found in the normal urinary tract and caused by *E-coli* in more than 80%.³

Urinary tract infection is more in women and it is estimated that 1 in 3 women will have at least 1 urinary tract infection requiring antimicrobial treatment by the age of 24 and 40 – 50% of the women will experience at least one urinary tract infection during their life time.⁴ Urinary tract infection is more common in

pregnancy (2.5 – 8.7%) where the use of antibiotics is not free from hazards and may lead to complications.⁵ Recurrence of urinary tract infection is very common. About 20 – 30% women who have had episodes of urinary tract infection, will have recurrent episode.⁶ Genetic tendency also plays important role in recurrent urinary tract infection.⁷

Over the past decade anti microbial resistance has become an increasingly common factor in the management of urinary tract infection.⁸ Due to resistance the overall cost of treatment and re-consultation for people is significantly higher.⁹ Misuse of antibiotics by unqualified professionals further adds to this problem. Extended spectrum β lactamase (ESBL) producing

bacteria are more resistant to antibiotics. Other strategies like natural products have been introduced and successfully used prophylactically in urinary tract infection.

The antimicrobial activity of cranberry has also been searched out.¹⁰ The objective of this study was to compare the antimicrobial activity of cranberry with some commonly used antibiotics in the treatment of urinary tract infection.

PATIENTS AND METHODS

This was a laboratory based (in vitro) single group experiment study performed in the Pathology Department of Ayub Medical College and outdoor clinics of Ayub Teaching Hospital, Abbottabad in collaboration with Post Graduate Medical Institute and University of Health Sciences, Lahore. Duration of study was Sept, 2013 to August, 2014. Approval of ethical committee was obtained and written consent was taken from every patient on the study proforma. Urine samples were collected in sterile containers from patients of suspected urinary tract infection. Catheterized patients, those having complicated urinary tract infection and patients on antibiotics were excluded. After confirming the presence of pus cells 5/HPF the samples were inoculated on CLED media and incubated at 37°C for 24 hours. E-coli were identified on the basis of cultural characteristics as colonial morphology and lactose fermentation and confirmed by API 20E standardized identification system. Sensitivity against cranberry was performed by putting 25, 50 and 100 µg of cranberry solution in punched holes in nutrient agar. For this purpose a commercially available sachet of 250 mg cranberry concentrate was dissolved in 50 ml distilled water. The antibiotics selected for comparison were those which are commonly used in practice for the treatment of urinary tract infection. These were Co-amoxiclav (30 µg), Ciprofloxacin (5 µg), Pipemedic acid (20 µg) and Co-trimoxazole (25 µg). Sensitivity of these antimicrobials was performed on nutrient agar using the Kirby-Bauer disc diffusion method. Plates were incubated at 37°C for 24 hours and zones of inhibition were measured in mm.

The data was analyzed by SPSS, 16. The antibacterial activity was expressed as mean ± SD. Difference between sensitivities was tested using ANOVA. Post Hoc Tukey’s test was applied to observe which group means differed. A p-value of ≤ 0.05 was considered as statistically significant.

RESULTS

The activity of cranberry was significantly high with higher concentration i.e., 100 µg. Due to this dose response relation, higher concentration of cranberry i.e., 100 µg was used for comparison with antibiotics.

The comparison effect of 100 µg of cranberry and test antibiotics on *E-coli* growth was significant.

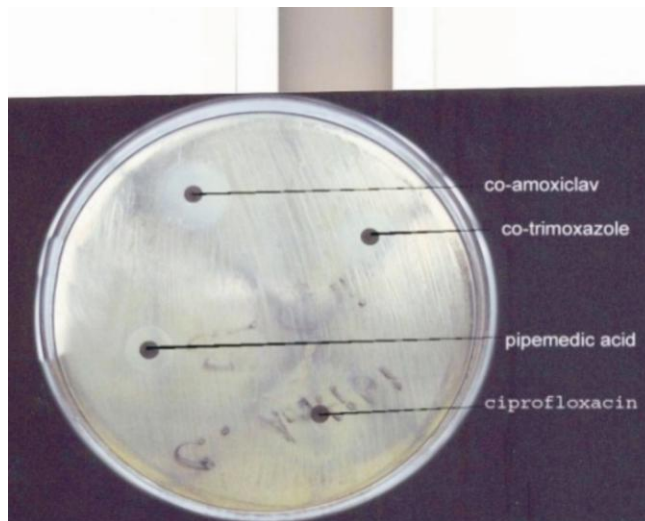


Figure showing the activity of test antibiotics.

Table 1: Activity of cranberry and test antibiotics against *E-coli*.

	(I)	(J)	P
E-coli	CB	Co-amoxiclav	0.000
		Ciprofloxacin	0.000
		Co-trimoxazole	0.001
		Pipemedic acid	0.000

Multiple comparison of 100 µg of cranberry and test antibiotics (Table 2) revealed that the zone of inhibition was significantly high with cranberry as compared to co-trimoxazole and pipemedic acid (P 0.001 and 0.000). It was significantly low as compared to co-amoxiclav and ciprofloxacin with P value of 0.000 each.

Table 2: Comparative activity of cranberry and test antibiotics. Results shows zone of inhibition in mm.

	CB 100µg	Co- amox	Cipro	Co- trimox	Pipemedic acid
M	15.63	18.8	21.1	13.5	13.29
SD	2.03	1.21	2.12	2.84	3.02
S ²	4.15	1.47	4.15	8.07	9.15

DISCUSSION

Cranberry has anti bacterial activity and a dose response relationship.¹¹ The antimicrobial activity of cranberry and four test antibiotics i.e., co-amoxiclav, ciprofloxacin, co-trimoxazole and pipemedic acid were compared with respect to their zone of inhibition against

E-coli. Since the antimicrobial activity of cranberry is dose dependent therefore, the highest concentration of cranberry (100 µg) was used for comparison with antibiotics. Mean zone of inhibition of E-coli growth revealed the following order.

Ciprofloxacin > co-amoxiclav > cranberry > co-trimoxazole = pipemedic acid.

Jeon¹² described ciprofloxacin to be the most effective and appropriate choice for urinary tract infection against *E-coli*. The same is observed in our study. Beerepoot¹³ concluded in their study, co-trimoxazole to be more effective than cranberry. This is not in consistency with our study. However, the resistance found in *E-coli* with one month antibiotic therapy was > 80% while it was less with cranberry during this period. Gurley¹⁴ commented on this marked difference of resistance and favoured the therapeutic potentials of cranberry over co-trimoxazole which is in agreement with our findings. Bossman¹⁵ compared cranberry extracts with co-trimoxazole. Statistically both were found effective. But the cost of cranberry extract was significantly higher. However the problem of resistance with co-trimoxazole favours cranberry to be a better choice.

It is **concluded** that cranberry has better anti bacterial activity against E-coli than co-trimoxazole and pipemedic acid. It has lesser anti microbial effect against E-coli as compared to ciprofloxacin and co-amoxiclav.

Conflict of Interest: None.

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AUTHOR'S CONTRIBUTION

SB: Principle author, conceived the idea, data collection, literature review, write-up. SC: Supervised the study, Literature search, proof read the manuscript. NAS: Improvement of manuscript. AM: Statistical analysis

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