

Comparative Activity of Vaccinium Macrocarpon and Antibiotics in Pregnancy

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ABSTRACT

Objective: The objective of this study was to assess the in vitro activity of vaccinium macrocarpon in comparison with antibiotics in pregnancy.

Study Design: Experimental study

Place and Duration of Study: This study was executed in the Pathology Department of Ayub Medical College and outdoor clinics of Ayub Teaching Hospital, Abbottabad from May 2020 to December 2020.

Materials and Methods: In this in vitro study, a total of 72 symptomatic pregnant ladies of urinary tract infection were screened and out of these 60 pregnant ladies in their 2nd and 3rd trimester were selected after their positive urine cultures for E-coli. Patients in Group A were given vaccinium macrocarpon for 10 days, while patients in Group B and C were given Cefixime and Co-amoxiclav for the period of 5 days respectively. Sensitivity test of vaccinium macrocarpon and antibiotics was done against the test bacteria for comparison. Zone of inhibition was measured in mm.

Results: The p-values of Shapiro-Wilk tests of Vaccinium macrocarpon, Cefixime and Co-amoxiclav are 0.075, 0.435 and 0.186 respectively, which highlighted the measures following the normal distribution. The mean value presented with Vaccinium macrocarpon was 19.47±1.37. The mean value presenting with Cefixime was 22.41±1.26. The mean value presenting with Co-amoxiclav was 21.75±1.09. The p-value between Vaccinium macrocarpon and Cefixime is 0.000. The p-value between Vaccinium macrocarpon and Co-amoxiclav is 0.000 whereas Cefixime and Co-amoxiclav is 0.08.

Conclusion: The results showed that antibiotics are superior to vaccinium macrocarpon in treating urinary tract infection in pregnant ladies.

Key Words: Urinary tract infection, E-coli, Vaccinium macrocarpon, Cefixime, Co-amoxiclav

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INTRODUCTION

The history of urinary tract infection dates back to same as that of human existence on the ground. It was first acknowledged in Ebers Papyrus, 1550 BC. It is a typical clinical issue that establishes around 1-6 % of clinical referrals¹. It is a frequent clinical concern, which can involve the urethra, bladder, and kidney. It affects all age groups; however, women are more vulnerable than men, owing to short urethra, nonexistence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora².

Urosepsis accounts for a part of the entire sepsis cases and can be a grave state that must be treated instantaneously. Universally, more than 30 million public suffer from sepsis yearly through a mortality rate

of 30–40%³. Its estimated incidence approaches 150 million new cases per year. The management of urinary tract infection accounts for an estimated 6 billion US dollars of expenses amid cystitis unaccompanied accounts for >10 million hospital visits and 1 million emergency hospital visits⁴.

In women urinary tract infection account for approximately 25% of the entire infections consequently being one of the most recurrent clinical bacterial infections⁵. The physiological changes, anatomical changes in the urinary tract, hormonal fluctuations which relax the ureteral muscle, and growing uterus cause accumulation of urine in the bladder, and also immune system changes for the duration of pregnancy increase the prevalence of urinary infection and in some cases leads to the symptomatic infection, resulting in serious risks for both mother and fetus.^{6,13} Approximately Beginning in the 6th week, with hit the highest point during 22nd-24th weeks of conception, 90% of the expecting women develop ureteric dilatation thereby increasing the threat of urinary stasis and vesicoureteric reflux.⁷ Urinary tract infection is a possibility for pyelonephritis, preterm delivery and miscarriages amid pregnant women, and is linked with impaired renal function and end-stage renal illness among pediatric patients.⁸

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An early recognition and management of asymptomatic bacteriuria may be of great consequence not only to preclude acute pyelonephritis and chronic renal failure in the mother but also to trim down the prematurity and fetal death.⁹ Asymptomatic bacteriuria (ASB) is the presence of 1 or more species of bacteria growing in the urine at specified quantitative counts ($\geq 10^5$ colony-forming units [CFU]/mL or $\geq 10^8$ CFU/L), irrespective of the presence of pyuria, in the absence of signs or symptoms attributable to urinary tract infection.¹⁰

Quite a few features of pregnancy act as predisposing factors for asymptomatic bacteriuria, together with: increased progesterone, slowed peristalsis, urinary stasis in ureters, uterine enlargement and bladder displacement.¹¹ For the duration of pregnancy, asymptomatic bacteriuria can turn out to be symptomatic and injurious to the unborn child.

The commonest basis of urinary tract infection among pregnant women has been found to be *E. coli* for the reason of its multidrug resistant strains¹². Other bacteria include *Staphylococcus* spp., *Klebsiella pneumoniae*, *Proteus* spp., *Pseudomonas aeruginosa*, *Enterococcus* spp. along with *Acinetobacter*¹³.

Management of asymptomatic bacteriuria in pregnancy via effectual antibacterial treatment lessens hazard of acute urinary tract infection from 40% to 4%. Numerous antibiotics are accessible on behalf of selection for treatment of asymptomatic bacteriuria in pregnancy including, Amoxicillin, Ampicillin, Cephalosporin, Nitrofurantoin, Trimethoprim and Sulfamethoxazole. This aims to clear the infection, which is merely possible if the secluded bacterium is susceptible to it.¹⁴ Besides, the surfacing of antimicrobial drug resistance by a good number of uropathogens presents a dare to the treatment of the women affected.

Herbal medicines are used globally for the management and prevention of disease. It is recognized that between 65% to 80% of earth inhabitants uses herbal medicine as prime form of wellbeing. Many clients trust herbal medicines as of "natural" source and consequently are harmless substitute to usual remedies.¹⁵ The expecting women also uses herbal medicine, most frequently ginger, peppermint, thyme, cranberry, chamomile, aniseeds, green tea and raspberry over and over again throughout the three trimesters of pregnancy.¹⁶

MATERIALS AND METHODS

This in vitro study was executed in the Pathology Department of Ayub Medical College and outdoor clinics of Ayub Teaching Hospital, Abbottabad, from May 2020 to December 2020. A total of 72 symptomatic pregnant ladies of urinary tract infection were screened and out of these 60 pregnant ladies in their 2nd and 3rd trimester were selected after their positive urine cultures for *E. coli*. Written consent was taken from every patient on the study proforma. Mid

stream urine samples were collected in sterile containers from these patients, with suspected urinary tract infection. Patients on antibiotics or any associated diseases were excluded. Following the confirmation of 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 recognized on the basis of cultural characteristics and confirmed by API 20E standardized identification system. Sensitivity against vaccinium macrocarpon was performed by putting 100 µg of vaccinium macrocarpon solution in hole punched in nutrient agar. For this purpose a commercially obtainable packet of 250 mg vaccinium macrocarpon concentrate was dissolved in 50 ml distilled water. The antibiotics selected for comparison were those which are generally used in practice for the management of urinary tract infection in pregnant women. These were Co-amoxiclav (30 µg) and Cefixime (5 µg). Sensitivity of these was executed on nutrient agar via the Kirby-Bauer disc diffusion technique. Plates were incubated at 37°C for 24 hours and zones of inhibition were calculated in mm.

Statistical analysis: The data was analyzed by statistical packages for social sciences (SPSS) version 24.0. The antibacterial activity was expressed as mean \pm SD.

RESULTS

The distribution of measures of Vaccinium macrocarpon, Cefixime and Co-amoxiclav was explored by using Kolmogorov-Smirnov test, Shapiro-Wilk and Box Plot. Mean and standard deviation were calculated for measures of Vaccinium macrocarpon, Cefixime and Co-amoxiclav. Student t-test for two independent samples was used to establish the comparison between measures of Vaccinium macrocarpon, Cefixime and Co-amoxiclav.

P-values of Kolmogorov-Smirnov and Shapiro-Wilk tests highlighted the measures are following the approximately normal distribution of Vaccinium macrocarpon, Cefixime and Co-amoxiclav.

Table No. 1: Distribution of Vaccinium macrocarpon, Cefixime and Co-amoxiclav

Group	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	P-Value	Statistic	df	P-Value
Vaccinium Macrocarpon	0.203	20	0.030	0.914	20	0.075
Cefixime	0.129	20	0.200*	0.954	20	0.435
Co-amoxiclav	0.125	20	0.200*	0.934	20	0.186

The above graphical representation also affirms the approximately normal distribution of Vaccinium macrocarpon, Cefixime and Co-amoxiclav.

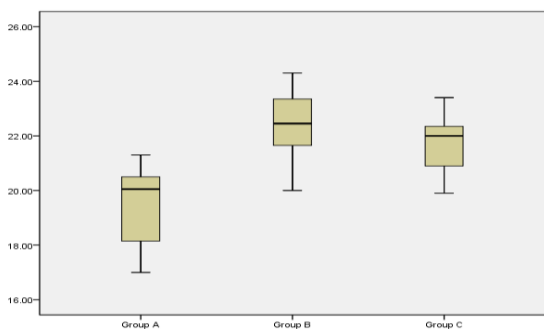


Figure No.1: Graphical Distribution of Vaccinium macrocarpon, Cefixime and Co-amoxiclav

Table No.2: Mean and SD of Vaccinium macrocarpon and Cefixime

Group	N	Mean	Std. Deviation
Vaccinium Macrocarpon	20	19.47	1.37
Cefixime	20	22.41	1.26
Co-amoxiclav	20	21.75	1.09

The highest mean value presented by Cefixime whereas runner up by Co-amoxiclav. It means the highest response given by Cefixime comparatively to Vaccinium macrocarpon and Co-amoxiclav whereas second best response given by Co-amoxiclav than Vaccinium macrocarpon.

Table No.3: Comparison between Vaccinium macrocarpon and Cefixime

Group	N	Mean	SD	T-test	P value
Vaccinium Macrocarpon	20	19.47	1.37	-7.08	0.000
Cefixime	20	22.41	1.26		

The mean value with less variation seen in Cefixime which comparatively giving better response than Vaccinium macrocarpon and significant p-values also affirms the significant difference between the response of both Vaccinium macrocarpon and Cefixime.

Table No.4: Comparison between Vaccinium macrocarpon and Co-amoxiclav

Group	N	Mean	SD	T-test	P-Value
Vaccinium Macrocarpon	20	19.47	1.37	-5.8	0.000
Co-amoxiclav	20	21.75	1.09		

The mean value with less variation seen in Co-amoxiclav which comparatively giving better response than Vaccinium macrocarpon and significant p-values, also confirms the significant difference between the response of both Vaccinium macrocarpon and Co-amoxiclav.

Table No.5: Comparison between Cefixime and Co-amoxiclav

Group	N	Mean	SD	T-test	P-Value
Cefixime	20	22.41	1.26	1.77	0.08
Co-amoxiclav	20	21.75	1.09		

The mean value with less variation was seen in Cefixime which comparatively was giving better response than Co-amoxiclav and insignificant p-value also sanctions the meaningless difference between the response of both Co-amoxiclav and Cefixime.

DISCUSSION

Expecting women are at a great threat of attaining urinary tract infection owing to functional as well as anatomical alterations in pregnancy. If urinary tract infection is not treated, it is linked with 30 % possibility of mounting pyelonephritis.¹⁷ Fair efficacy divergence intervening between various antibiotic treatments for UTI in women. It provides a useful tool for clinical decision making in everyday practice. Ciprofloxacin and Gatifloxacin emerge to be the mainly effectual treatments. On the other hand, Quinolones have escalating resistance rates and are connected with adverse effects.¹⁸

From the current revise, we conclude that every expectant female should be monitored for bacteriuria once in every trimester, by doing scheduled urine culture. The most predominant organisms causing urinary tract infection, are Staphylococcus aureus and E-coli. Drug of choice for nearly all is Cefixime and Co-amoxiclav. It is suggested to become aware of bacteriuria in pregnant females and take care with suitable antibiotic therapy as this could significantly lessen the undesirable maternal and fetal outcome. Preventive procedures for example, drinking cranberry juice or sanitation measure, like wiping the genitals from front to back etc., are a few of the measures that was recommended in different studies.

As expecting women have high chance of risk of urinary tract infection found in literature and also said infection observed in this study during examination or treatment of expecting patients. Antibiotic medicine (ciprofloxacin or cefixime) gave the significant results and is considered an effectual treatment in the literature and in this study so it's too clear that effectiveness of antibiotic medicine is comparable between literature and findings of this study.

CONCLUSION

In this study, we have made an obvious expression that Cefixime treatment of urinary tract infection in expecting mothers can be considered as one of the finest option and suggested it for the pregnant ladies.

Author's Contribution:

Concept & Design of Study: Saima Bukhari
 Drafting: Saima Bukhari
 Data Analysis: Zakia Subhan
 Revisiting Critically: Wajid Ali
 Final Approval of version: Saima Bukhari

Conflict of Interest: The study has no conflict of interest to declare by any author.

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