*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*
*e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 3 Ver.8 March. (2018), PP 29-31*
*www.iosrjournals.org*

# Role of Cranberry Extract in Prevention of Urinary Tract Infection inDJ Stented CKD Patients

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***Abstract***
***Introduction****: Number of patients of chronic kidney disease(CKD) due to urinary lithiasis are increasing worldwide and episodes of UTI in this population are common in occurrence. This study is done to clear the role of cranberries in prevention of UTI in DJ stented CKD patients.*
***Material and methods:*** *This study was conducted in PGIMS, Rohtak, India. Total 60 DJ stented CKD patients included in the study which were divided into two groups. Patients of group-I received cranberry extract and patients of group-II did not receive cranberry extract. Single dose of prophylactic antibiotic given to patients of both the groups.*
***Results:****In group-I, total 6 patients developed episodes of UTI within 3 months of DJ stenting. In group-II, total 18 patients developed episodes of UTI within 3 months of DJ stenting. The difference in occurrence of UTI between two groups was statistically significant (p<0.05). Most commonly isolated bacteria from cultures, among both the groups, were E.coli.*
***Conclusion:*** *Cranberry extract is useful in DJ stented CKD patients to prevent the episodes of UTI. However, in light of the heterogeneity of clinical study designs and the lack of consensus regarding the dosage regimen and formulation to use, further studies are required to establish its role in UTI prevention.*
***Keywords:*** *Cranberries, Cranberry extract, DJ stented CKD patients, UTI prevention*

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Date of Submission: 01-03-2018 Date of acceptance: 19-03-2018

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## I. Introduction

The diagnosisof chronic kidney disease (CKD) implies a persistent abnormality in glomerular filtration rate (GFR) with a wide spectrum of causes.Number of the patients of CKD are persistently increasing worldwide but the management protocols to treat urinary tract infections (UTI) in these patients are unclear. There are limited number of antibiotics which can be used to treat UTI in CKD patients in normal doses, most of them require dose alteration which may affect the effectiveness of these antibiotics. Because of these reasons, treatment of UTI in these patients become even more difficult. So prevention of UTI is an intelligent strategy in this group of patients. There are reports which suggest the role of cranberries in prevention of UTI. This study was conducted to clear the role of cranberries in prevention of UTI in DJ stented CKD patients.

## II. Material And Methods

This study was conducted in the department of nephrology and department of urology, PGIMS Rohtak India, from September 2016 to September 2017. The study was done on the patients of CKD due to renal or ureteric calculi who required DJ stenting. Total 60 patients of CKD due to urinary lithiasis were included in the study. Exclusion criteria of study were CKD due to other causes, hemodynamically unstable patients, patients with coagulopathy and patients with UTI. All the included patients had sterile urine culture and none of the patient had symptoms of UTI like burning micturition, fever, suprapubic pain or hematuria. Injection ceftriaxone 1gm i.v. stat given to all the patients just before DJ stenting. These patients were randomized into two groups by card method. Group-I had 30 patients who received tablets of cranberry extract 300mg BD after DJ stenting for 3 months. Group-II also had 30 patients who did not receive tablets of cranberry extract. All these 60 patients were followed up for 3 months and symptoms of UTI were observed. UTI was confirmed by urine culture and treated with appropriate antibiotics.

## III. Results

A total of 60 patients of CKD due to urinary lithiasis were admitted to our ward from 1 September 2016 to 1 September 2017. The mean age of the patients of group-I were 52 years, and mean age of the patients of group-II were 56 years. There was no statistically significant difference between the age of two groups($p>0.05$). There were 20 females and 10 males in group-I; and there were 18 females and 12 males in group-II. Both the groups were comparable with regard to sex ratio. Twelve patients in group-I had Foley's catheter and 10 patients in group-II had Foley's catheter. There were no statistically significant difference between two groups in relation to Foley's catheterization. In group-I, 8 patients were diabetic and in group-II, 10 patients were diabetic. The difference between two groups was statistically insignificant. In group-I, total 6 patients developed episodes of UTI within 3 months of DJ stenting. In group-II, total 18 patients developed episodes of UTI within 3 months of DJ stenting. The difference in occurrence of UTI between two groups was statistically significant ($p<0.05$). Most commonly isolated bacteria from cultures, among both the groups, were E.coli.

**Table-1**

| | Group-I | Group-II |
|---|---|---|
| Total no.of patients | 30 | 30 |
| Mean age in years | 52 | 56 |
| Male | 20 | 18 |
| female | 10 | 12 |
| Foley' catheterized patients | 12 | 10 |
| UTI episodes | 6 | 18 |
| DM | 8 | 10 |
| Type of bacteria | | |
| E.coli | 4 | 10 |
| Proteous | 1 | 2 |
| Klebsiella | 1 | 2 |
| Enterococcus | 0 | 1 |
| Pseudomonas | 0 | 1 |
| Staphylococcus | 0 | 2 |

**Table-2**

| | Analysis of UTI in group-I | Analysis of UTI in group-II |
|---|---|---|
| Total numbers | 6 | 18 |
| Male/Female | 2/4 | 7/11 |
| DM | 2 | 7 |
| Foley's catheterized | 1 | 3 |
| Lower/Upper tract UTI | 6/0 | 15/3 |

## IV. Discussion

CKD has already become a burden of global health (1). Because of advancement in hemodialysis and medical care, patients of CKD have had prolonged survival. These patients may have some medical problems that cause CKD, such as diabetes mellitus (DM), uncontrolled high blood pressure, primary kidney diseases, or drug toxicities, which may result in chronic medical problems. They may have complications of CKD, such as hypertension, malnutrition, anemia, bone disease, and decreased quality of life (2). In addition, due to prolonged hemodialysis that may compromise their immune system, they are vulnerable to infections, including UTIs.

Mean age of patients in this study was 54 years. In a study by Zhang et al. (3) they found a high prevalence(17.4%) of CKD among older adults (50 to 74 years) from 9806 participants. In our study females were more prone for UTI. Females are prone to UTIs due to the shortness of the urethra, which is close to the vagina and anus; the lack of prostatic fluid, which has antibacterial activity; or the use of spermicides and/or diaphragms (4). Patients with DM are more likely to have UTI because of so many factors which are altered in DM.Multiple potential mechanisms unique to diabetes may contribute to the increased risk of UTI in diabetic patients(5). Higher glucose concentrations in urine may promote the growth of pathogenic bacteria(6). Various impairments in the immune system, including humoral, cellular, and innate immunity may contribute in the pathogenesis of UTI in diabetic patients(7). Autonomic neuropathy involving the genitourinary tract results in dysfunctional voiding and urinary retention, decreasing physical bacterial clearance through micturition, thereby facilitating bacterial growth(8).

Most UTIs only involve the urethra and bladder, in the lower tract. However, UTIs can involve the ureters and kidneys, in the upper tract. Although upper tract UTIs are more rare than lower tract UTIs, they're also usually more severe(9).Bacteria in the enteric flora periodically gain access to the genito-urinary tract. Close proximity of anus in women to peri-urethra is a likely factor. Bacterial colonization of peri-urethra often precedes the onset of bladder bacteriuria (10). The urethra and uretero-vesicle junction are mechanical barriers that prevent ascension. In our study also, most of the patients had symptoms of lower tract UTI.

Cranberries or its extract have been tried in many trials to prevent UTI. The current hypothesis is that cranberries work principally by preventing the adhesion of type 1 and p-fimbriae strains (particularly from *E. coli*) to the urothelium (11-14). Without adhesion, the bacteria cannot infect the mucosal surface. *In vitro*, this adhesion is mediated by two components of cranberries: fructose, which inhibits the adherence of type 1 fimbriae, and proanthocyanidins (PAC), which inhibits the adherence of p-fimbriae (15-17).

Ledda et al. (18)observed that, in the cranberry group, the reduction in the frequency of UTI episodes during the study period compared with the two months before the inclusion was 73.3% ($p < 0.05$). Urine evaluation was completely negative in 20/22 subjects in the Cranberry group (90.9%) and in 11 control subjects (50.0%; $p < 0.005$). No adverse events were observed. Cranberry appears to be a safe, herbal choice for UTI prophylaxis and has relatively good tolerability. Another studies(19,20) also have found that the use of cranberry for up to 12 months is safe and moderately effective. McMurdo et al. (21) compared Trimethoprim and cranberry extract. They observed that Trimethoprim had a very limited advantage over cranberry extract in the prevention of recurrent UTIs in older women and had more adverse effects. They suggested that older women with recurrent UTIs to weigh up the inherent attractions of a cheap, natural product like cranberry extract whose use does not carry the risk of antimicrobial resistance or super-infection with *Clostridium difficile* or fungi. Freire Gde C. (22) suggests that cranberry juice is less effective in prevention of UTI than previously indicated. Our study observed that cranberry extract is useful in prevention of UTI in DJ stented CKD patients and minimise prophylactic use of antibiotics in this population.

## V. Conclusion

Cranberry extract is useful in DJ stented CKD patients to prevent the episodes of UTI. However, in light of the heterogeneity of clinical study designs and the lack of consensus regarding the dosage regimen and formulation to use, further studies are required to establish its role in UTI prevention.

## References


[1]. Nugent RA, Fathima SF, Feigl AB, Chyung D. The burden of chronic kidneydisease on developing nations: a 21st century challenge in global health. NephronClin Pract. 2011;118(3):269-77.

[2]. 2.Thomas R, Kanso A, Sedor JR. Chronic Kidney Disease and Its Complications. Primary care. 2008;35(2):329.

[3]. Zhang QL, Koenig W, Raum E, Stegmaier C, Brenner H, Rothenbacher D. Epidemiology of chronic kidney disease: results from a population of older adults in Germany. Prev Med. 2009 Feb;48(2):122-7.

[4]. Valiquette L. Urinary tract infections in women. Can J Urol. 2001;8:6–12.

[5]. Chen SL, Jackson SL, Boyko EJ. Diabetes mellitus and urinary tract infection: epidemiology, pathogenesis and proposed studies in animal models. J Urol. 2009;182(6):51–56.

[6]. Wang MC, Tseng CC, Wu AB, et al. Bacterial characteristics and glycemic control in diabetic patients with Escherichia coli urinary tract infection. J Microbiol Immunol Infect. 2013;46(1):24–29.

[7]. Geerlings SE, Brouwer EC, Van Kessel KC, Gaastra W, Stolk RP, Hoepelman AI. Cytokine secretion is impaired in women with diabetes mellitus. Eur J Clin Invest. 2000;30(11):995–1001.

[8]. Kaplan SA, Te AE, Blaivas JG. Urodynamic findings in patients with diabetic cystopathy. J Urol. 1995;153(2):342–344.

[9]. Minardi D, d'Anzeo G, Cantoro D, Conti A, Muzzonigro G. Urinary tract infections in women: etiology and treatment options. International Journal of General Medicine. 2011;4:333-343.

[10]. Moore KN, Day RA, Albers M. Pathogenesis of urinary tract infections: a review. J Clin Nurs. 2002 Sep;11(5):568-74.

[11]. Schmidt DR, Sobota AE. An examination of the anti-adherence activity of cranberry juice on urinary and nonurinary bacterial isolates. Microbios. 1988;55(224-225):173–81.

[12]. Zafriri D, Ofek I, Adar R, Pocino M, Sharon N. Inhibitory activity of cranberry juice on adherence of type 1 and type P fimbriated Escherichia coli to eucaryotic cells. Antimicrob Agents Chemother. 1989;33(1):92–8.

[13]. Pinzon-Arango PA, Liu Y, Camesano TA. Role of cranberry on bacterial adhesion forces and implications for Escherichia coli-uroepithelial cell attachment. J Med Food. 2009;12(2):259–70.

[14]. Ofek I, Mirelman D, Sharon N. Adherence of Escherichia coli to human mucosal cells mediated by mannose receptors. Nature. 1977;265(5595):623–5.

[15]. Foo LY, Lu Y, Howell AB, Vorsa N. The structure of cranberry proanthocyanidins which inhibit adherence of uropathogenic P-fimbriated Escherichia coli in vitro. Phytochemistry. 2000;54(2):173–81.

[16]. Howell AB, Vorsa N, Der Marderosian A, Foo LY. Inhibition of the adherence of P-fimbriated Escherichia coli to uroepithelial-cell surfaces by proanthocyanidin extracts from cranberries. N Engl J Med. 1998;339(15):1085–6.

[17]. Foo LY, Lu Y, Howell AB, Vorsa N. A-Type proanthocyanidin trimers from cranberry that inhibit adherence of uropathogenic P-fimbriated Escherichia coli. J Nat Prod. 2000;63(9):1225–8.

[18]. Ledda A, Bottari A, Luzzi R, Belcaro G, Hu S, Dugall M, Hosoi M, Ippolito E, Corsi M, Gizzi G, Morazzoni P, Riva A, Giacomelli L, Togni S. Cranberry supplementation in the prevention of non-severe lower urinary tract infections: a pilot study. Eur Rev Med Pharmacol Sci. 2015 Jan;19(1):77-80.

[19]. Kontiokari T, Sundqvist K, Nuutinen M, Pokka T, Koskela M, Uhari M. Randomised trial of cranberry lingonberry juice and Lactobacillus GG drink for the prevention of urinary tract infections in women. BMJ. 2001;322:1571.

[20]. Stothers L. A randomized trial to evaluate effectiveness and cost effectiveness of naturopathic cranberry products as prophylaxis against urinary tract infection in women. Can J Urol. 2002;9:1558–62.

[21]. McMurdo MET, Argo I, Phillips G, Daly F, Davey P. Cranberry or trimethoprim for the prevention of recurrent urinary tract infections? A randomized controlled trial in older women. Journal of Antimicrobial Chemotherapy. 2009;63(2):389-395.

[22]. Freire Gde C. Cranberries for preventing urinary tract infections. Sao Paulo Med J. 2013;131(5):363.