

Evidence-Based Practice Critically Appraised Topic

Cranberry Products and Urinary Tract Infections

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Clinical Scenario

An 87 year old white female patient presents to the clinic with her son. According to the patient's son, the assisted living facility reported that his mother had an increase in confusion, frequency, urgency, and dysuria for the past week. Urine: positive for leukocytes (TNTC) and bacteria (3+). Results indicate a urinary tract infection (UTI). The urine culture indicates E coli > 100,000 cfu/ml. The patient has had four UTIs in the last six months. With each UTI, she has had acute delirium and combativeness. The patient has an allergy to sulfa medications. The patient has a medical history of multiple sclerosis, dementia, stage three renal failure, and heart failure.

Clinical Question

Among women with frequent urinary tract infections, are cranberry products effective in the prevention of UTIs when compared to a placebo?

Articles

- Howell, A.B., Botto, H., Combescure, C., Blanc-Potard, A., Gausa, L., Matsumoto, T., Tenke, P, Sotto, A., & Lavigne, J. (2010). Dosage effect on uropathogenic Escherichia coli anti-adhesion activity in urine following consumption of cranberry powder standardized for proanthocyanidin content: a multicentric randomized double blind study. *BMC infectious disease, 10(94)*. doi: 10.1186/1471-2334-10-94.
- Jepson, R.G. & Craig, J.C. Cranberries for preventing urinary tract infections. *Cochrane Database of Systematic Reviews 2008*, Issue 1. Art. No.: CD001321. doi:

10.1002/14651858.CD001321.pub4.

### Summary and Appraisal of Key Evidence

**Study 1** Howell et.al., (2010) completed a multi-location randomized, double-blind versus placebo study to evaluate whether cranberry powder can be utilized in the prevention of UTIs by inhibiting bacterial adhesion and virulence in the urinary tract, providing Level 1, Grade A level of evidence. Study participants included-32 women from Japan, Spain, France, and Hungary. The women were sexually active, over the age of 18, and demonstrated normal renal function. Participants were excluded if they had been on antibiotic therapy in the last 6 months, had an allergy or intolerance to cranberry products, were pregnant, or routinely consumed food supplements which had vitamins, minerals or trace elements. The study did not include the ages of the women, and it cannot be assumed that the elderly population is represented in this study.

The study was carried out using commercially available capsules of cranberry powder in 18 or 36 mg proanthocyanidins (PACs) equivalents. Each participant in the study was given two capsules a day. The capsules contained either a placebo or a dose of proanthocyanidins in a dose range of 18 or 36 PACs equivalents. Depending on the type of capsule administered and the dose received, the total dose given to the participant would be 0, 18, 36, or 72 PACs. The volunteers consumed the capsules at the same time every day and urine was collected at the same time each day. A uropathogenic E. coli was isolated and marked with a fluorescent protein for observation. Anti-adhesion activity was significant in the urine from the volunteers that consumed cranberry powder compared to placebo. The 72 PACs equivalent was found to be significant in the anti-adhesion activity. There was a dose dependent decrease in bacterial adhesion with cranberry intake. Interestingly dosing amount and time of effectiveness does matter and it is suggested that the cranberry powder being taken twice a day at 36 PACs.

**Study 2** Jepson & Craig, (2008) independently assessed and extracted information on 10 studies (n=1049, five cross over, five parallel groups) that were conducted on cranberry product versus placebo. Seven studies conducted using cranberry/cranberry-lingonberry juice versus placebo/water and four studies evaluating cranberry tablets versus placebo (one study evaluated both juice and powder) in preventing UTIs in susceptible populations, providing Level 1, Grade A level of evidence. The participants in these studies included participants with a history of recurrent lower UTIs, elderly men and women, pregnant women, participants that either needed intermittent or indwelling catheterization, or having an abnormality of the urinary tract. Exclusions to this meta-analysis included studies of the treatment of UTIs and urinary tract conditions not caused by bacterial infection. All of the studies had side effects in common and the dropout rate was high. It was concluded that cranberry juice and capsules can prevent recurrent infections in women. There was not significant evidence showing effectiveness in

elderly men and women. There was evidence that it was not effective in people who needed catheterization.

### Results

The relevance of these two studies indicated that the use of cranberry products can be effective in the prevention of UTIs in women. Howell et al.(2010), study met criteria for multi-location randomized, double-blind trial which revealed a dose-dependent and time-dependent effect of E. coli adherence to bladder epithelial cells with the administration of PACs. This study also considered the natural ability of the body to have endogenous adhesion inhibitors, the effect of diet, and lifestyle between Asian and European cultures. The limitations of this study were the exclusion of the elderly, women with catheters, and number of participants. The dose of cranberry product needs to be in the range of 72 PACs equivalents to be the most effective in the prevention of UTIs. There was a significant bacterial anti-adhesion activity in the urine sample collected from the participants that consumed the cranberry product ( $p<.001$ ).

Jepson & Craig (2008) analyzed ten studies comparing cranberry/cranberry-lingonberry versus placebo. The participants ( $n=1049$ ) were from all populations susceptible to UTIs. The limitations to the study include participants not completing the study, dose of the cranberry juice and duration of the therapy unknown for optimal effect, and the evidence of the studies were not clear when it pertained to the elderly population. The authors had to seek out missing information in the studies. Missing information, to include side effects, and discrepancies were resolved by the authors via discussion. Out of 10 studies analyzed, only two of them gave a P value. There was some evidence to show that cranberries (juice and capsules) can prevent recurrent infections in women.

### Clinical Bottom Line

The results of the two studies indicate that cranberry products are recommended for the prevention of UTIs. In order for cranberry products to be effective, it is recommended that the dose of the product be 72 PAC equivalents for the prevention of bacterial adhesion to the lining of the urinary tract. Cranberry products are not recommended for prevention of UTIs in the elderly and patients with catheters. UTIs are 50% more common in women than men and statistically 30% of women will experience an UTI in their lifetime, thus showing the relevance of UTI prevention.

### Implications for Practice

I would recommend using cranberry products for the prevention of UTIs in women. I would also recommend cranberry products to the elderly and patients with an abnormality of the urinary tract. The study by Howell et al. (2010) revealed encouraging statistics in the prevention of UTIs

in women. There were no risks mentioned in either study on using cranberry products. More research is needed to assess the effectiveness of cranberry products in the elderly and patients with abnormalities of the urinary tract.