Efficacy of Cranberry Products:

An Alternative UTI Treatment

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One of the most common bacterial infections is a urinary tract infection (UTI) (Vasileiou et al., 2013). UTIs are categorized by the location of infection. Infections may occur in the urethra kidneys and bladder (Vasileiou et al., 2013). Both men and women are at risk for infection (Vasileiou et al., 2013). However, women are approximately 50 times more susceptible (Vasileiou et al., 2013). Bass-Ware et al. (2014) states, UTIs are the second most common infection in women all over the world. Furthermore UTIs have a reported 26.6% rate of recurrence within 6 months (Vasileiou et al., 2013). UTIs are clinically described as minor infections, but the associated symptoms can greatly alter an individual's quality of life (Bass-Ware et al., 2014).

Most UTIs begin with the accumulation of pathogenic organisms in the urinary tract (Vasileiou et al., 2013). This creates a prolific environment for any bacteria that enters the tract (Vasileiou et al., 2013). Escherichia coli are the more common culprits of infections accounting for 80-90% of infections (Vasileiou et al., 2013 and Bass-Ware et al., 2014). Staphylococcus Saprophyticus is responsible for roughly 5to10% and the least common pathogen is Proteus Bacteria (Bass-Ware et al., 2014). Antibiotic prophylaxis is used in low doses as treatment but has become the cause of microbial resistance (Vasileiou et al., 2013 and Bass-Ware et al., 2014). It is for this reason that alternative methods of prevention and have been sought after (Vasileiou et al., 2013).

A growing body of evidence suggests that cranberries may be the answer not only to prevention, but also to treatment (Vasileiou et al., 2013). Studies have shown adults who frequently consume cranberry juice are 38% less likely to develop UTI symptoms (Bass-Ware et al., 2014). Incidences of UTI are reported to be 3-9% in young women and increase to 20% in women over 65 (Bass-Ware et al., 2014). A review of literature performed by Vasileiou et al.

(2013) and Bass-Ware et al. (2014) observed the mechanisms by which cranberries act along with their acclaimed benefits.

The earliest studies of cranberry's effect on UTIs were focused on the ability to lower the pH of urine, thus inhibiting bacterial growth. Several studies noted a reduction in urine pH through consumption of cranberry juice, but not enough to retard bacterial growth (Vasileiou et al., 2013). One study found that a pH of 5.0 was necessary to obstruct the reproduction of bacteria (Vasileiou et al., 2013). It was determined that cranberry juice could not adequately lower the pH of urine except in rare cases when large volumes of cranberry juice had been consumed (Vasileiou et al., 2013).

The next preventative step examined cranberry's effect on the attachment and colonization of bacteria, specifically E coli (Vasileiou et al., 2013). E coli contain fimbria that produces adhesins allowing it to attach to cells in the urinary tract (Vasileiou et al., 2013). Cranberries contain two compounds, fructose and proanthocyanidins (PAC), that have been shown to adversely affect adhesion production (Vasileiou et al., 2013). Unlike fructose, PAC is exclusive to the Vaccinium genus which includes cranberries (Vasileiou et al., 2013). Studies have confirmed PAC's strong dose dependent ability to inhibit the mannose-resistant adhesions in urinary E coli while eliciting only a modest affect on fecal isolates (Vasileiou et al., 2013).

Another mechanism of UTI prevention by cranberries is the creation of nitric oxide through the reduction and oxidation of nitrite (Vasileiou et al., 2013). This process of dismutation occurs in slightly acidic conditions which are possible due to cranberries potential to lower pH (Vasileiou et al., 2013). The antimicrobial properties of nitric oxide are reportedly time and concentration dependent (Vasileiou et al., 2013).

A large component of cranberry's benefits lie in symptom relief. The invasion of pathogens provokes an inflammatory response to which the ingredients of cranberries react (Vasileiou et al., 2013). The ursolic acid in cranberries inhibits cyclooxygenase-2, which plays a major role in inflammation pathways (Vasileiou et al., 2013). As shown in the research of Vasileiou et al. (2013), cranberry extracts inhibit activation of many mechanisms in the inflammatory pathways. This suggests cranberries are also responsible for the mitigation of inflammation (Vasileiou et al., 2013).

Gallien et al. (2014) takes an interesting approach by studying cranberry products effectiveness on population with confounding ailments. Multiple sclerosis (MS) patients are at high risk for urinary tract dysfunction due to their spinal disease (Gallien et al., 2014). It is estimated that 50-80% of the individuals with MS will develop some form of urinary disorder which may be coupled with the acquisition of a UTI (Gallien et al., 2014). A study performed by Gallien et al. (2014) tested the prevention of UTIs in MS patients with daily doses of cranberry extract.

Patients ranging from the ages of 18 to 70, with urinary disorders were observed for 1 year across 8 different locations (Gallien et al., 2014). Individuals received a 3 month supply of either powdered cranberry extract or a placebo which they were to consume twice a day (Gallien et al., 2014). Each dose of cranberry extract contained 18g of PAC composing a daily total of 36g of PAC (Gallien et al., 2014). Compliance was observed by the number of empty sachets. A total of 171 patients were observed, of which 89 had been given a placebo and 82 had been given cranberry extract (Gallien et al., 2014).

At the conclusion of the 1 year follow up, there was no significant difference between cranberry and placebo test groups concerning UTI reduction (Gallien et al., 2014). The cranberry

group reported a 37.8% rate of UTI, while the placebo group reported 40.4% (Gallien et al., 2014). A difference in recurrence of infections between the groups was also insignificant (Gallien et al., 2014). The data suggests that the consumption of cranberry extract is an inefficient method of reducing UTI occurrence in MS patients (Gallien et al., 2014). In this study, cranberry extract also had no effect on the UTI symptoms (Gallien et al., 2014). According to Gallien et al. (2014), this evidence supports the findings of previous studies in spinal cord injury patients that found cranberry to be an ineffective treatment. The main point of conducting the study was to address the limitations in previous studies (Gallien et al., 2014). Gallien et al. (2013) concluded by stating the consumption of 36mg of PAC does not prevent UTIs in MS patients with bladder dysfunction.

UTIs are also common place in long-term care facilities, making up approximately 25% of all infections in these facilities (Caljouw et al., 2014). The symptoms may be minor but can cause server consequences such as dehydration (Caljouw et al., 2014). Caljouw et al. (2014) examined the effect of cranberry capsules in elderly, institutionalized populations. Using a double-blind randomized method, Caljouw et al. (2014) studied 928 residents, separated into cranberry or placebo groups, at multiple sites. Capsules were administered twice a day for 1 year (Caljouw et al., 2014). Each cranberry capsule contained 9mg of PAC for a daily total of 18mg (Caljouw et al., 2014). The study found that high UTI risk patients experienced a 26% decrease in clinically defined UTI occurrence, while low UTI risk patients experience no difference (Caljouw et al., 2014). A review of the results determined that the effectiveness of the cranberry product is dependent on the population being treated. Caljouw et al. (2014) notes that the positive effect displayed in this older high UTI risk patients may oppose previous studies due to several factors: the type of cranberry product, the population type, and increased sample size.

Many studies examine the effect of cranberry juice and cranberry capsules, Burleigh et al. (2013) decided to study the effects of dried cranberries. One of the focuses became the intestinal tract as an alternative site for prevention because many recurring infections are believed to be related to E coli in the gut flora (Burleigh et al., 2013). A clinical study was performed to determine the efficacy of sweetened, dried cranberries on recurrent UTI in 20 women.

Prior to the experiment, participants underwent a 2 week washout from antibiotics (Burleigh et al., 2013). Each woman was to consume 42g of sweetened dried cranberries everyday for 2 weeks. Rectal swab samples were taken before and after the 2 week trial. Burleigh et al. (2013) examined the 6 month UTI rates of the women before and after the experiment as well as the time until first recurrence.

The average UTI recurrence rate made a significant drop in the following 6 months, from 2.4 to 1.1 (Burleigh et al., 2013). These women also had a significant decrease in rate of infection when compared to the Kaplan-Meier analysis, which compared vaccinated and placebo rates on infection (Burleigh et al., 2013). As for the effect of cranberries on the intestinal flora, rectal swabs showed no change in E coli isolates (Burleigh et al., 2013)

Overall studies do not support the common theories of cranberry's ability to inhibit bacterial growth or sterilize the urinary tract (Vasileiou et al., 2013). On the other hand, studies do confirm the ability to hinder bacterial adhesion and aid in inflammatory symptom relief (Vasileiou et al., 2013). Though there are still some conflicting conclusions, much of the data presented suggests cranberries may be more effective than not, leading to their use as an alternative to antibiotic treatment.

References

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