Clinical Studies on Cranberry (*Vaccinium macrocarpon* Aiton)

Urinary Tract Infection

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Kontiokari *et al.*, 2001	Urinary tract infection prevention	O, R, C n=150	12 months	50 ml of cranberry-lingonberry juice daily for 6 months or 100 ml of lactobacillus drink 5 days/wk for 1 year, or no intervention	Cranberry-lingonberry juice concentrate or lactobacillus drink	Cranberry juice, compared to lactobacillus or no intervention, significantly reduced the recurrence of urinary tract infections. The women had at least 1 recurrence at the following rates: 8 (16%) of the women in cranberry group, 19 (39%) in the lactobacillus group, and 18 (36%) in the control group. The cranberry group demonstrated a 20% reduction in absolute risk compared with the control group.
Schlager *et al.*, 1999	Urinary tract system assessment of bacteriuria using preventive therapy	DB, PC, C n=15 children, 2–18 years, with neurogenic bladder	6 months (3-month crossover), receiving clean intermittent cathaterization	60 ml/day juice concentrate (equivalent to 300 ml cranberry juice cocktail)	Specially prepared unsweetened cranberry juice concentrate (Ocean Spray®) vs. cranberry Jell-O® placebo concentrate (Kraft Foods Inc.)	Cranberry concentrate had no effect on bacteriuria, and no significant difference was observed in the acidification of urine vs. placebo. Results suggest that cranberry juice may not be effective in preventing UTIs in children with neurogenic bladder receiving intermittent catheterization.
Dignam *et al.*, 1998	Urinary tract system	RCS, LC n=538 nursing home patients with a history of UTIs	RCS: 28 months LC:16 months (8 months preintervention; 8 months intervention)	4 ounces juice/day or 450 mg/day	Commercial cranberry juice cocktail or Azo-Cranberry® capsules	In the cross-sectional study, symptomatic UTI rates were significantly reduced in long-term care residents. In the preintervention period of 19 months, there were 545 UTIs. For the full intervention period of 19 months, there were 164 UTIs. The Student T-test was used to compare average numbers of UTIs in preintervention with full intervention, yielding a T-value of 2.84, which is significant (p=0.0008). In the longitudinal cohort study of 113 residents for 16 months, the number of UTIs dropped from 103 in the preintervention period, to 84 during the intervention period. Although cranberry reduced the number of UTIs, the authors recommended additional well-controlled trials.
Walker *et al.*, 1997	Urinary tract system prevention of UTIs	R, DB, PC, C n=10 women; 28–44 yrs with history of recurrent UTIs (at least 4 UTIs in the previous year or at least 1 during previous 3 months)	6 months (3 months cranberry; 3 months placebo). Treatment began after 10-day course of antibiotic therapy for symptomatic UTI. UTI treated with antibiotics was not counted in the study for enrollment criteria.	400 mg, 2x/day dry cranberry solids vs. placebo (dicalcium phosphate)	Solaray® CranActin®, each capsule contains 400 mg powdered cranberry solids	Using Student T–test and 99% confidence interval, daily consumption of cranberry extract was more effective than placebo in reducing the occurrence of UTIs ($p<0.005$).
Jackson and Hicks, 1997	Urinary tract system (effect on urinary pH)	PS, DCO, n=40 (21 completed study) Elderly men residing in nursing home with history of UTIs (mean age, 73 years)	3 months (4 weeks no juice, 4 weeks juice, 4 weeks no juice)	236.6 ml, 3x/day with meals	Cranberry juice (brand not stated)	Urinary pH during juice period was significantly lower than first and second non-juice periods. The findings support the claim that cranberry juice acidifies urine, even in moderate amounts. This study suggests that cranberry juice can be a home health nursing intervention to reduce risk of UTIs in the elderly.

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Foda *et al*., 1995	Urinary tract system	R, SB, C n=21 pediatric neuropathic bladder population prophylaxes receiving clean intermittent catheterization	12 months (6 months cranberry and 6 months water)	15 ml/kg/day cocktail for 6 months; 15 ml/kg/day with water for 6 months	Cranberry juice (brand not stated)	No difference between intervention periods (2-tailed, p=0.5566 [whole group]; p=0.2845 [antimicrobial subset]) with respect to infection. 12 patients dropped out for reasons related to cranberry (taste, caloric load, cost). Fewer infections were observed in 9 patients taking juice and in 9 taking water; no difference was noted in 3 Cranberry, on a daily basis, at 15 ml/kg, did not have any effect greater than water in preventing UTI. This study does not support use of cranberry for antibacterial prophylaxis in pediatric neuropathic bladders.
Avorn *et al*., 1994	Urinary tract system (effect on bacteriuria and pyuria)	R, DB, PC n=153 (elderly women, mean age 78.5 years)	6 months using clean-catch urine samples	300 ml/day vs. placebo	Ocean Spray® Cranberry Juice Cocktail, vs. cranberry-flavored, vitamin C-fortified placebo	After 4 to 8 weeks of regular intake, there was a significantly reduced (95% confidence interval, p=0.004) frequency of bacteriuria and pyuria in the cranberry group. Bacteriuria with pyuria occurred in 28.1% of urine specimens of placebo group compared to 15% in the cranberry group. Cranberry reduced pre-existing bacteria in the urinary tract. Average pH of urine in the cranberry group (6.0) was higher than in the placebo group (5.5). Patients in cranberry group with bacteriuria and pyuria were more likely to convert to non-bacteriuria pyuria than in control group.
Haverkorn and Mandigers, 1994	Urinary tract system	R, PC, C n=17 (elderly patients)	8 weeks (4 weeks cranberry; 4 weeks placebo)	15 ml, 2x/day in water	Cranberry juice diluted in water (brand not stated)	This study confirmed the findings of Avorn *et al*. (1994), suggesting that cranberry juice reduces the frequency of bacteriuria in elderly persons. 3 patients had bacteriuria all the time and 7 at no time during the study. The remaining 7 had fewer occurrences of bacteriuria during the cranberry treatment period (p=0.004). Increased diuresis is unlikely to be the cause of the decreased bacteriuria rate.
Gibson *et al*, 1991	Urinary tract system (prevention of UTI)	O n=28 (nursing home patients)	7 weeks	120–180 ml, ca./day	Cranberry Juice Cocktail, Ocean Spray®	Daily ingestion prevented UTIs in 19 of the 28 nursing home patients. The remaining 9 patients had trace or greater leukocytes and/or nitrates in all their urine and significant colony counts of Gram-negative bacilli. This study suggested that cranberry might be preventive rather than curative.
Rogers, 1991	Urinary tract system	U, MC n=16 girls with neuropathic bladders	2 weeks	180–240 ml, 2x/day for 1 week followed by 3x/day for one week	Cranberry juice (brand not stated)	All urine samples showed a reduction in both red and white cell counts, which suggests a significant reduction in infection. Urine samples from school group continued to culture *E. coli*, whereas cultures from hospital group showed a significant reduction of *E. coli*. Study suggests that cranberry juice is beneficial to children with neuropathic bladders, especially in the case of suspected infection or after bladder surgery. No statistics reported.
Schultz, 1984a	Urinary tract system (acidification of urine)	R, C n=8 (3 women, 5 men) with multiple sclerosis)	41 days (20 days cranberry treatment, 24-hour washout, 20 days orange juice)	180 ml juice, 2x/day; plus 500 mg, 2x/day ascorbic acid	Cranberry juice vs. orange juice control (brand not stated)	Cranberry juice was significantly more effective than orange juice (p<0.001) in acidifying urine, and evening pH values were significantly lower (p<0.001) than morning pH values (N-580).
Kinney and Blount, 1979	Urinary tract system (effect on urinary pH)	R n=40 (21 women, 19 men, mostly students) (ages 20–35 years)	12 days	4 separate groups; 150, 180, 210 or 240 ml, 3x/day with meals	Specially prepared sweetened beverage containing 80% juice, Ocean Spray®	Significant reduction in mean urine pH (p<0.01) was observed from ingestion of cranberry juice in each of the experimental groups. Effect was not dose dependent, and there were no serious side effects.

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Nickey, 1975	Urinary tract system (effect on urinary pH)	n=10	15 days		Cranberry juice and ascorbic acid given alone and in combination (brand not stated)	Mean urinary pH reductions from baseline during administration of cranberry juice and ascorbic acid, alone and in combination. Greatest reduction occurring with combination, with occurrence of mean urinary pH of 5.5 and 5.0 or below. No statistic reported.
Light *et al.*, 1973	Urinary tract system	U n=15 Patients with calcium-containing renal stones (n=10). Patients without calcium-containing renal stones (n=5).	Not stated	Stone-forming patients: 32 oz. daily Normal patients: 32–80 oz. daily	Cranberry juice (brand not stated)	In patients with calcium-containing renal stones, the urinary ionized calcium was reduced with cranberry juice by an average of 50% ($p<0.001$). No consistent change in total or ionized calcium excretion in normals by administration of up to 480 ml juice.
Kahn *et al.*, 1967	Urinary tract system (effect on urinary pH and calcium excretion)	U n=4 healthy, infection-free men	7–11 days	1,500–4,000 ml/day, depending on subject's liquid tolerance, 1x/day	Cranberry Juice Cocktail Ocean Spray®	3 subjects demonstrated only transient decrease in pH and increase in titratable acidity, while fourth sustained these changes for 1 week. 2 subjects experienced progressive increase in urinary calcium, despite absence of sustained urinary acidification effect. Statistics are based on each subject, not on entire group.
Papas *et al.*, 1966	Urinary tract system (treatment of acute UTI)	U n=60 44 women and 16 men with acute UTI (All patients were symptomatic, but only 38 fit colony count criterion of 100,000 organism/ml for UTI)	21 days	ca. 450ml/day	Commercial cranberry juice product (brand not stated)	After 3 weeks of cranberry therapy, a positive clinical response was reported in 53% (32/60) of UTI patients (no urogenital complaints and fewer than 100,000 bacteria per ml urine), while an additional 20% experienced moderate improvement. During the 6 weeks after treatment period, 61% experienced recurrence. Substantial decrease in bacterial count and alleviation of urogenital complaints was significant.
Bodel *et al.*, 1959	Urinary tract system (effects on urine pH and hippuric acid excretion)	U n=5	24 hours	1,200–4,000 ml/day	Cranberry Juice Cocktail, Ocean Spray®	Hippuric acid content of urine increased by several grams a day. Only slight changes in urine pH were reported. Bacteriostatic activity decreases five-fold when urinary pH rises to 5.6. No statistics available.
Fellers *et al.*, 1933	Urinary tract system (effect on urine pH)	U n=6 healthy men (22–27 years)	5 days	100–300 g/day	Fresh cranberries	Cranberry ingestion increased titratable acidity, organic acids, hippuric acid, hydrogen ion concentration, and ammonia in urine, while uric acid and urea nitrogen slightly decreased. Amount of hippuric acid in urine was directly proportional to weight of cranberries eaten.

Other

Author/Year	Subject	Design	Duration	Dosage	Preparation	Results/Conclusion
Tsukada *et al.*, 1994	Dermatological improvement of skin complications from urostomies	U n=13 patients with peristomial skin conditions; (average, 61.5 years)	Average 6 months (3 weeks to 2 years)	160 ml, 1–2x/day	Cranberry juice, 50% concentration (brand not stated)	An improvement in skin condition in 6 patients with erythema, maceration, or pseudoepithelia hyperplasia (PEH) and in 2 patients with maceration or PEH. Study suggests that cranberry juice improves peristomial skin PEH and maceration. Improvement was not due to acidification of urine, as the pH of the fresh urine actually became unexpectedly more alkaline ($p=0.0178$).

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