

Cranberry juice for urinary tract infection in children

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Abstract

Question Several children in my clinic are recovering from urinary tract infections (UTI). A mother of one of the children asked me if I recommended cranberry juice for children to prevent future episodes of UTI. She was given cranberry juice after she suffered from a UTI several months ago.

Answer Cranberry juice has been shown to be effective in preventing adhesion of bacteria such as *Escherichia coli* to the bladder epithelium. Current evidence supports the use of cranberry juice for prevention of UTI in adult women, but no such evidence exists at this time for the prevention of UTI in children. While cranberry juice is very safe for most children, its acidity reduces palatability among children. The dose of cranberry juice to prevent UTI in children has also yet to be determined.

Jus de canneberge pour les infections des voies urinaires chez l'enfant

Résumé

Question Plusieurs enfants de ma clinique se rétablissent d'une infection des voies urinaires (IVU). La mère de l'un d'eux m'a demandé si je recommandais le jus de canneberge pour prévenir de futurs épisodes d'IVU. On lui avait recommandé d'en boire lorsqu'elle a souffert d'une IVU il y a quelques mois.

Réponse Il a été démontré que le jus de canneberge était efficace pour prévenir l'adhésion de bactéries comme *Escherichia coli* à l'épithélium de la vessie. Les données scientifiques actuelles appuient l'utilisation du jus de canneberge pour la prévention des IVU chez les femmes adultes, mais il n'en existe pas pour le moment sur la prévention des IVU chez l'enfant. Si le jus de canneberge est très sécuritaire pour la plupart des enfants, son acidité fait que son goût est moins apprécié des enfants. Il reste aussi à déterminer la quantité de jus de canneberge nécessaire pour prévenir les IVU chez les enfants.

Urinary tract infection (UTI) is one of the most common medical conditions requiring outpatient treatment, affecting millions of children every year. Despite advanced immunization for many bacterial infections, the urinary tract is currently the most frequent site of occult and serious bacterial infections in children.¹ A study of 3581 infants found 3.7% of boys and 2% of girls to have urine cultures positive for bacteria in the first year of life.² During the preschool and school years (1 to 11 years of age), the incidence of screening for bacteriuria is 9 to 10 times higher in girls³ because they have short urethras. The cumulative incidence of symptomatic UTI in children younger than 6 years of age is 6.6% for girls and 1.8% for boys.⁴

Cranberry in UTI

Antibiotics are recommended for all children with proven UTI, and recent guidelines from the American Academy of Pediatrics have been more conservative than in the past when it comes to imaging procedures in children.¹ Additional measures to prevent or treat

UTI include drinking juice of the American cranberry (*Vaccinium macrocarpon*), which has a long folk tradition of use in UTI. Preliminary reports have demonstrated cranberry juice to be effective in patients with UTI caused by antibiotic-resistant bacteria.⁵ Furthermore, the use of cranberry products substantially decreased antibiotic use in some reports.⁶

Traditionally, cranberry has been supplied as fresh berry, drinks, concentrate, and sauce. A cocktail containing 33% cranberry juice was introduced because the pure juice was very acidic (pH level <2.5) and unpalatable.^{7,8} Today, multiple types of capsules and tablets are available.

Mechanism of action

Cranberry contains flavonoids, anthocyanins, catechin, terpenoids, and organic acids (citric, malic, quinic, benzoic, and glucuronic).⁷ Benzoic acid is excreted in the urine as hippuric acid, and the therapeutic effect of cranberry juice has long been attributed to hippuric acid inhibiting the growth of bacteria.⁷ However,

an acid medium is required for bacteriostatic activity of hippuric acid, and it has been shown that, owing to the low level of benzoic acid in cranberry (<0.1%), ingestion of more than 4 L of cranberry juice a day is required to acidify the urine and increase hippuric acid excretion.⁹

Another mechanism of action is the inhibition of adhesion of type I and P-fimbriated uropathogens (such as *Escherichia coli*) to the uroepithelium, prohibiting colonization and infection.^{10,11} The *E coli* fimbriae produce 2 adhesins, one of which is mannose sensitive and the other of which is mannose resistant.¹² Cranberry juice contains proanthocyanidin, which has been found to block the attachment of bacterial fimbriae to the urothelial mucosa owing to strong inhibitory activity against mannose-resistant adhesins of urinary *E coli*.¹³

Cranberry is considered safe when taken orally, but ingesting large amounts might result in diarrhea. One study suggests caution in the use of cranberry in patients at risk of nephrolithiasis.¹⁴

One of the most considerable barriers to treating children with cranberry juice is its palatability. Most studies report a large number of dropouts or withdrawals over time owing to the bitter taste of cranberry juice.^{15,16}

Cranberry juice for prevention of UTI

A Cochrane review of 10 trials with more than 1000 patients¹⁷ showed that good-quality randomized controlled trials in women found that cranberry juice decreased the number of symptomatic UTIs over a 12-month period, especially among women with recurrent UTIs. No such evidence was provided for the effectiveness of cranberry juice or cranberry-lingonberry juice in children.

In an earlier randomized controlled trial from Finland, respiratory tract bacterial composition and fecal fatty acid composition (as a measure for colonic bacterial flora) did not change significantly using cranberry juice in 342 children in day-care centres over a 3-month period.¹⁸ Unlike in other studies, the cranberry juice was well accepted by the children, which might suggest that its concentration might have been too low to affect them. It is also possible that colonic flora do not correlate well with the incidence of UTI.

Two randomized studies on prophylaxis against bacterial UTI in a pediatric neuropathic bladder population were conducted. In 40 patients, drinking 15 mL/kg of cranberry cocktail daily for 6 months did not have any effect compared with water on preventing UTI.¹⁹ In another study, 3-month consumption of cranberry concentrate in 15 children had no effect on bacteriuria in this population.²⁰ In a study from Italy, 84 girls divided into 3 groups were randomized to receive 50 mL of cranberry juice, *Lactobacillus* GG drink, or placebo; there were 5 of 27 (18.5%), 11 of 26 (42.3%), and 18 of 27 (48.1%) episodes of symptomatic


UTI, respectively ($P < .05$). Withdrawal was minimal in all groups.³

In a recent double-blind randomized placebo-controlled trial in 7 Finnish hospitals, 255 children treated for UTI were given cranberry juice or placebo for 6 months. The investigators found no differences in timing between first recurrences of UTI ($P = .32$), but UTI incidence per person-year at risk was 0.16 episodes lower in the cranberry group ($P = .035$). The number of days on antibiotic therapy was much lower in children receiving cranberry (-6 days per patient-year; $P < .001$). This suggests a potential for cranberry juice to reduce recurrent UTIs in children.¹⁶

Cranberry for treatment of UTI

Randomized trials of cranberry products for the treatment of UTI have not been performed yet. However, in one uncontrolled study, more than 50% of patients had a positive clinical response after drinking 450 mL of cranberry juice daily for 3 weeks.²¹ Another study²² found that 2 to 3 glasses of cranberry juice a day reduced white cell counts to 500 per mm³ or less in children with neuropathic bladders, although urine cultures continued to be positive for *E coli*.

Conclusion

Some evidence suggests that cranberry juice might be beneficial to prevent recurrence of UTI in children. Further studies with robust methodology are needed. However, palatability of cranberry juice is a challenge in children, and the optimal dose has yet to be determined. 

Competing interests

None declared

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