Topic: In what ways does the utilization of cranberry supplements minimize the reoccurrence of urinary tract infections caused by *E.coli*?

**Introduction**

It is estimated that at least 60% of women in the United States have contracted urinary tract infections at some point and because of UTI’S high prevalence, it is a cause for health concern.(Hisano et al.2012). The use of cranberries has become the traditional choice of most women to prevent urinary tract infections.As recent studies have proven cranberries work mainly by hindering the sticking of *Escherichia coli* to urotheliumfound in the lower urinary tract and contains antibacterial as well as anti-inflammatory properties.Anti-adherence activity against gram negative bacteria isolated from urine was observed in volunteers that were given a cranberry juice cocktail which proved its effectiveness in treatments (Das, 2020). The recurrence of urinary tract infections, following antibiotic treatments suggests *E. coli’s* resistance therefore alternative medicine was explored. Urinary tract infections are diseases caused by *E.coli* which is a microorganism found in the human gut. The human gut acts as a pool for this bacteria and when it is released through excrement it then attacks the urethra causing an infection; however, cranberries have components which hinders the sticking of this bacteria to cells found in the urethra.Cranberry supplements can be used to minimize the reoccurrence of urinary tract infections caused by *E.coli* due to their anti-adhesive agents, immunologic response to bacteria and ability to reduce *E.coli* colonies.

**Anti-adhesive properties of cranberry aids in reducing E. coli manifestation**.

Indeed, the anti-adherent properties of cranberry aids in reducing E. coli manifestation, by preventing cleave of E. coli to uroepithelial cells in the urinary tract thus reducing the recurrence of urinary tract infection. Consumption of cranberry compound is a major step in preventing the pathogenesis of E.coli because cranberry acts as anti-adhesive agents in inhibiting the adherence of pathogens to the uroepithelial cell receptors in urinary tract (González de Llano et al., 2020). This shows that cranberry compound hinders the development of E.coli because it prevents the sticking of bacteria to the cells that line the bladder, ureters and urethra thus the bacteria is unable to infect the urinary tract. Consequently in order for E. coli to manifest in the urinary tract it has to inhibit the uroepithelial cells, however, this action can be prevented by consuming cranberry compounds which exhibit non sticking agents, thus this aids to reduce the recurrence of urinary tract infection.

In addition cranberry compound is used to inhibit the bacterial adhesins; mannose-sensitive fimbrial adhesins and mannose-sensitive fimbrial adhesins that are found in uropathogenic E. coli (Raz et al. 2014). This indicated that the consumption of cranberry is used to restrain protein found on the surface of bacteria which aids E. coli in attaching to the urinary tract, which then leads to UTI. Granted that the adhesin compounds found on the surface of E.coli is interdicted by consuming cranberries, it then prevents E.coli from attaching to the uroepithelial cells hence preventing urinary tract infections. This is a medical alternative to reduce the recurrence of UTI, and if executed effectively this could bring a new dynamic to the scientific field.

**Cranberries and their immunological response to bacteria**

In addition to their anti adhesive properties,frequent consumption of cranberries and their by-products can be extremely helpful in boosting the immunological response to bacterial infections in the urinary tract including that of E-coli; due to their antibacterial properties. Consumption of cranberry compounds relieves adverse symptoms of E. coli by quelling inflammatory cascade as an immunologic response to bacteria invasion in the urinary tract (Llano,D. et al. 2020).This suggests that, ingesting cranberries or their products can assist in enhancing the human body’s immune response function by suppressing symptoms of E. coli,for example, urgent and frequent need to urinate and burning sensation followed with pain in urethra when urinating. Thus these symptoms are experienced less often while cranberry products are continuously consumed versus if they are not consumed .

Moreover, cranberries contain acids that cause chemical reactions which can damage the cells of microorganisms and restrict their functions. Citric and malic acid which are used as food preservatives and are also in cranberry juice, are capable of inhibiting the functions of a wide variety of microorganisms including E-coli and other gram-negative bacteria. ( [Struve, C.](http://www.frontiersin.org/people/u/281126) et al. 2017).This indicates that the acid mixtures found in cranberries and their products produce an antibacterial effect which is beneficial in boosting the immune response to bacteria. It also suggests that out of all the acids present in cranberries, this antibacterial effect is strongest in the mixtures of citric and malic acid.This makes cranberries extremely useful for reducing the numbers of bacteria in the urinary tract and limits their ability to cause harm.

**Cranberry supplements results in a decrease in the colonies of Escherichia Coli**

Firstly, regular consumption of cranberry supplements results in a decrease in the population of Escherichia coli present in the human body, which minimizes the recurrence of urinary tract infection. Cranberries are generally used as a natural alternative to antibiotics as they contain chemicals such as polyphenols which have properties that inhibit the growth of harmful bacteria (González de Llano et al., 2019). This means that cranberries contain chemicals that can prevent the reproduction and growth of E. coli. Antibiotics are generally prescribed to patients who are infected with this disease however, due to an increase in resistance of bacteria to these medications, alternative methods are generally sought after. Since cranberries are fruits and contain chemicals which actively inhibit the growth of E. coli, they are often used to prevent the recurrence of utis. By consuming these supplements consumers are able to decrease their chances of reinfection while using natural alternatives. This information provided aligns with the research topic as it shows that cranberries contain chemicals such as polyphenols which actively fight against E.coli by inhibiting its growth. This then reduces the population of the bacteria present in the body, which lowers the chance of a person being reinfected as its population decreases. It also shows that since cranberries contain chemicals that are capable of providing these benefits, the higher the intake of them, the greater the chance of minimizing reinfection.

Additionally, a decrease in the abundance of bacteria which causes disease and a major increase in the number of bacteria that are important for human health was observed when cranberry extracts were used (O’Connor et al., 2019). This observation shows that cranberry supplements have the potential to minimize the recurrence of urinary tract infections by reducing the population of E.coli while increasing the population of important bacteria. By decreasing the population of harmful bacteria, cranberry supplements prove to be effective in decreasing the recurrence of UTIs and therefore a positive effect in consuming them is obtained. This point also highlights another benefit of consuming these supplements as unlike antibiotics, cranberry supplements increase the number of good bacteria present which promotes a healthy bacterial flora. By promoting an increase in good bacteria in the body, they provide a person with an increase in bacteria that can fight against the harmful ones. Therefore, it reinforces that cranberries can be used to prevent the recurrence of UTIs as they reduce the population of E. coli and they can also be used to promote the growth of good bacteria in the human gut which is necessary for a healthy individual.

**Conclusion**

The use of cranberry supplements can be useful in reducing the reocurrence of urinary tract infections caused by *E.coli* . Cranberry supplements are said to contain antiadhesive properties that hinders the sticking of Escherichia coli to cells found in the urethra. While it is a good anti adhesive agent it also boosts an immunologic response to bacterial infection, it operates by subduing symptoms of urinary tract infections at the same time reducing the colonies of *E.coli* creating in the process an abundance of other bacteria*.* Our team explored this idea because of the frequency of UTI’s and the growing resistance of *E.coli* to antibiotics. We want the audience to know that there are alternative medicines that can be explored. It is recommended that for preventing infections capsules or tablets containing 120-800 mg of dried cranberry taken once or twice daily have been used. Drinking cranberry juice 120-300ml 1-3 times daily has also been used for the best results.