INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA):IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

Zea Mays Linnaeus (Baby Corn Silk): A Faith Healing For Uropathogenesis

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ARTICLE INFO

Received: 24 April 2024
Accepted: 28 April 2024
Published: 02 May 2024
Keywords:
Baby Corn silk, Zea mays Linnaeus, UTI, Nutrition, Uropathogenesis, Natural treatment.
DOI:
10.5281/zenodo.11103892

ABSTRACT

Background: In a urinary tract with functional or structural abnormalities (ex. in dwelling catheters and renal calculi). The predisposing factors of host such as age, catheterization, diabetes mellitus and spinal cord injury cause complicated UTIs. During complicated UTI cystitis of long duration or hemorrhagic cystitis occurs. The antibiotic treatments suggests the pathogen's resistance to conventional antibiotics. CS has variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids. These metabolites have antimicrobial properties. The mechanisms of action are believed to include stimulation of the immune response, change in urinary Ph, and prevention of growth and adhesion of pathogens. Corn silk is nontoxic and that daily doses as high as 4.5 grams per pound of body weight (10 grams per kg) are likely safe for most people.

Objective:

Worldwide about 150 million people were diagnosed with UTI each year. The increasing incidence of antibiotic resistance among bacterial pathogens necessitates medicinal plants as an alternate therapy in the management of UTI. Corn silk has been widely used as a folk medicine. The aim of this study is to evaluate the clinical advantages of using the aqueous extract of corn silk in patients with UTI.

Conclusion:

The increasing incidence of antibiotic resistance among bacterial pathogens necessitates medicinal plants as an alternate therapy in the management of UTI. Corn silk is regarded as a soothing diuretic and useful for irritation in the urinary system. Administration of aqueous extract of corn silk significantly reduce the symptoms in patient with UTI in addition to reduction in the values of pus cells, RBCs, and Crystals, without any reported side effect which indicate its efficacy and safety.

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

INTRODUCTION

Corn silk:

Corn silk, the stigma and style from the flower of maize(ZeaMaysLinn.),is a biological by-product from cultivation of corn and has been widely reported to exhibit various pharmacological activities such as anti-inflammatory, anti-depressant, anti-hyperlipidemic, anti-diabetic, anti-fatigue, and antioxidant activities as well as neuroprotective, diuretic, and kaluretic effects.(1,2)Corn silk is a natural product and it may be created as functional food ingredients or nutraceuticals. The chemical makeup of CS and the action mechanisms of its bioactive constituents such as volatile oils, steroids, alkaloids and natural antioxidants such as flavonoid, phenolic, terpenoids, etc. have favorable effects on human health. CS is an excellent source of vitamin k and contains protein, carbohydrate, fibers, sugars, resin, maizeric acid, mucilage that are essential for a diet and minerals such as k, Ca, Mg, Zn and Mn.(3-4)Corn Silk is also used in cyno industry and food industry as a food additive and flavoring agent. For example, corn silk powder is used as food additive to improve the content and physical characteristics of beef patties. Currently, products from CS such as tea, powder and cosmetics are commercial in China, Korea, Japan, USA and UK. (5)

Urinary Tract Infection:

"Urinary tract infection is defined as presence of microbial pathogens in the urinary tract with associated symptoms. The infection affects both lower and upper urinary tracts and is known as acute cystitis and polynephritis respectively". Urinary tract infection (UTI) is the second most common infections presentation in community practice; worldwide about 150 million people were diagnosed with UTI each year (6, 7). For better management and prognosis, it is mandatory to investigate the possible site of infection, occurrence of re-infection, or relapse, treatment failure in addition to pathogenesis and risk factors.(6, 8, 9)UTI may involve only the lower urinary tract or may involve both the upper and lower tract. The term "cystitis" has been used to describe lower UTI, which is characterized by a syndrome involving dysuria, frequency, urgency and suprapubic pain. (6, 8, 9) The most common bacterial infections seen in primary care are predominantly UTIs and then respiratory tract infections. Urinary tract infection is an infection in any part of our urinary system like kidneys, ureters, bladder and urethra. The infection involves the lower urinary tract, the bladder and urethra. Urine that is produced in the kidney is carried to urinary bladder through the ureters and excreted out of the body via the urethra. Any infection sees along the ureter, urinary bladder and urethra are called urinary tract infection. Women are at greater risk of developing a urinary tract infection than men. It is common among the women of all age groups and the incidence and prevalence increases with the age. (10, 11) Complicated UTI –It is an infection in a urinary tract with functional or structural abnormalities (ex. in dwelling catheters and renal calculi). The predisposing factors of host such as age, catheterization, diabetes mellitus and spinal cord injury cause complicated UTIs. During complicated UTI cystitis of long duration or hemorrhagic cystitis occurs. Uncomplicated UTI – Infection in a structurally and neurologically normal urinary tract. Simple cystitis of short (1-5

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day) duration. Urinary tract infections usually develop first in lower urinary tract (urethra, bladder). If these infections are not treated, they may progress to upper urinary tract (ureters, kidneys). (12)

Common symptoms of urinary tract infection include: (13, 14)

- Strong and frequent urge to urinate
- Cloudy, bloody or strong smelling urine
- Pain or burning sensation when urinating
- Urine with blood or pus
- Nausea and vomiting
- Muscle aches and abdominal pains
- Fever

UTI PROPERTY OF BABY CORN SILK

Corn silk is used to treat urinary tract infections and kidney stones in adults. Corn silk is regarded as a soothing diuretic and useful for irritation in the urinary system. This gives it added importance, since today, physicians are more concerned about the increased use of antibiotics to treat infections, especially in children and in old age. Eventually, overuse can lead to drug- resistant bacteria. Also, these drugs can cause complications in children and in old age. The increasing incidence of antibiotic resistance among bacterial pathogens necessitates medicinal plants as an alternate therapy in the management of UTI (6, 15). The increasing prevalence of antimicrobial resistance is a major health problem; many bacterial species including E.coli are showing an increasing resistance to antibiotics. Multidrug resistance among E.coli isolates have been reported from many parts of world, and these rates of resistance to antibiotics differ from region to region (6, 16). It has been shown that the choice of drugs in the treatment of UTI is quite narrow today due to the wide scale resistance that the common UTI pathogens show to drugs which have been used previously. Many drugs which are considered as effective against uropathogens are now rarely prescribed as empirical therapy in areas where resistance rate to these antibiotics is high. (6, 17)

Medicinal plants have been acknowledged as potential sources of new compound of therapeutic values as a source for drug design and development (6, 18). Throughout the world there are several reports for the use of herbal treatment of UTI; one of these most common herbal agents is corn silk (6,19).Furthermore, corn silk is used in combination with other herbs to treat conditions such as cystitis (inflammation of the urinary bladder), urethritis (inflammation of the urethra), and parostitis (mumps). Corn silk is said to prevent and remedy infections of the bladder and kidney. The tea is also believed to diminish prostate inflammation and the accompanying pain when urinating. Since corn silk is used as a kidney remedy and in the regulation of fluids, the herb is believed to be helpful in treating high blood pressure and water retention. Corn-silk is also used as a remedy for edema (the abnormal accumulation of fluids). Corn silk is used to treat urinary conditions in countries including the United States, China, Haiti, Turkey, and Trinidad. Furthermore, in China, corn silk as a component in an herbal formula is used to treat diabetes. The use of CS herbal medicine in treatment of chronic and acute UTI is not a new approach certainly. The main property of this herb that is used for this treatment is that it has a variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids; these metabolites have been found in vitro to have specific antimicrobial properties.

CS can also be taken as a tea to sooth and treat the symptoms of UTI. Corn silk is best used in combination with other stronger antiseptic herbs to treat bladder infections but it will provide effective symptom relieve from burning and pain associated with UTI. (20) Urinary tract infection (UTI), acute

and chronic, can be effectively treated with herbal medicine. It has been shown that, there are two strategies which are essential in utilizing herbal medicine; the choice of herb depending on its herbal action, and the appropriate therapeutic dosing strategies that will determine the effectiveness of herbal treatment and prevent the need to intervene with antibiotics.(6,21) It has been found that medicinal plants are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids; these metabolites have been found in vitro to have antimicrobial properties (4,22) Interest in medicinal plants has increased in recent years; this interest has led to the discovery of new biologically active molecules and the adoption of crude extracts of plants for self-medication by the general public.(6, 23) Many plants have been evaluated not only for their inherent antimicrobial activity, but also for their action as a resistance-modifying agent. (6, 24) It has been believed that certain medicinal plants can prevent the recurrence of UTI; examples of such are cranberry juice (6, 25), garlic (6, 26), and others (6, 27). The mechanisms of action are believed to include stimulation of the immune response, change in urinary PH (6, 28), and prevention of growth and adhesion of pathogens (6, 29, 30). In addition to that, recent works documented that early severe inflammatory response to uropathogenic microbials predispose to chronic and recurrent UTI (6, 31); and that many medicinal plants have been used in the treatment of UTI because of their anti-inflammatory effect. (6, 32) All the above mentioned mechanisms may be exist as a potential.

Material and Method:

Corn silk extract preparation:

1. **Corn silk extract preparation by using 40 %v/v Ethanol and Distilled Water:**

Corn silk was obtained from P-3302 and P-6240 (Hybrid corn seed) Pioneer; and it provided by Corteva agriscience seed Pvt. Ltd., Madhapur, Hydrabad T.S. India, and Pin.-500081. The silk was harvested 7 days (silking stage) after their emergence. Freshsilk was cleaned with tap water, drenched with distilled water, and dried in an oven at 45 °C until constant weight. The dried silk was mashed into a fine powder (particle size < 0.149 mm) and extracted individually using 40% v/v ethanol and distilled water. Each dried sample (300 g) was macerated three times with 40% v/v ethanol (1.5 L) for 24 h at room temperature and digested with distilled water (1.5 L) for 1 h at 45 °C. The extract solutions were filtered separately through a filter paper (Whatman No. 1) and then the solvents were evaporated using a rotary evaporator at 40 °C. The water residue in each extract was eliminated using a freeze dryer. Appearances of extracts including P-3302 ethanol extract (PE), P-6240 Aqueous extract (PA) were of dark brown mass. The percent yield was expressed as the mass of extract obtained per 100 g of dried baby corn silks. All extracts were stored at −20 °C before analysis. (62)

Qualitative analysis:

1. Tests for flavonoids

Cyanidin's test (Shinoda's test): The Alcoholic solution of the extract when treated with magnesium ribbons and concentrated hydrochloric acid gave the magenta color of flavonoid solutions. Ferric chloride test: The extract was reacted with some drops of 10% w/v ferric chloride solution. The resulting blackish green color designates the existence of flavonoids.

2. Tests for tannins

Gelatin solution:

5% w/v Gelatin solution and 10% w/v sodium chloride solution were poured into the solution of

extract. If white precipitates are obtained, tannins are present.

Ferric chloride test:

10% w/v Ferric chloride solution was added to the extract solution. A green or brownish green color indicates the presence of tannins.

Bromine water test:

The bromine solution was added to the extract solution. If yellow precipitates are observed, tannins are present.

3. Tests for steroids and terpenoids

Liebermann–Burchard test:

The extract was treated with acetic anhydride and chloroform followed by concentrated sulfuric acid, and shaken well. Appearance of green and reddish brown colors indicates the presence of steroids and terpenoids, respectively.

Salkowski test:

Each extract solution was added to chloroform, and then concentrated sulfuric acid was carefully poured into a mixture. The development of reddish purple and reddish brown at the interface confirmed the presence of steroids and terpenoids, respectively.

4. Tests for alkaloids

Dragendroff's test:

The extract solution was treated with Dragendorff's reagent (bismuth potassium iodide) and the development of orange red precipitates indicates the existence of alkaloids.

Wagner's test:

The Wagner's reagent (iodine in potassium iodide) was added to the extract solution. The emergence of reddish brown precipitates indicates the existence of alkaloids.

Sr. No	Test	Observation	Inference (+ Presence / - Absent)	
			PE	PA
Test of Flavonoids				
1	Cyanidin's test (Shinoda's test)	Magenta color	+	+
2	Ferric chloride test	Blackish green color	+	+
Test of Tannins				
1	Gelatin solution	White precipitates	+	+
2	Ferric chloride test	Green color	+	+
3	Bromine water test	Yellow precipitates	+	+
Test of Steroids and Terpenoids				
1	Liebermann–Burchard test	Reddish brown colors	+	-
2	Salkowski test	Reddish brown	+	-
Test for Alkaloids				
1	Dragendroff's test	Orange red precipitates	-	-
2	Wagner's test	Reddish brown precipitates	-	-

Corn silk dosage:

Because human research on corn silk is limited, official dosage recommendations haven't been established. A variety of factors could influence your body's reaction to this supplement, including age, health status, and medical history. Most available research suggests that corn silk is nontoxic and that daily doses as high as 4.5 grams per pound of body weight (10 grams per kg) are likely safe for most people. That said, most labels for corn silk supplements recommend

considerably lower doses of 400–450 mg taken 2–3 times per day.

RESULT:

The phytochemicals of 40% v/v ethanol and distilled water extracts from baby corn silk, Flavonoids, tannins, terpenoids, and steroids were found in PE , while only flavonoids and
Tannins were detected in PA. In this study, alkaloids were absent in all extracts.

DISCUSSION:

The use of herbal medicine in the treatment of disease in general and specially UTI is not a new approach; it has been reported that the Ebers papyrus from ancient Egypt recommended herbal treatment to ameliorate urinary symptoms without providing insight into pathological mechanisms. (42, 49).It has been found that medicinal plants are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavonoids; these metabolites have antimicrobial properties.(42, 51). The mechanisms of action are believed to include stimulation of the immune response, change in urinary PH(42,65), and prevention of growth and adhesion of pathogens.

Notes

CONFLICT OF INTEREST

"No potential conflict of interest relevant to this article was reported."

Funding

"This article did not received any specific grant from funding agencies in the public, commercial or not fit sectors"

AUTHORS CONTRIBUTION

All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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HOW TO CITE: Minal R. Chaudhari, Bharat D. Mali, Tarannum R. Sayyad, Prashant P. Nikumbh Sandip S. Chaudhari, Zea Mays Linnaeus (Baby Corn Silk): A Faith Healing For Uropathogenesis, Int. J. of Pharm. Sci., 2024, Vol 2, Issue 5, 67-74. https://doi.org/10.5281/zenodo.11103892