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SIRKA NAISHAKAR (*SACCHARUM OFFICINARUM* L.): BASED ON ITS PHARMACOLOGICAL ACTIONS AND THERAPEUTIC USES WITH SPECIAL REFERENCE TO UNANI MEDICINE, A REVIEW

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ABSTRACT

Sugarcane vinegar has been utilized to treat a variety of diseases across the world. besides its long history as a common condiment, food ingredient, preservative, flavouring, and culinary agent, *sirka* has also been widely used as a powerful medicinal ingredient. Since Hippocrates allowed the use of a vinegar preparation known as *Sikanjabin* to heal ulcerations and treat sores, vinegar has been used to treat infections and other acute ailments.

In the name Oxymel, *Sikanjabin* was also used in the traditional system of medicine. It is produced due to fermenting a variety of substances, such as sugarcane, dried grapes, figs, jamun, honey, onions, and grains, according to the Unani classical literature. Sugarcane has been used in USM either by itself or in combination with other plant materials. This article aims to emphasize its internal and local therapeutic applications in dermatology and a variety of infectious diseases. Vinegar's acetic acid has antiviral, antifungal, and antimicrobial effects etc.

KEYWORDS: *Sirka Naishakar,* Sugarcane, *Khal, Sareeun Nafooz,* Unani medicine.

INTRODUCTION

In the Unani medicine system, *Sirka* is a commonly prescribed medicine. Its *Sareeun Nufooz, Muhallil,* and *Qabiz* characteristics make it useful for skin disorders. It is produced by a specific procedure in which the juice of an ingredient is placed in a vessel and left in the sun until the liquid effectively ferments, and it is obtained after fermentation of a variety of substances, including sugarcane juice, grapes, blackberries, jaggery, dates, figs, honey,

etc.[1,4] Vinaigre, which means "sour wine" in French, is the origin of the word vinegar.[1,2] The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) both stated that vinegar is an edible liquid which is made exclusively from starchy and sugary raw materials through the following two processes, including fermentation of acetic acid and alcohol.[3] Sugarcane (*Saccharum officinarum* Linn.), formerly referred to as *Sirka Naishakar*, is a popular crop in the Poaceae family. After Brazil, India is the world's second-largest producer of sugarcane. The word "saccharum" originates from the Greek word "sakcharon," which means sugar, especially sucrose.[5,6]

Figure: 1 Sirka Naishakar (*Saccharum officinarum* L.)

Botanical name: *Saccharum officinarum* Linn. (*Sirka Naishakar*)

Botanical description

Sugarcane is a thick, tough, tall perennial grass that is grown in fields.[5] Because the juicy stalk stores 15 to 18 percent sucrose, it is the most essential sugar crop in the world. Of the 1.87 billion tonnes of sugarcane produced worldwide in 2020, 40% came from Brazil, 20% from India, and 6% from China. These days, sugarcane vinegar is used with a variety of vegetables, which include green chili, white radish, and onion.[6]

Sugarcane juice is highly beneficial to human health in addition to making sugar. It contains essential nutrients such as calcium, phosphorus, manganese, zinc, and iron (9 mg/kg), along with numerous amino acids like aspartic acid, alanine, and citric acid, as well as vitamins A, B1, B2, B3, and C, niacin, and riboflavin (Huang et al., 2006; Legaz et al., 1990). These nutrients make sugarcane juice an effective medicinal beverage that is used to prevent and treat colds, the flu, sore throats, and numerous other ailments.[5] Plant-based natural medicines and functional foods are common due to their positive health effects and bioactive compounds. One of the things that benefits people is vinegar due to its bioactivities.[7]

Family: *Poaceae*

***Mutradifat* (Vernacular names)**

English: Sugarcane, Noble Cane[8]

Hindi: Kanji[3]

Urdu: *Gannaa, Sirka Nayshakar*[9,8]

Farsi: *Sirka*[2,3]

Arabic: *Khal*[1,3]

Taste: *Tursh*[2,3]

Parts used: Juice[1,10]

***Miqdare Khurak* (Dose):** 25 ml[3,11,12]

***Mizaj* (Temperament):** *Murakkabul quwa* (multipotential)[3,4,13,14], *Barid yabis* (cold & dry)[2,14] Cold 2^0 & Dry 2^0[3,4].

***Muzir* (Toxicity):** Harmful to *Sawdāwī* temperament,[1,15] and adverse to a cold temperament.[1,3,14] Additionally, it has negative effects on the uvula, nerves, and lungs. *Quwate bah* (sexual power)[2,3,13,14] and people with dark complexion.[16]

***Musleh* (Correctives):** *Shereen Halwajat; Yakhni, Sheerni, A'sal* (honey)*; Roghane Badam* (bitter almond).[2,3,14]

***Badal* (Substitutes):** *Sharab, Aabe Lemo,* and *Aabe Lemo Kaghzi*.[1,2,3,14]

***Murakkabat* (Compound formulation):** *Zimade Jarb,*[8,17] *Sikanjabin Bazoori,*[18] *Sikanjabin Sada,*[18] *Jawarish Safarjali Mushil*.[18]

***Af'aal* (Pharmacological actions):** *Qābid* (astringent)[1,2,4,14], *Mushtahi* (appetizer),[1,4,10,14] *Dafi'-i-Ta'affun* (antiseptic),[3,4,14] *Habis-i-Dam* (hemostyptic),[1,3,4,10,14] *Jali* (detergent), [1,14] *Muhallil* (resolvent),[1,4,14] *Mulattif* (demulcent),[1–4,10,14,15] *Mujaffif* (decicant),[1,3,4,10,14] *Hadim* (digestive),[1,4,10,14] *Munzij* (concoctive),[4] *Mudirr-i-Bawl* (diuretic),[4] *Musakkin-i Alam* (analgesic),[1,3,4,14] *Mufattih-i-Sudad* (deobstruent),[1,2,4,14] *Qatil-i-Didan-i-Shikam* (vermicidal),[4] *Muqawwiyat-i-Asnan-o-Litha* (tonics for gums and teeth),[4] *Muqawwī-i-Basar* (eye tonic),[16] *Muqawwī-i-Dimagh* (brain tonic),[3,4] *Muqawwī-i-Qalb* (cardiac tonic),[16] *Muqawwī-i- Me'da* (stomachic),[16] *Muqawwī-i-Tihal* (spleen tonic),[16] *Dafi-i-Qay* (antiemetic),[4,11] *Qate Safra,*[1,4,9] *Qate Akhlate Ghaleeza,*[1,4,9] *Hidate Dam and Safra,*[1] *Sareeun Nafooz* (rapidly diffusible).[1,3,4,9]

***Nafae Khas* (Main action):** *Jali* (detergent),[1,14] *Muhallil* (resolvent),[1,3,4,14] *Mushtahi* (appetizer),[1,4,10,14] *Munaffit* (vesicant),[1,2] *Qābid* (astringent),[1,2,4,14] *Hadim (*digestive),[1,2,6] *Muqawwī-i-Dimagh* (brain tonic),[1,3,4,14] and *Qate Akhlate Ghaleeza* (lytic of viscid humour).[1,4,9]

***Istemalat* (Indications/Uses):** *Khushuna-al-Jild* (dryness of skin),[1] *Shab Chiragh* (carbuncle),[4,15] *Hasba* (measles),[14] *Chechak* (smallpox),[14] *Baras* (vitiligo),[1,4,14] *Bahaq* (pityriasis),[1,4,14] *Jarab* (scabies),[4] *Narfarsi* (eczema),[4] *Quba* (dermatophytosis),[4,10,15] *Namla* (herpes),[4,15] *Hikka* (pruritis),[2,4,15] *Humrah* (boils),[4] *Kharish* (itching),[4,10] *Intisab al-Nafas* (orthopnoea),[6] *Qarha Sa'iyya* (spreading ulcer),[4,15] *Suda* (cephalalgia),[2,4,10,15] *Sarsam-i Hadd* (acute meningitis),[2,4] *Safrawi Bukhar* (bilious fever),[1,4] *Waja'-al-Asnan* (toothache),[2,4] *Qula* (stomatitis),[2,14] *Tanin-o-Dawi* (tinnitus),[1] *Waram-al-Lawzatayn* (tonsillitis),[4] *Su'al Muzmin* (chronic cough),[4,10] *Nazla Hadd* (acute catarrh),[3,4] *Diq al-Nafas* (bronchial asthma),[4] *Khunaq* (diphtheria),[2,4] *Niqris* (gout),[1,4] *Ghathayan* (nausea),[4,14] *Qay* (vomiting),[4,14] *Fuwaq* (hiccups),[1] *Tashnagi* (thirst),[1,4] *Huzal* (cachexia),[4] *Waram al-Thadi* (mastitis),[4] *Tabkhir-i-Me'da* (flatulence),[1] *Shozishe Me'da* (heartburn),[1,10] *Yaraqan* (jaundice),[1] *Waram-i-Tihal* (spleenomegaly),[1] *Didan-i-Ama* (intestinal worms),[2,3] *Qarha-i-Am'a* (intestinal ulcers),[4] *Istisqa Ziqqi* (ascites),[4,10] *Bawasir Damiya* (bleeding piles),[4] *Busoore Safravi*,[4] *Shozishe Tihal*,[1,3] *Darde Ghosht*.[2]

Preparation of *Sirka* from Sugarcane: Fresh sugarcane should be washed thoroughly before use. Each stalk is crushed to remove all the juice. Prepared cane sugar juice can also be used. These extracted juices are placed into a glass or stainless-steel pan. The yeast is added to the sugarcane juice and the mixture is well with a wooden spoon. This mixture is transferred to ceramic jars and covered with a dry cloth or towel.[19] The jars are kept in a dark place for two weeks, to allow the juice to ferment into alcohol. This fermented liquid is strained to separate it from the yeast sediment. In this mixture, one part of unpasteurized vinegar to four parts of fermented sugarcane mixture. This mixture is kept in jars with a clean cloth for one to two weeks, stirring twice a day. The mixture is allowed to ferment for four to six weeks.[19]

Chemical constituents: Acetic acid is the chief constituent of natural vinegar, a smaller amount of citric acid, tartaric acid, and other acids are also present.[20]

1. **pH value:** Ranges from 2.5 to 3, depending on the concentration of acetic acid. The pH of commercially available vinegar is about 2.4.[20]

2. **Density:** The level of density depends on the acidity of the vinegar. Approximately 0.96 g/ml density is usually observed.[20]

Scientific Reports

1. **Anti-infective activity:** Vinegar preparation is recommended for cleaning wounds and the treatment of bedsores by the father of medicine, Hippocrates.[19]

2. **Antibacterial activity:** Acetic acid alters the pH and makes a microenvironment hostile to growth. Also, it decreases induced inflammatory cytokine release and increases monocyte phagocytic capacity. Yagnik et al in their study cultured *E. coli* and *S. aureus* in the presence of acetic acid to determine the anti-microbial activity. They found the inhibitory concentration for *S. aureus* to be 2.5% and for *E. coli*, 0.1% acetic acid.[21]

3. **Antifungal activity:** In an infection-induced model of denture stomatitis, acetic acid resulted in antifungal activity against *Candida spp,* which was comparable to nystatin in terms of reducing microbial adherence and destruction. Yagnik et al found that 5% acetic acid restricted the growth of *Candida albicans* on culture plates. On disc diffusion assay, *Aspergillus niger* and *Saccharomyces cerevisiae* have shown high susceptibility to 25% acetic acid.[17]

4. **Antimicrobial activity:** Vinegar has antimicrobial properties, which make it useful for several applications. The organic acids in vinegar and mainly acetic acid, pass into the cell membranes of microorganisms, leading to bacterial cell death. The bacterial strains, temperature, pH, acid concentration, and ionic strength influence the antimicrobial activity of organic acids.[22] It demonstrates significant antimicrobial activity against a variety of pathogenic bacteria and yeasts. This biological property is directly linked to its rich profile of bioactive compounds, including phenolics, flavonoids, organic acids, alcohols, and volatile organic compounds (VOCs). Recent research by Abdali et al. has highlighted the considerable potential of vinegar in inhibiting the growth of both gram-negative bacteria (E. coli) and gram-positive bacteria (*B. subtilis and S. aureus*), as well as yeasts such as *Candida albicans*—microorganisms notorious for developing multidrug resistance and causing frequent infections in both community and hospital settings.[23]

5. **Antiviral activity:** Vinegar and its active component, acetic acid, have shown remarkable antiviral activity against severe acute respiratory syndrome (SARS) CoV-2 virus. Acetic acid causes inactivation and disaggregation of haemagglutinin glycoproteins (found on the surface of influenza viruses) by generating a low pH-dependent conformational change, destroying the viral envelope, and inhibiting viral transmission. Vinegar is

effective in inhibiting the infectivity of the virus by lowering the titer by 90% in the nasopharyngeal swab. Also, fumigation with vinegar at a low concentration (0.34%) ameliorated the symptoms of mild SARS-CoV-2 infection at a faster rate.[21]

6. **Antioxidant activity:** The antioxidant activities of polyphenols in vinegar include the ability to scavenge free radicals, chelate transition metal ions, and reduce oxidants. In-vitro antioxidative activities of various kinds of vinegar were investigated by using a linoleic acid autoxidation model detected by the TBA method and the 1, 1-diphenyl-2-picrylhydrazyl radical system.[1]

7. **Hypolipidemic activity:** A study performed over a test group of rats fed with acetic acid revealed that it significantly decreased total serum cholesterol values.[16]

8. **Dietary control:** Vinegar, if taken with food, is thought to increase satiety and so reduce the amount of food consumed.[20]

9. **Anti-obesity agent:** Vinegar has been found to lower low-density lipoprotein levels and increase high-density lipoprotein levels, which helps deter weight gain.[24]

10. **Antihypertensive activity:** A significant reduction in systolic blood pressure (approximately 7 mm Hg) in SHR rats fed a standard laboratory diet mixed with either vinegar or an acetic acid solution.[1]

11. **Antitubercular activity:** In a study, the efficiency of vinegar was tested against *Mycobacterium tuberculosis*. It was found that exposure to a 6% solution of vinegar for 30 minutes successfully killed the bacteria. It was concluded that vinegar is an effective mycobactericidal disinfectant.[4]

12. **Antitumor activity:** Vinegar is also a dietary source of polyphenols, compounds synthesized by plants to defend against oxidative stress. Polyphenols injected into humans enhance in vivo antioxidant protection and reduce cancer risk. A case-control study conducted demonstrated that vinegar ingestion was associated with a decreased risk for esophageal cancer.[14,25]

CONCLUSION

Since ancient times, sugarcane vinegar has been widely used as an ancient medicine due to its numerous therapeutic properties, which include antiviral, antimicrobial, antioxidant, and antihypertensive effects.

Recent studies on both human and animal subjects indicate the effectiveness of the medication in certain areas. Vinegar has been used for over 2,000 years to treat wounds, prevent infections, clean surfaces, control diabetes, and flavour and preserve food. Important details about *Sirka Naishakar's* actions and therapeutic applications that are mentioned in the Unani system are provided by this evaluation. Yet, the USM mentions several unique indications whose effectiveness remains to be established. Therefore, more clinical research is required to determine the efficacy of the further indications specified in the Unani system of medicine.

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