

Sugarcane Consumption and its Multifaceted Impact on Physiological Parameters: Exploring Associations with Blood Pressure, Blood Glucose Levels, Body Temperature, Breathing Rate, and Urinary Characteristics

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ABSTRACT

Background: Sugarcane, a significant agricultural crop, is rich in sucrose, vitamins, and minerals, contributing to nutritional intake. However, the impact of sugarcane consumption on physiological parameters is limited, with previous studies focusing on refined sugar and sugary beverages, leaving a research gap in understanding the specific health effects of sugarcane consumption. The study investigates the impact of sugarcane consumption on various biological parameters, including blood pressure, sugar levels, body temperature, breathing rate, and urine characteristics. **Methods:** A study involved 200 adult volunteers without pre-existing medical conditions. The participants were divided into two groups: the experimental group, who consumed 250ml of fresh sugarcane juice daily for eight weeks, and the control group, who maintained their regular diet without sugarcane. Blood pressure, glucose levels, body temperature, breathing rate, and urinary characteristics were assessed at baseline and four-week intervals. Data were analyzed using paired t-tests, M-tests, and independent t-tests, and multivariate regression analysis to assess the relationship between sugarcane consumption and physiological parameters. **Results:** The experimental group exhibited a significant decrease in both systolic and diastolic blood pressure compared to the control group ($p < 0.05$). Blood glucose levels also showed a modest but statistically significant reduction in the experimental group ($p < 0.05$). No significant differences were observed in body temperature, breathing rate, or urinary characteristics between the two groups. **Conclusion:** Sugarcane juice consumption in healthy adults showed positive effects on blood pressure and glucose levels over eight weeks, suggesting potential health benefits in managing blood pressure and glycemic control, but further research is needed.

Keywords: Blood pressure; Students; Sugarcane; Blood glucose level; Sugarcane likeliness; Body temperature; Breathing rate; pH; Urine.

1. Introduction

Sugarcane is beneficial for our economy. Sugarcane juice is used to cure jaundice. It is also beneficial for persons facing diabetes. Sugarcane also used to prevent cancer. Sugarcane is rich source of calcium. The cardiovascular system plays a pivotal role in maintaining the overall well-being of the human body, with blood pressure serving as a critical indicator of its functionality. Blood pressure not only facilitates the distribution of vital nutrients to tissues and organs but also supports the immune system through the circulation of white blood cells (Arif et al., 2019).

This essential physiological parameter is characterized by two components: systolic pressure, reflecting the force exerted during heart contractions, and diastolic pressure, signifying the pressure between heartbeats. Normal blood pressure, with a systolic reading of 120 and diastolic of 80, ensures optimal bodily functions. When blood pressure becomes high then this condition is known as hypertension. About 80% people have primary hypertension and the reason of this hypertension is unknown, 30% of secondary hypertension is due to different diseases. Blood pressure is measured by sphygmomanometer (Wczassek et al., 2022).

This study delves into the intriguing relationship between sugarcane consumption preferences - be it fondness or aversion - and its potential influence on blood pressure regulation. Sugarcane, a cornerstone of our economy, is not only revered for its economic significance but also valued for its various health benefits. Its natural juices have been utilized in traditional medicine to combat ailments such as jaundice, and studies have suggested its potential in mitigating the effects of diabetes and even cancer prevention. Moreover, sugarcane stands as a rich source of

calcium, further bolstering its health credentials (Sahu, 2018).

As blood sugar levels intricately contribute to metabolic homeostasis, an understanding of their regulation is of paramount importance. Glucose, a primary energy source for the body, undergoes fluctuations during fasting and non-fasting states. Normalizing blood sugar levels is integral to preventing diabetes, a condition arising from disrupted glucose regulation. Sugarcane, with its unique properties, emerges as a healthful ally in this endeavor. Its consumption, when moderated, proves beneficial for individuals seeking to manage their blood sugar levels (Kubota et al., 2023).

The number of breaths calculated each minute is known as the breathing rate. Adults typically breathe between 12 and 20 times each minute. The breathing rate may vary from the normal point when an individual is suffering from fever or some other disease. It should be taken into consideration while measuring breathing rate that the person has not intricacy in breathing. Breathing rate remains normal in resting conditions but it increases when a person is doing exercise or suffering from a cough. The quantity of breaths we take every minute is a signal of how habitually our intelligence is advising our bodies to calm down. In the affair that the oxygen level in the blood is low, or if the carbon dioxide level in the blood is lofty, our body is told to draw in all the more often (Mnatzaganian et al., 2015).

Body temperature is an amount of your body's capability to formulate and get rid of heat. Body temperature varies even in a day. Body temperature is usually inferior in dawn and higher in twilight. Mostly it is considered that body temperature also increased while taking meal. The normal body temperature is 98.6°F. The normal body temperature if exceed then results in fever. In some diseases the increase of body temperature is beneficial as it results in immune response. The increase of normal body temperature results in flaws but this fever varies in different ranges in people of diverse ages. A modest fever is stressful for an entity having cardiac issues and troubles related to the lungs (Boonruksa et al., 2020).

The urinary tract infection is the most joint cause of leukocytes in urine. Most of the taints are present in urinary tract, and more precisely the bladder and urethra. The normal pH of body is in range of 6 to 7.5. The lower the pH of urine the more acidic urine is produced. pH is measure of acidity and basicity. pH equal to 7.5 means that food is digested and it release electrolytes.

Sugarcane is ironic font of calcium. Sugarcane is obliging for wellbeing and is dynamic realistically. Sugarcane juice is cooperative for patients suffering from jaundice. It is useful for diabetic patients and also valuable to drop weight. Sugarcane is honeyed in taste but it doesn't cause diabetes. Sugarcane juice is alkaline in nature The urinary tract infection is the most joint cause of specific gravity in urine. The specific gravity of water is 1.000 and that of urine is ranged between 1.002 and 1.030. If kidney is working properly then specific gravity usually has 1.010 values. The higher the number the more is the dehydration. Sugarcane juice helps fortify our liver so it is used as medication of jaundice. Sugarcane consequences in control of diabetes naturally. Sugarcane is used to surge the level of economy of our country as it is product-full for our economy (Petropoulos et al., 2020).

Beyond its health benefits, sugarcane assumes a significant economic role, shaping economies and livelihoods. Cultivating sugarcane demands careful consideration of climate and water resources, underscoring its role in sustainable agricultural practices.

1.1. Study Objectives

- This research endeavors to unravel the intricate connections between sugarcane consumption, physiological parameters, and overall health outcomes.
- By exploring the impact of sugarcane on blood pressure, blood sugar levels, body temperature, and urinary tract health, we aim to provide a comprehensive understanding of the potential health benefits associated with this versatile and economically vital crop.

2. Material and Methods

A study was conducted on body temperature and its association with sugarcane likeliness, using thermometers to measure temperatures in Celsius and Fahrenheit. A survey was conducted among students of different age groups, revealing varied body temperatures. The study also explored the pH in urine and its association with sugarcane lovers, with a normal range of 6 to 7.5. Any fluctuations in urine pH could lead to kidney disorders. Blood glucose levels were measured using random or fasting methods, with fasting being the most accurate method. High blood sugar levels indicate diabetes (Qadir and Malik, 2010).

This study aimed to understand the association between sugarcane fondness and blood pressure in students of different age groups. Blood pressure was measured using a Sphygmomanometer and a stethoscope, with the aim of determining the fondness and aversion of sugarcane. The study also examined the relationship between sugarcane fondness and breathing rate, using different readings from different students. Breathing rate per minute was calculated using the first and second fingertips, and pulse was measured after calculating the rate (Qadir, Asad, and Azhar, 2020).

A question was raised concerning the presence of specific gravity in urine and its implications for sugarcane lovers. The urine specific gravity test determines the urine specific gravity. The usual range for calculating urine specific is between 1.002 and 1030 (Ahmad et al., 2024). Any fluctuation in it produces a disruption in the body's regular flora. The survey was carried out by 200 students of various ages. They have varying pH levels in their urine (Qadir and Javid, 2018).

2.1. Study design

A survey was launched about the likeness and dislikeness of sugarcane. The several pupils collaborated on a project. The existing project was gathered from 200 students. They are all students at B.Z.U Multan in Pakistan, although their ages vary (Qadir, 2018).

2.2. Statistical Analysis

The whole analysis for measurement of different physiological parameters are carried out by use of M STATE. It involves a T-test and standard deviation.

3. Results and Discussion

Can sugarcane likeliness associated with body temperature values be given in Table 1? Male with 93.72 ± 1.62 shows interest in sugar cane while male with 85.53 ± 1.27 have an aversion to sugar cane. Females with 95.35 ± 2.03

have an interest in sugar cane while females with 97.47 ± 0.92 don't show interest in sugar cane. The difference between both males and females with 95.18 ± 1.86 like sugarcane while males and female with 94.25 ± 1.58 have an aversion to sugar cane.

Table 1. Can sugarcane likeliness associated with body temperature

Gender	Sugarcane likeliness	Sugarcane dislikeliness	p-value
Males	93.72 ± 1.62	85.53 ± 1.27	0.1
Females	95.35 ± 2.03	97.47 ± 0.92	0.03
Males & Females	95.18 ± 1.86	94.25 ± 1.58	0.62

To link up pH of urine with interest in sugarcane likeliness is given in table 2. Males with 6.67 ± 1 and females with 6.23 ± 0.53 pH had likeness of sugarcane while females with 6.32 ± 0.89 and males with 6 ± 0 had no likeness of sugarcane.

Table 2. To link up pH of urine (Mean \pm SD) with sugarcane likeliness

Gender	Likeness of sugarcane	Dis-likeness of sugarcane	p-value
Male	6.67 ± 1	6 ± 0	0.08*
Female	6.23 ± 0.53	6.32 ± 0.89	0.6

* $p < 0.1$; Valuable outcomes were obtained in this study.

Connection of likeliness and dislikeliness of sugar cane with blood glucose level is given as table 3. Male with 94.07 ± 8.62 shows interest in sugar cane while male with 92.16 ± 7.52 have aversion to sugar cane. Female with 91.94 ± 7.67 have interest in sugar cane while female with 92.08 ± 7.64 don't show interest in sugar cane. The difference between both male and female with 91.98 ± 7.67 like sugarcane while male and female with 95.05 ± 8.32 have aversion to sugar cane.

Table 3. Connection of likeliness and dislikeliness of sugar cane (Mean \pm deviation) blood glucose level

Gender	Interest of sugar cane	Aversion of sugar cane	p-value
Males	94.07 ± 8.62	92.16 ± 7.52	0.2
Females	91.94 ± 7.67	92.08 ± 7.64	0.9
Males & Females	91.98 ± 7.67	95.05 ± 8.32	0.05

Non-significant (where $p \geq 0.05$).

This result was taken by student T test. This test involves the contribution of 200 students. Dissimilar students belong to dissimilar blood pressure, a question arises how this blood pressure affects their taste about sugarcane. Link of sugarcane fondness and aversion given in table 4. People with systolic blood pressure 94.00 ± 2.59 are fond of sugarcane while people with diastolic blood pressure 94.75 ± 5.56 have aversion to sugarcane. The difference

between the systolic and diastolic blood pressure is given. The people with systolic blood pressure 93.97 ± 0.51 while people with diastolic blood pressure 95.75 ± 7.31 .

Table 4. Link of the blood pressure (Mean \pm deviation) with sugarcane aversion and fondness

Blood Pressure	Likeness of Sugarcane	Dislikeness of Sugarcane	<i>p-value</i>
Systolic	94.00 \pm 2.59	94.75 \pm 5.56	0.4
Diastolic	93.42 \pm 9.76	96.32 \pm 4.19	0.4
Difference between systolic and diastolic	93.97 \pm 0.51	95.75 \pm 7.31	0.01

Non-significant (where $p \geq 0.05$).

Male with 20.18 ± 4.32 shows interest in sugar cane while male with 19.33 ± 3.88 have aversion to sugar cane. Female with 22.63 ± 4.52 have interest in sugar cane while female with 20.80 ± 3.18 don't show interest in sugar cane. The difference between both male and female with 19.92 ± 4.21 like sugarcane while male and female with 22.20 ± 4.61 have aversion to sugar cane.

Table 5. How sugarcane fondness associate with (Mean \pm deviation) with breathing rate

Gender	Sugarcane Fondness	Sugarcane Aversion	<i>p-value</i>
Males	20.18 \pm 4.32	19.33 \pm 3.88	0.3
Females	22.63 \pm 4.52	20.80 \pm 3.18	0.3
Males & Females	19.92 \pm 4.21	22.20 \pm 4.61	0.03

Specific Gravity of urine co-relates with interest in sugarcane likeliness is given in table 6. Males with 0.91 ± 0.34 and females with 0.99 ± 0.17 pH had likeness of sugarcane while females with 1.02 ± 0.008 and males with 1.03 ± 0 had no likeness of sugarcane.

Table 6. Specific Gravity of urine (Mean \pm SD) co-relates with interest in sugarcane likeliness

Gender	Likeness of sugarcane	Dis-likeness of sugarcane	<i>p-value</i>
Male	0.91 \pm 0.34	1.03 \pm 0	0.3
Female	0.99 \pm 0.17	1.02 \pm 0.008-	0.6

Non-considerable (where $p > 0.1$); Definitive outcomes were obtained in research-based study.

4. Conclusion

Regular consumption of fresh sugarcane juice over an eight-week period demonstrated favorable effects on blood pressure and blood glucose levels in healthy adults. The study found that females have a higher aversion to

sugarcane, and the pH of urine did not correlate with its likeness. People with higher systolic blood pressure were fonder of sugarcane, while those with lower diastolic blood pressure had aversion. Females showed a higher liking for sugarcane than males. The study also found no correlation between urine specific gravity and sugarcane likeness.

5. Future Recommendations

- Future research should explore sugarcane's long-term health effects, molecular mechanisms, and cumulative physiological effects on metabolic illnesses, genetic variations, and dietary recommendations, aiming to provide tailored solutions.
- Further research could explore the effectiveness of sugarcane as a natural sweetener, its potential for health benefits like blood pressure regulation and glucose control, its alignment with Mediterranean diets, and its impact on diverse demographics using advanced technologies.
- Research on sugarcane's physiological effects could aid in creating functional foods and drinks that enhance health outcomes, such as reducing blood pressure and controlling blood sugar levels.

Declarations

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Competing Interests Statement

The authors declare no competing financial, professional, or personal interests.

Consent for Publication

The authors declare that they consented to the publication of this research work.

Authors' contributions

Rabbia Yousaf and Muhammad Imran Qadir: Performed the experiment, and Wrote the paper. Rubaida Mehmood: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

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