

“Evaluation and Medicine Service of Beetroot”

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ABSTRACT

A Beetroot is the taproot portion. of the plant. It is an excellent food which is important for development and growth of human body. It is food a rich source of antioxidant and minerals. It also acts as fruits as well as vegetables. fresh from. of beetroot generally consumed as a Salad It contains betalain essential for Cardiovascular health It plays another role as a natural color in the textile industries.and as a medicinal Plant to cure the Various illnesses. Beetroot, the cultivated form a Beta Vulgaris subsp. vulgaris, is known for its Various beneficial Properties but more critical data about its bioactive compounds digestion is needed In the present research the bio accessibility of Phytochemicals in freshly prepared red beetroot juice was studied changes in total Phenolic and Profile as well as the antioxidant activity were monitored before and after Simulated gastrointestinal digestion Beetroot juice is a low cost Solution that triggers the body into action. It produces nitric oxide in the body which causes vasodilation. This allows the body to get more blood to the muscles therefore increasing the athletic performance. A Beet root also contains folate, Vitamin B6 choline and miners such as magnesium Potassium and zinc. Significant loss of contents of total. Phenolics and flavonoids measured Introduction after digestion resulted in the recovery of 27.07 and 36.4% respectively the same negative tendency was observed for battalionbio accessibility, while nearly 27% of betaxanthins were present after the simulated digestion, almost all betacyanin's have been lost.



I. INTRODUCTION

Beetroot is the cultivated form of Beta vulgaris Subsp vulgaris grown throughout the Americas, Europe and Asia, unlike Betavulgaris Subsp. vulgaris, known as sugar beet conditiva subspecies are two times. Poorer in Sucrose. Red beet is a root vegetable and known as. Source of phenolicCompounds, Carotenoids, nitrates, vitamins minerals and water soluble pigments .It is Consumed regularly as part of an in everyday diet and also is extensively used as a food Colouring agent. Beetroot is also rich source of Phenolicacid and avonoids as well as of other compound. Such as Carotenoids and ascorbic acid.which may further increase it's total antioxidant Capacity ford .No Extraction method was applied in order to stimulate real condition of juice consumption.then loss of Phytochemicals and their corresponding activity 3 or recovery of such were also calculated.Beet root medicinal Properties which give some positive. effect on the human body Beetroot can be eaten raw, boiled, steamed and roasted Red beetroot is a rich source of minerals (magnesium, manganese, Sodium, Potassium, iron, copper) Several Parts of this plants are used as antioxidant, antidepressant, antimicrobial, antifungal, anti-inflammatory diuretic and Carminative the beetroot is an alkaline food with a PH 9.5-2 and it contains Significant amount of vitamin C, vitamin B1, B2, nigrin B6,

B12 and its leaves are Excellent Source of vitamin A. Beta vulgaris. Subsp. maritima Arcang, also known as sea beet, is recognized as the Progenitor of the cultivated beta crops, all of which are the designated as B vulgaris Subsp. Vulgaris and include sugar beet, mangel Swiss chard, fodder beet, and table or garden beet During the more than 2,000 year history of Beta crops. humans Selected Swollen rooted form that were eventually Cultivated as livestock feed, Source of source, and vegetable. In the process, root morphology was transformed. The objective of this paper to examine the history and I conography of rooted forms of the B vulgaris complex Under domestication, emphasizing the table

CULTIVATIONS

Beta vulgaris belongs to betoideae subfamily the within the Amaran. thaceae/chenopodiaceae alliance Although originated in Europe and North Africa, red naturalized in several countries worldwide. this species developes better in deep, looser acid soils rich in organic and in cold water weather, the weather, the beetroot the reproductive stage vegetable attains in mild (20°C) to (10°C) in cold and plant goer through of its best quality (13) The appearance heart-shaped leaves , vegetative phase around stem that grows erect. Floral tasselemission occurs with the production, tarte a of occurs the oblong in the stem, that emission cu the production of 2-3 mm lenticular seeds comprising glomeruli during the reproductive stage (all) The rest Stem syst is composed of main and smaller root with lateral branching The taproot in dark purplish red. shape, and develops surface (14, 15) globular to almost long in on the soil surface (14,15). Abiotic condition such or atmospheric humidity, extreme temperatures, low and high exposure time brightness in can to Sunlight and affect No3 accumulation vegetables, although some agriculture. management aspects, such as Systems sail availability growth and farming fertilization nutrient and achieve there development [16] Crop'

NUTRITIONAL VALUE

A single cup of beetroot contains around 58 Calories It also contains a lot of 13 grams of carbohydrates while having 2 grams of protiens.it also has trace amount of vitamins A, vitamin C, calcium and iron. Beetroot also contains folate, vitamin and minerals. such as magnesium potassium and zinc - The additional elements of thiamine riboflavin and betaine all have excellent health. Many nitrates which responsible for of these

ingredients contain are the main Chemical mort of the amazing. health benefits adhered beetroot juice.

PHYTOCHEMISTRY

NUTRITIONAL AND HEALTH BENEFITS OF BEETROOT

The use of seasoned remedies severallyor together with customary medicines. has been utilized in varied medical treatises for the cure of various malady, ailment or disease Beetroot is amongst the well-known edible plants and has substantial healthful properties because of the presenceof distinctive natural edible substance. It contains antioxidant, vitamins and minerals varies vital antidepressant, antimicrobial and anti-carcinogenic.

Table 1: Physical properties of beetroot

Physical parameters	Average value
Mass	180 gm
Length	16.25 cm
Colour	Dark red
Diameter	5.43 cm
Shape	Round
Viscosity	0.72 Pa s
Edible index	91.03%
Waste index	8.07%

*value is the average of 3 determinations

RED BEETROOT PHYTOCHEMICALS BIOACCESSIBILITY

The aim of the current study was to evaluate the of Phytochemicals in freshly Prepared beet root juice. by using in vitro model method Simulating gastro intestinal digestion No extraction method was & applied. in order the simulate real conditions of juice. consumption The loss of Phytochemicals and their corresponding activity or recovery of such were also Calculated HPLC-DAD analysis of individual polyphenols, before and after SGD, was performed as well. Spectrophotometric quantification of Betalains. Betalains quantification was performed as described by stinteingetal. Samples of Dative or digested BJ were diluted with McIlvaine buffer (PH6.5) to obtain absorption. Values of 0 g < A), 1.0 at their respective absorption maxima. The betalain contents. - separately for betacyanins and betaxanthins were Calculated as follows $Br[mg/g dw] = \frac{A \times D \times MW}{(x \times l \times 9)}$ where A is the absorption value at the absorption maximum Corrected by the absorption at 650 nm, of is the dilution factor, is the length (1 cm) of the curette and 9 is the dry

after 30 min weight in 1 mol of sample. for quantity quantification of betacyanins and betaxanthins, the molecular weights (MW) and molar pressed extinction coefficients

NUTRIENT COMPOSITIONS, HEALTH BENEFITS AND BIOAVAILABILITY

Many antioxidants are found in red beetroot including epicatechin, rutin and caffeic acid with high absorption and bioavailability in humans. Previous reports stated that red beet roots is among the top ten vegetable species with the Strongest antioxidant Properties because of betalain. Red beetroot also has indicaxantin.

THE EFFECT OF FACTORS AFFECTING THE BEETROOT (BETA VULGARIS) CELL MEMBRANE

The cell membrane plays many roles in cell functions such as cell barriers, cell & Supporters Cell communicators and Provides cell shape Beetroot was selected to test the conditions the cell permeability and uniform sizes. of beet Pieces. were treated with hot bath, cold bath, distilled water and 10 % SDS. Solution Three trials were tested with. the time interval of 10 minutes and reaction. changes were monitored. Based on detergent had higher effect on the result, membrane than temperature In trial 1,45 1. transmission of Pigment leakage in hot bath, 11 1. transmission of Pigment leakage in hot and cold bath.

Each Piece of beet cut was measured. approximately 2 mm long, 1mm wide, and 0.5mm thick in size Three trials were taken and all three trials were measured at ten minutes intervals. The awareness regarding the impact of acute and chronic beetroot juice consumption on blood pressure and vascular function by Clinical Studies is rapidly rising within this review, we investigated total of 25 human Studies. The number of studies with emphasis on the blood pressure lowering Properties among normotensive and hypertensive individuals in different health states, overwhelms. those contradicting this outcome.

EFFECT OF BEETROOT ON MICROMINData and information regarding the impact of Beta vulgaris on gut microbiome and salivary microflora is limited, yet. the association with metabolic dysfunction. cannot be neglected within this context it was primarily indicated that dietary No3 Supplementation could alter the salivary microbiome, an outcome. that has been pre perused

through investigation of 6 human and & animal Studies in this review

CHEMICAL COMPOSITION OF

BEETROOTchemical composition of Beet Foot - Beetroot Leaves are commonly cut off and discarded co before using its bulb dueto bulb lack of knowledge of how to use them Aiming at using these leaves, in the Present study in natura and dehydrated beetroot leaves were chemically characterized in terms of fatty acid composition, minerals. total Phenolic compounds and antioxidant activity by DPPH in different stages of development. PROXIMATE COMPOSITION Moisture, ash and crude Protein content . were determined in accordance with AOAC - Association of official Analytical chemist Total lipids were extracted using the Bligh and Dyer method carbohydrates were estimated. by difference, and the energetic value was calculated considering the following energy conversion factors carbohydrates 4 kcal g 9 kcal g-1 Protein 4 kca.g-1 and lipid for mineral determination, the samples. were digested in a muffle at 600°C for 6-8 h until complete organic matter decomposition and were recovered with nitric acid solution (51. v/v).

CHROMATOGRAPHIC ANALYSIS: The fatty acid methyl esters were Prepared by methylation of the total lipids, as described by the Hartman and Lago method Methyl esters was separated by gs chromatography using a shimadzu 14-A (Kyoto, Japan) gas chromatography equipped with a flame ionization detector and a fused silica capillary Column CP-Select CB - FAME (100m x 0.25mm id. 0.25 um film thickness, Varian, USA) The sample splitting rate was 1: 100, and the samples (2411) were injected in triplicate

II. STATISTICAL ANALYSIS

Analysis of Variance (ANOVA) was used to test the difference between means (stages of development) which were analyzed by the tukey test at 95% (p<0.05) level of significance using the statistic version 7.0

POTENTIAL BENEFITS OF RED BEETROOT SUPPLEMENTATION IN HEALTH AND DISEASE

The well-documented health benefits of a diet high in fruit and vegetable has led to a growing interest in so Called functional. foods and their application in health and disease. In recent years, the root vegetable Beeta vulgaris, rubra, otherwise known as Red beetroot has attracted much attention. as a

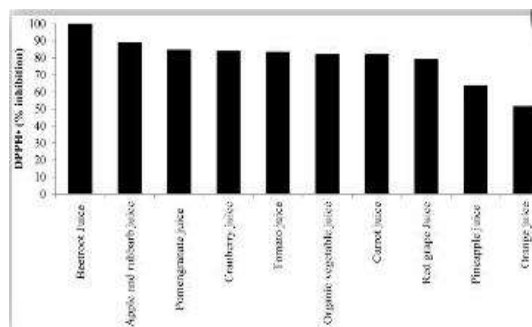
healthy Promoting functional food. while scientific interest in beetroot has only gained momentum in the Past few decades, reports of its use as a natural medicine date back to Roman times. Beetroots effect on the vasculature is largely attributed to its high inorganic nitrate content (250 mg.kg of fresh weight.) Nitrate itself is not considered to mediate any specific Physiological function.

BIOAVAILABILITY: Food component to be considered. beneficial for health it must be bioavailable in vivo, that is following ingestion, the active compounds are through the gastro-intestinal tract and made available in the circulation, in Sufficient quantities, to be utilized by cell. However, in order to reach the systemic Circulation and exert, any salubrious functions, a food. Component must maintain its molecular Structure through several phase of digestion that each Present significant metabolic a challenge for the molecule and affect. eventual rate and extent of absorption Two studies have directly investigated its betalain bioavailability by measuring their appearance in human urine after Ingesting a single bolus of beetroot juice Kanner et al. Identified 0.5 ·1 -0.9.1 of the ingested betacyanins (betanin and is betanin) in volunteer's urine in the 12 h after consuming 300ml of beetroot Juice.

OXIDATIVE STRESS Beetroot Supplementation might serve as a useful strategy to strengthen endogenous antioxidant defence helping, to Protect cellular component from oxidative damage under normal metabolic conditions, the biological environment of La cell is considered to be in a state of redox balance or in other words, an equilibrium exists between reducing and oxidising agents. Molecules capable of oxidation are commonly Known as reactive oxygen and nitrogen species and are continuously generated in cellular metabolism. At these low. Concentration. RONS Play an important role in a diverse multitude of cellular and biochemical processes including gene expression, cell proliferation However excess exposure of a cell to exogenously generated RONS or endogenously synthesized RONS (aberrant cell metabolism, inflammation), can overwhelm the cell antioxidant defences, causing an imbalance in redox homeostasis, which gives rise to the Condition typically referred to as oxidative Stress.

FUTURE DIRECTION: while the precise mechanisms by which beetroot exerts these beneficial effects are yet to be fully elucidated, the present status quo dictates that the "Cardio -

Protective, Physiological and metabolic effects are mediated by nitrate and its Subsequent conversion to NO, While the anti-oxidative and anti-inflammatory effects by betalains and other Phenolics.



BET ROOT POSITIVE OR NEGATIVE FEED BACK : It is also used for other conditions good Scientific, but there is no evidence to support these uses live diseases, reducing muscle soreness after exercise , high blood pressure. People use beet most often for athletic performance

HOW DOES WORK Beets contain chemical that might reduce Swelling and cholesterol Also, beet can. increase levels of a chemical called nitric oxide in the body. Nitric oxide can affect blood vessels, Possibly reducing blood Pressure and making it easier to exercise.

NUTRITION FACTS Calories : 43

Water : 88%

Protein : 1.6 grams

Carbs : 9.6 grams

Sugar : 6.8 grams

Fiber : 2.8 grams

Fat : 0.2 grams **FIBER** Beetroots are high fiber, Providing about 2-3 grams in each 3/4-cup (100 grams) raw serving Dietary fiber is important as part of a healthy diet and linked to a reduced risk of Various disease

OTHER PLANTS COMPOUNDS Betanin- Also Called beetroot red. betanin is the most common pigment in beetroots, responsible for their Strong red color, it is believed to have various health benefits .

INORGANIC NITRATE

Found in generous. amount in leafy green vegetables, beetroots, and beetroot juice, inorganic nitrates turns into nitric oxide in your body and has many important functions. Inorganic nitrate include nitrates, nitrites and nitric oxide. Beetroots and beetroot juice are exceptionally high in nitrates. However, debate has swirled around this substance for a long time Some people believe that they're

harmful land cause cancer, while others believe the risk is mostly associated with nitrites in Processed meat. Most dietary nitrate (80-95%) comes from fruits and vegetables. On the other hand, dietary nitrate comes from food additives, baked goods, cereals, and processed or cured meat. Beetroot is high in oxalates that contribute to the formation of excessive acid in our system. Too much uric acid is dangerous for us like extreme joint pains, shiny red joints, and high fever.

BET ROOTS BEATS ROUTE TO ALZHEIMERS Alzheimer's disease is the most common cause of dementia, a neurodegenerative disease linked with plaques and tangles of "misfolded" proteins. Particularly amyloid beta that forms in the brain. Preventing protein misfolding could slow the development of plaques and reduce the severity of the disease. Presenting this work at the American Chemical Society meeting in New Orleans, US, Darrell Cerrato, a PhD candidate from the University of South Florida, explained how protein-metal complexes may be a suitable target for treatments. 'Alzheimer's is a potentially curable disease,' he told Chemistry World. A metal-related disease, amyloid-beta can interact with metals such as iron, zinc, and copper, thus misfolding. That misfolding is then what causes the cascade of Alzheimer's when it forms the plaque on the neurons.

BETANIN: using compound often used to track oxidation -3,5-di-tert-butyl catechol or DTBC – Cerrato and colleagues observed the oxidative potential of amyloid beta in complex with metals. Could we prevent the chemistry that is involved once the metal is bound to the amyloid-beta molecule? In essence, can we stop the oxidation process once it is bound? Chemistry of betanin - The first report on the crystallization of betanin was communicated by two independent groups: Schmidt and Schonleben and Water and Dreiding. These two groups played an electrophoretic strategy for betanin purification. Wyler and Dreiding recognized three products which were formed by the alkaline degradation of betanidin, these were 4-methylpyridin and dicarboxylic acid, formic acid, and S-cyclo

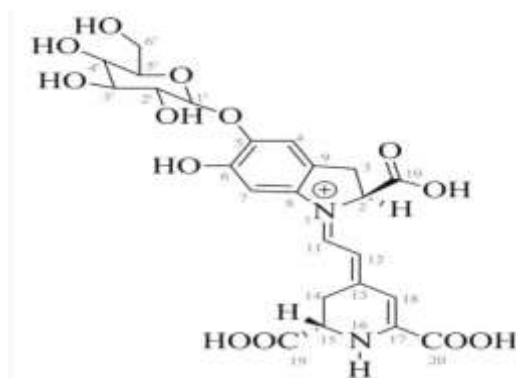
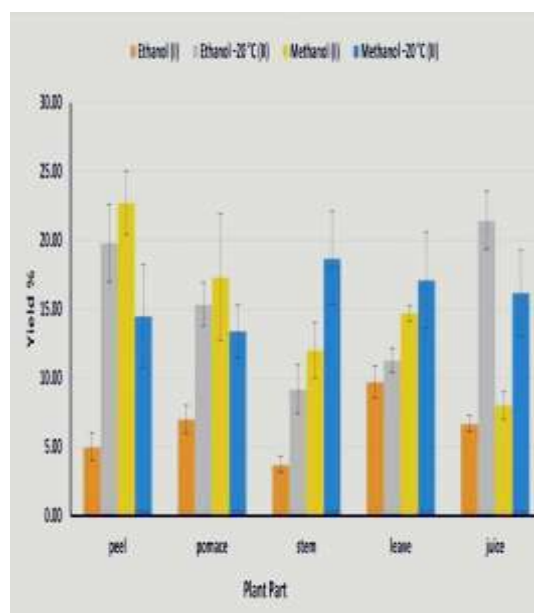


Figure 1. Chemical structure of betanin.

PREPARATION OF LIP BALM (BEETROOT)

- Beetroot
- feel of skin
- shred beets
- Done
- transfer to mixie jar
- Then transfer to filter
- strain completely
- Thick juice
- again strain, double filter.
- Liquid consistency
- transfer to kadai by filtering boilon medium heat Stary occasionally
- reduced thick beet completely and Completely cool transfer to clean Container
- Petroleum jelly- 1.5 tbsp
- take equal amount of beet extract and Petroleum jelly mix well with tooth
- Pick done nice color, close lid.
- keep in refrigerator for 30 mins to set Store in refrigerator upto 3 months



III. CONCLUSION AND RESULT

MINERALS CONTENT

The analysis re of minerals content revealed that, juice contained the highest level of all detected minerals, except of Calcium and magnesium at the same time, it is worth. Mentioning that all samples in the Present Study were high in Potassium content

EXTRATION YIELD

Generally, Phytochemicals extraction varied according to the Solvent Polarity and thenature of the extracted molecules. in additionto temperature Accordingly, using different solvents, temperature, and extraction time. resulted in various amounts of bioactive components.

A balanced fertilization program for Vegetable crops should be chalked out to ensure an adequate, but not excessive supply of nutrients for opium yield and quality, and avoid or minimize nitrogen losses to the environment. The supply and release of nutrients must be in synchrony with the need of the plant.

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