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# An Analysis of Health Benefits of Water Melon

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***ABSTRACT:*** ***Watermelon has long been thought to be a delicious but nutritionally deficient fruit throughout the world. Watermelon is now regarded as a "functional food" and a popular fruit that contains significant nutritional and bioactive components that have a variety of health advantages. Watermelon makes a significant contribution to the antioxidant activity of human diets. Both the seeds and the skin of a watermelon are edible and high in nutrients and bioactive substances, offering significant medical, health, and economic advantages. The combination of genetic, climatic, growing, and postharvest variables determines the quality of watermelon fruit. Watermelon's therapeutic function against life-threatening metabolic syndromes, especially chronic illnesses including cancer, cardiovascular disease, obesity, and diabetes, has been shown by many research. The health benefits of watermelon have recently been shown in a human model. There is still a need for further research on the watermelon's other appealing qualities.***

***KEYWORDS:*** ***Citrullus Spp, Fruit, Health, Seed, Watermelon.***

## 1. INTRODUCTION

Watermelons (Citrullus spp.) are softly hairy vines with deeply indented blue–gray–green leaves and branching tendrils that are prostrate, basally branched, and softly hairy. Each stem node produces one bloom. A male flower blooms at the majority of nodes, while a female flower, also known as a hermaphroditic flower, blooms at every seventh or eighth node. Some ancient cultivars are andromonoecious, whereas modern cultivars are monoecious. The blooms are smaller and lighter yellow than those of melon and cucumber, making them less striking. Watermelons are often cultivated for the fresh, edible fruit flesh and need a lengthy, warm growth season to develop. Unlike melons and pumpkins, the placental portion, or endocarp, is eaten. Consumption of the seeds is also essential in certain areas[1].

Citrullus is a xerophytic genus endemic to Africa, having 11 pairs of chromosomes (2n = 22) and a diploid genome. Watermelon's genome was recently sequenced. Because crossing barriers between species are usually minor, the number of species within the genus is debatable, ranging from five to seven. Three xerophytic southern African plants are not cultivated. The others are grown sparingly to extensively. The dessert watermelon, Citrullus lanatus (Thunb.) Matsum. and Nakai, is popular across the globe, although its origins are disputed. Some scholars think it is derived from the colocynth, Citrullus colocynthis (L.) Schrad., a tiny, spherical, very bitter fruit native to northern Africa and southern Asia that is sometimes grown for therapeutic reasons. Others have speculated that it comes from the citron watermelon, Citrullus amarus Schrad., a native of southern Africa that is grown there and in a few other places for cooking, preserves, and animal feed. The egusi watermelon, Citrullus mucosospermus (Fursa) of western Africa, which is differentiated from other watermelons by its soft, mucilagenous seed coverings, is more closely linked to the dessert watermelon than both the colocynth and the citron watermelon, according to recent genome sequencing. Despite this, the nucleotide divergence of reproductive-barrier genes in the egusi and sweet dessert

watermelons is substantial. We favor the theory that the dessert watermelon, C. lanatus, originated in northern Africa, where wild populations of watermelons still persist and where archaeological evidence, ancient iconography, and ancient literature suggest that watermelons have been farmed for at least 4000 years[2].

Dessert watermelons come in a wide range of sizes, ranging from around 2 kg to over 20 kg. Fruits may be nearly spherical or obovate in form. Although most fruits are green, few uncommon varieties contain yellow or bicolor (yellow and green) fruits. The rind of a watermelon fruit may be a single green tint, such as black–green, dark green, or light green, or it can be striped with two green colors. The width of the dark and light stripes, on the other hand, may differ significantly from one another, with the black stripes being considerably wider, broader, approximately the same width as, thinner, or much narrower than the light stripes. The color of the inside of the fruit (placental) may range from light green to white to light yellow, strong yellow, orange, pink, red, or extreme red. The flesh of most cultivars is crimson. ‘Crimson Sweet,' a leading cultivar with medium-size (8–11 kg), spherical-oval fruits with a tough and very attractive rind of broad, dark stripes and high-quality, very sweet, fine-grained red flesh with relatively few small brown seeds, was bred at Kansas State University in the United States and commercially released in 1966. The concept of triploid (3n = 33) seedless hybrids, originally suggested by Japanese geneticists in the 1930s, has come to reality, with seedless cultivars now dominating markets in the developed world. Seedless cultivars similar to ‘Crimson Sweet,' which have the same peel, fruit meat, and disease tolerance as ‘Crimson Sweet,' are becoming more popular[3].

Watermelon seeds are widely consumed in certain countries, most notably China. Watermelon seeds occur in a variety of hues, but the most common are black, brown, tan, white, red, or green, or a pattern of these colors. The size and quantity of seeds per fruit can vary a lot. Cultivars developed for seed consumption often have an unique seed coat color (such as red or green) or pattern (such as tan ringed with black) and tiny fruits with many medium- to large-size seeds. The egusi watermelon, Citrullus mucosospermus, is extensively grown in Africa for its ‘naked,' hullless seeds[4].

According to the FAO, watermelons have the highest global output of any cucurbit, at over 63 million tonnes. China, with almost 38 million tonnes of watermelons, is unsurprisingly the world's biggest producer. Other cucurbits, such as melons, summer squash, and cucumbers, have many times the monetary worth per unit weight as watermelons, thus this tonnage does not imply comparable economic significance. The majority of the other major producers are nations with long, hot summers, such as Turkey, Iran, the United States, Egypt, Mexico, Kazakhstan, Spain, and Saudi Arabia. Watermelons do not have a great nutritional value, however their flesh does contain a lot of carotenoids[5].

*1.1 Watermelon Juice:*

Aside from its refreshing flavor, fragrance, and beautiful color, watermelon juice offers a number of potential benefits. Because the juice includes a high concentration of soluble solids, concentration, particularly utilizing membranes, is an appealing technique. Watermelon juice may be concentrated from 6.5 to 24°Brix using three different RO membranes, according to Das Gupta and Jayaraman. On a pilot plant scale, a researcher concentrated watermelon juice utilizing the RO process using a polyamide composite membrane at 30°C and 60 bar transmembrane pressure. The findings revealed an increase in the concentrated juice's physicochemical characteristics, particularly its lycopene concentration and antioxidant capacity.

*1.2 Plant description:*

Watermelon is a vine-like flowering plant that belongs to the cucumber family (Cucurbitacea). It is a drought-tolerant crop grown mostly in tropical, semi-tropical, and cold climates throughout the globe. Watermelon comes in a variety of shapes and sizes, including sugar baby, golden midget, star light, jubilee, yellow baby, and others. They differ not only in size (big or little), but also in form (oval, round, or rectangular) and flesh color (red, orange, and yellow). Sweet watermelon is native to West Africa, not southern Africa, as previously thought, while the South African citron melon has been domesticated separately. The Citrullus lanatus type specimen, produced by a Linnaean collector in South Africa in 1773, is not the watermelon species that we know today. Instead, it's a member of another species that's related to C. ecirrhosus, a South African endemic with no tendon. A West African species is the watermelon's closest cousin[6].

*1.3 Chemical components:*

Alkaloids and glucosides were not found in watermelon seeds. The press cake of watermelon (Cucurbita citrullus) seeds contains soluble protein products, sugar, and resinous substances in addition to the fatty oil. A very tiny quantity of a phytosterol and a novel alcohol, cucurbitol, were extracted from the resin (C24H40O4). The shells of the seeds accounted for 48.7% of the total weight of the seed. A minor quantity of arachidic acid was extracted from the shell in addition to other fatty acids. Other ingredients in the shells were identical to those found in the pressed cake.

*1.4 Physical properties:*

Razavi and Milani investigated some physical properties of watermelon (Citrullus vulgaris) seed from three major local Iranian varieties, Sarakhsi, Kolaleh, and Red, including linear dimensions, volume, sphericity, surface areas, true and bulk densities, porosity, repose angle, and static coefficient of friction as a function of moisture content, variety, and environmental and growth conditions.

*1.5 Effect on growth:*

Watermelon seed full-fat (WMSF) and watermelon seed meal (WMSM) samples were tested for proximate composition before being added to broiler chick diets at a rate of up to 20%. Weight growth (P0.05), feed intake, protein consumption, protein efficiency ratio, and feed conversion ratio all improved as a result of WMSF. In birds given WMSF, a positive linear impact was found for weight growth, protein intake, and protein efficiency ratio. The amount of WMSM in the feed grew in a linear relationship with the amount of WMSM in the feed. Weight growth, protein intake, protein efficiency ratio, and feed conversion ratio in chicks exposed to increasing doses of WMSM, however, did not show a comparable response. According to the research, up to 20% of WMSF and WMSM may be utilized as feed components in broiler chick diets. The treatment group of male albino rats given a customized diet containing Citrullus vulgaris seeds gained substantially more weight and had a higher PER (Protein Efficiency Ratio) than the control group of rats fed the stock diet (p 0.01).

*1.6 Anti-diabetic effect:*

Nabila Benariba et al. performed a research on streptozotocin-induced diabetic rats to determine the antihyperglycemic activity of Citrullus colocynthis seed aqueous extracts. The research found that Citrullus colocynthis seed aqueous extracts improved fasting glucose levels, oral glucose tolerance tests, body weight, and food and fluid consumption, resulting in

glucose homeostasis and body weight maintenance. Magdalene Omigie et al. studied the effects of a methanolic extract of Citrullus lanatus seeds on blood glucose levels and electrolyte parameters (Na+, K+, HCO3-, Cl-) in fifteen female Wistar rats. The co-treated rats were given an i.p injection of streptozotocin (60 mg/kg) to make them diabetic, and after one week, an oral dose of methanolic extract of seeds (200 mg/kg body weight) was given as a protection for 21 days. At weeks 2 and 4, there was a substantial reduction in plasma glucose concentration, but no similar impact was seen in the electrolytes concentration. The reduction in plasma glucose concentration was caused by either increased hepatic glycogen synthesis or stimulation of insulin release from the pancreatic -cells.

*1.7 Effect on reproductive system:*

Adesanya The effects of a methanolic extract of Citrullus lanatus seed (MECLS) on experimentally induced benign prostate hyperplasia in adult male wistar rats were studied by A. Olamide et al. Hormone therapy (testosterone and estradiol on alternate days for three weeks) had no effect on the animals' body weight, but it did result in a substantial reduction in the weight of the testes, rendering all of the rats azoospermic. Furthermore, extract administration reduced the size of the enlarged prostate, seminal vesicle, and testes in a dose-dependent manner (P0.05). The experimental male Wistar rats were given a hydro alcoholic watermelon seed (Citrullus Vulgaris) extract at a dosage of 55mg/kg body weight/day for 28 days, which substantially enhanced sperm population as well as sperm motility and viability. As a result, it was determined that the seed extract may be utilized in phytotherapy as a male infertility treatment. Citrullus vulgaris seeds extract was given to streptozotocin (55mg/kg) caused diabetic male Wistar rats for 28 days, which substantially enhanced sperm parameters and sperm population. As a result, it's reasonable to anticipate that using this extract might benefit infertile diabetes individuals. The hydro alcoholic extract of Citrullus lanatus seeds improved sperm quality and serum testosterone levels, which was reflected in a higher rate of male fertility.

*1.8 Anti-obesity and anti-arthritic effect;*

J. Manoj evaluated the anti-obesity and anti-arthritic activities of seed extracts of C. vulgaris (Cucurbitaceae) in rats at Rajiv Gandhi University of Health Sciences in Bengaluru, Karnataka. With both alcoholic (ALSCV) and aqueous (AQSCV) extracts of the seed tested for LD50 studies, no mortality or behavioural abnormalities were observed in mice at the highest dose level of 2000mg/kg. The research used three distinct dosages of both extracts: low (100mg/kg), medium (200mg/kg), and high (400mg/kg). a standard citation In obese rats fed a cafeteria (CD) or atherogenic (AD) diet, sibutramine had a significant anti-obesity effect. In CD and AD induced obese rats, both the seed extracts at medium and high doses showed significant anti-obesity activity by lowering body weight, food intake, organ and fat pad weight, and serum glucose, cholesterol, triglyceride, LDL and VLDL cholesterol levels while increasing HDL levels. In formaldehyde and freunds adjuvant (FA) induced arthritis, indomethacin, the gold standard, showed substantial anti-arthritic efficacy. In the FA induced arthritis model of rats, both the medium and high doses of seed extracts showed significant anti-arthritic activity by lowering the arthritic index and lowering serum biochemical parameters like BUN, Calcium, ALP, Protein, SGOT, SGPT levels with an increase in Albumin levels.

*1.9 Anti-ulcerogenic effect:*

Citrullus lanatus has anti-ulcerogenic properties among its many therapeutic properties. When the crude methanolic extract of Citrullus lanatus seeds was given orally to albino Wistar rats

with two distinct ulcer models, pyloric ligation and water immersion stress, the ulcer index in both pyloric ligated and water immersion stress caused animals was significantly reduced. The pyloric ligation model also demonstrated a reduction in stomach volume, free acidity, and total acidity. The presence of triterpenoids and phenolic chemicals in the methanolic extract of Citrullus lanatus seeds, which exhibited anti-secretory and proton pump inhibitory action, may explain the ulcer-protective potential.

*1.10 Food formulation:*

The oil and protein content of the seeds of melon fruits has already been established. These seeds were used to make oil in Nigeria, and they were also used to make snacks in some Arabian countries by salting and roasting them. As a result, watermelon seeds, which are a byproduct, can be used as a food product, and biscuits can be made using them. Five biscuit formulas containing wheat flour, free fat watermelon (Citrullus vulgaris) seed kernels, rice, corn, and chickpea were used to make high protein biscuit blends (HPBB). The nutritional value, physical and organoleptic properties, as well as the thickness, weight index, and dimensions of these biscuits, differed depending on the presence or absence of gluten, the starch source, and the protein content. The biscuits made from 100 percent watermelon seed kernel flour were not only nutritious and tasty, but they were also gluten-free and carbohydrate-free. As a result, it is possible that defatted watermelon seed kernel flour could be used to make high-protein biscuits. (40-50%), either with wheat flour or in a combination with other cereal flours such as corn, rice, and chickpea flours. A study was conducted with the goal of determining the sensory acceptability, nutrient content, and cost of three products made from amaranth seeds, watermelon seeds, and their flour in various proportions: "Biscuits," "Mathri," and "Laddoo." The results showed that amaranth seeds, watermelon seeds, and their flour can be successfully incorporated in "Biscuits," "Mathri," and "Laddoo" based on sensory evaluation using a 9-point hedonic scale. Protein, fat, carbohydrate, calcium, and iron content increased in enriched "Biscuits," "Mathri," and "Laddoo," according to the nutritional value of the prepared products. As the ratio of amaranth seeds, watermelon seeds, and their flour increased, the cost of the three products increased significantly[7].

## 2. LITERATURE REVIEW

Ernest E et al. discussed Effects of pH, Dosage, Temperature and Mixing Speed on The Efficiency of Water Melon Seed in Removing the Turbidity and Colour of Atabong River in which they discussed how The impact of operational factors including temperature, pH, dose, and mixing speed on the effectiveness of watermelon seed in reducing turbidity and color from the Atabong River, which serves the people of Eket and its surroundings in Akwa-Ibom State, were investigated. The water melon coagulum eliminated 87.9% of the turbidity and 84.3 percent of the color of the raw river water at an optimum pH of 7.5, temperature of 25 o C, dose of 0.6g/l, and mixing speed of 120rpm, according to the results. Water melon coagulum reduced raw water turbidity from 67.7 to 8.18 NTU and color from 318 to 50 TCU under these optimal circumstances. The results show that water melon seeds may be utilized as a potential substitute for chemicals like alum and ferric salts that are often employed in coagulation-flocculation water treatment[8].

Mohamed S et al. discussed Purification of urease from water melon seeds for clinical diagnostic kits in which they discussed how Urease was partially purified from water melon Citrullus vulgaris cv. Giza 1' seeds in liquid and powder forms, with purity meeting the requirements for diagnostic use, using a simple reproducible method that included delipidation, extraction, batch adsorption on TEAE-cellulose, filtration through a Non Binding Protein

Filter, and lyophilization. The final preparation's electrophoretic behavior revealed a single urease activity band that matched with the main protein band. During the purification process, 1 mM EDTA and 10% glycerol were regularly added to the enzyme solution to stabilize the solution form. 0.1 percent sodium azide and 0.01 mM dithiothreitol were added to the filtered enzyme to prevent contamination with microorganisms and to preserve enzyme stability. Urease was produced as a powder in the absence of glycerol and lyophilized in the presence of 2% dextran. The final preparation was transparent and stable for 14 months at 4 °C, with a free ammonia concentration of less than 0.01 g-1 unit. The pH optimum for both liquid and powder ureases was found to be 8.0. Heat stability tests revealed that at pH 7.5, there was no loss of enzyme activity up to 40 °C for 30 minutes[9].

Ranu P et al. discussed a review on watermelon (Citrullus lanatus) medicinal seeds in which they discussed how Herbal products are widely used due of their minimal risk of adverse effects, cheap cost, and ease of availability. Water melon is a well-known fruit in traditional folk medicine for its bioactive components such as triterpenes, sterols, vitamins, cucurbitacin, and minerals. Fruit is utilized as a blood purifier, aphrodisiac, and cooling agent. Citrullus lanatus seeds are nutrient-dense, with plenty of protein, fat, vitamins, and minerals. Snakes are prepared using the seeds, which are mixed into flour and used in sauces. Urinary tract infection, bed wetting, dropsy, and kidney stones are all treated with the seeds. This study aims to offer information on Citrullus lanatus' nutritional value and pharmacological activity in order to aid future research. Introduction The fruit crop watermelon (Citrullus lanatus) is a herbaceous creeping plant in the cucurbitaceae family. It is mostly reproduced via seeds and grows best in warm climates. It's a tropical plant that needs a lot of sunlight and a temperature of above 25°C to thrive. Watermelon grows best in well-drained, rich soil that is somewhat acidic. It may be found growing along Ghana's coasts, in the forest, and particularly in riverbeds in the Northern Savannah[10].

## 3. DISCUSSION

The watermelon is a popular fruit. It is a recently introduced cash crop that is rapidly acquiring economic significance in terms of revenue production and nutritional value supply. Vitamins, minerals, and other antioxidant chemicals found in watermelon flesh play an essential role in human metabolism. By functioning as oxygen radical scavengers, antioxidant components aid in the prevention of human illness. The inclusion of essential amino acids citrulline, fibers, minerals, and phenolic compounds in watermelon rind and seed provides many health advantages. Watermelons are a great source of essential nutrients, with a high concentration of nutrients suitable for human use. It also includes several components with therapeutic properties. As a result, it would be more effective in the administration of healthcare. Watermelon rind and seed are also high in an essential amino acid as well as minerals. Watermelon and its products have such outstanding characteristics that we should utilize them for health reasons.

## 4. CONCLUSION

Herbal medicine has been studied extensively all over the world. As a result, a substantial amount of information about the beneficial effects of watermelon seeds is available. Watermelon seeds could be a useful tool for treating a variety of ailments with no obvious negative side effects, especially in countries where more traditional therapeutic approaches are not readily available. There is still plenty of room for research to uncover previously unknown bioactive ingredients responsible for these seeds' positive health effects. Because it is known that citrulline, a key ingredient, is present in watermelon seeds based on a thorough literature

review, an integrated study should be conducted to determine the amount of citrulline present in the seeds of various watermelon species.

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