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REVIEW ARTICLE **OPEN ACCESS**

Futuristic Review: Oral Wafer of Ascorbic Acid from *Moringa oleifera*

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ABSTRACT
The natural world has given humans a complete supply of cures for all diseases. The Indian plant *Moringa oleifera* is found in tropical and subtropical climates all over the world. Its common names include "drumstick tree" and "horseradish tree". The leave are full of important compounds, vitamins, and minerals. Malnutrition can be treated using leaf extracts, which are also used to help breastfeeding women produce more milk. It is use as a potential antibacterial, anticancer, anti-inflammatory, and anti-inflammatory agent. A prime example of a multipurpose tree is the *Moringa oleifera*. A significant dietary item known for its role in the tropics' natural nutrition is *Moringa.* Vitamins A, B, a strong supply of vitamin C (ascorbic acid), palmitic acid, steric acid, calcium, and potassium are all present in *Moringa*. Its seeds provide high-quality edible oil and water-soluble proteins that work well as coagulants in the treatment of water and wastewater. The ascorbic acid (Vitamin C) content of *Moringa* stem, fresh leaves, and dried leaves samples has been examined using titration, enzymatic, and HPLC methods. When compared to lemon and mosambi, fresh leaves of the *Moringa* tree were discovered to be a high source of vitamin C. Buccal drug delivery is the primary and most widely accepted drug delivery method among the Novel Drug Delivery systems. Wafers are better than other traditional dosage forms and other oral solid dosage forms that disintegrate in the mouth. *Moringa oleifera* leaves can be used to extract ascorbic acid and with modern technology can be convert into novel drug delivery system for better results.
Keywords - Buccal drug delivery, Oral Wafers, ascorbic acid, Mucus Permeability, Herbal Medicines

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INTRODUCTION

Ayurveda is one of the traditional systems of medicine practiced in India and Sri Lanka and can be traced back to 6000 B.C. Ayurveda medicines are based upon herbomineral preparations and herbal and have specific diagnostic and therapeutic values. Herbal medicines are valuable and precious gift of the nature and have been playing a significant role in the prevention and treatment of various human ailments. The use of medicinal parts is accepted as the most common form of traditional medicine. [1] In developing countries, herbal medicines continue to play important role in primary health care, especially where health service is limited. *Moringa Oleifera* is a type of local medicinal Indian herb. Other terms used for *Moringa* are Drumstick, Sajna, Kelor, Marango, Horseradish tree, Mungna, Munika, Sigru and Mulangay. The use of medicinal plants is growing daily related to therapeutic phytochemicals, that can accelerate the development of new medicines. An Indian indigenous medicinal herb is called *Moringa Oleifera*. Other names for moringa include horseradish tree, drumstick, sajna, kelor, marango, mungna, munika, and sigru. [2]

Due to its potential nutrients, moringa is a plant with therapeutic benefits and is used as a dietary supplement to combat malnutrition. A deciduous tree with rapid growth is called *Moringa Oleifera*. It can grow as tall as 10 to 12 cm and as wide as 45 cm. A thick cork surrounds the whitish-gray bark, giving it its colour. The bark of the new shoots is hairy and purple or greenish-white in colour. The tree has a fragile open crown with feathery tripinnate leaves and feathery leaves. The bisexual, fragrant blooms are connected by five uneven, thinly veined, yellowish-white petals. One of the most useful tropical trees is *Moringa oleifera*. It contains vitamins and minerals in good amounts. Because of its extraordinary ability to treat a wide range of disorders, including certain chronic conditions, moringa has earned the nickname "the miracle tree." Because its seeds, leaves, and pods contain a range of vital phytochemicals, moringa is a

nutrient-dense plant. The *Moringa* plant is used medicinally to cure a variety of conditions, including cholera, bronchitis, anxiety, asthma, blackheads, anaemia, anxiety, and skin infections. [3]
Additionally, *Moringa oleifera* has anti-inflammatory, antispasmodic, antihypertensive, anticancer, antioxidant, antipyretic, antiulcer, diuretic, cholesterol-lowering, renal, anti-diabetic, and hepatoprotective properties. Additionally, it has always been praised for its excellent cosmetic value. *Moringa* is frequently discovered in a variety of health care products, such as body and hair conditioners and moisturisers. A stronger immune system is also a result of vitamin C. Scurvy, the most severe form of vitamin C deficiency, has changed the course of human history. Vitamin C has been cited as proof that it affects immune function due to the high concentration of vitamin C in leukocytes and the quick drop in plasma and leukocyte vitamin C concentrations during stress and infection. It is unknown how vitamin C lessens the frequency or severity of respiratory tract infections. In my review article the novelty of work was that form the herbal products that is *Moringa Oleifera* tree (drumstick) has Vitamins C more as compared to oranges. After extracting the Vitamin C from Moringa that Active pharmaceutical product (vitamin C) has to convert into novel drug delivery system oral wafer which will be like simple wafer but will cure Scurvy and make strong immune systems. As oral wafers are placed on tongue and are wetted by saliva due to water soluble polymer and excipient. [4]
This vitamin C oral wafer will dissolve within second for rapid absorption by releasing active ingredient and will help to cure Scurvy and boost up our immune system rapidly as after Corona period the immunity of our body became weak. As this product will be from herbal so there will be less chance of side effect. In formulation our active ingredient will be Vitamin C (Ascorbic acid) extracted form *Moringa oleifera*. Oral wafer will be formed by mixing different excipient and active pharmaceutical product (API). The best polymer will be chitosan used with ascorbic acid. Some colouring agent like tetrazine, Eosin, some flavoring agent like orange, binder, diluent will be added with polymer with API to formulation of oral wafer of ascorbic acid. [5]
1.1 Scientific classification of *Moringa oleifera*:
Kingdom: Plantae
Division: Magnoliophta
Class: Magnoliophyta
Order: Brassicales
Family: Moringaceae
Genus: Moringa
Species: M. Oleifera
1.2 Differents species in the genus of *moringa* family:
Moringa Pterygosperma
Moringa Oleifera
Moringa Arborea
Moringa Borziana
Moringa Longituba
Moringa Ovalifolia
Moringa Drouhadil
Moringa Pygmaea
Moringa Peregrine
Moringa Rivae
Moringa Ruspoliana
Moringa Stenopetala

Different uses of Vitamin C
Ascorbic acid is the cell's universal reducing agent. It performs redox reactions by free- Radical mechanisms to activate mono-oxygenases and dioxygenases vital for many aspects of normal cellular metabolism. Ascorbic acid is required for the growth and repair of all tissues owing part to its role which is essential for collagen formation and wounds healing. It also directly moderates oxidative stress by neutralizing free radicals, and indirectly by affecting the metabolism of glutathionic and vitamin E. In animals that lack the gene L-gulonolactone oxidase, or possess a mutated gene, ascorbic acid cannot be synthesized and becomes a dietary essential. Poor ascorbic acid status has been related to risk for chronic disease and the worsening of respiratory function in high-risk populations, such as the elderly and smokers. Although ascorbic acid is considered relatively nontoxic, supplementation by some populations is not recommended. Vitamin C deficiencies were common, especially during the winter months and during long ocean voyages. Vitamin c

is also responsible for the better of doing immune system. In its most severe form, scurvy, vitamin C deficiency has altered human history. [6]

The high concentration of vitamin C in leukocytes, and the rapid decline in plasma and leukocyte vitamin C concentrations during stress and infection, has been used as evidence that vitamin C plays a role in immune function. The mechanism of by which vitamin C reduces the incidence or severity of respiratory tract infections in not known. Vitamin C supplementation reduces blood histamine concentrations from 35% to 45% in adult subjects and an acute dosages of vitamin C reduces bronchial responsiveness to inhaled histamine patients with allergy. Ascorbic acid can also influence neutrophile chemotaxis. Vitamin C depletion for a 9 week period in human subjects did not appear to alter T-cell number or T-cell proliferation in assays in vitro and decline in lymphocyte proliferation noted in aged populations is not restored by vitamin C in vitro. Vitamin C ingested daily in amounts ranging from 5 to 251 mg for 92 days also did not affect mitogen-induced lymphocyte proliferation. The mechanism is complex and appears to involve mitogen-induced proliferation processes as well as reduction in or in combination with a reduction in the rate of apoptosis in T cells maintained in culture. [7]

Oral Wafer

Buccal delivery provides easy access to highly vascularized tissue, avoiding first pass metabolism and concomitant liquid intake. Buccal dosage forms include mucoadhesive tablets, films, patches, ointments, and hydrogels, each of which has limitations. Several approaches can be taken to increase the permeation of a drug through the buccal mucosal membrane. Among the Novel Drug Delivery system, buccal drug delivery is the main and extensive acceptable drug delivery between the other delivery systems. The orally disintegrating tablets are available in the market providing 1 to 2 minute of disintegration time. Among fast dissolving drug delivery systems, Oral flash release wafer drug delivery system is an alternative to tablets, capsules, and syrups for paediatric and geriatric patients who experience in difficulties of swallowing traditional oral solid dosage forms.[8] This technology has been used for local action, rapid release of products and for direct systemic circulation in the oral cavity to release drug in rapid fashion. And also this delivery protect drug from first pass metabolism and improve the dissolution. Oral thin Wafer drug delivery systems are solid 15 dosage forms, which dissolve in a short period of time when placed in the mouth without drinking water or chewing. These are also referred as fast dissolving Oral Wafers, wafers, buccal films/ Oral strips.[9]

The mucous membrane permeability provides a convenient route for the systemic delivery of new and existing therapeutic drugs. Different mucosal regions like oral mucosa, nasal, rectal, vaginal, ocular may facilitate bioavailability by avoiding the hepatic metabolism. Transmucosal drug delivery is being considered as an attractive delivery route for new and existing drug compounds, some of which are only available today through parentral delivery. Among the various sites available for transmucosal drug delivery, the buccal mucosa and the sublingual area are the best-suited sites for local as well as systemic delivery of drugs, due to their physiological features. Fast dissolving wafers are a new arising oral dosage forms used by patients world widely. These dosage forms can be used even in acute condition for getting instant relief.[10] Fast dissolving wafers have gained vast attention on the market because of its various advantages along with an extended shelf life of 2-3 years. These oral sublingual wafers are nothing but a thin oral strip which when place in the sublingual cavity dissolves immediately due to presence of saliva in the mouth by releasing medicament within short span of time.[11] Sublingual wafers seem to be highly advantageous dosage form during travelling as it does not need water for engulfment. Even rapid onset of action is achieved as this dosage form is highly efficient in avoiding first pass metabolism. Wafers are administered sublingually to improve the onset of action, lower the dose and enhance efficacy of the medicament, it is more stable, durable and quicker dissolving than other conventional dosage forms, an oral wafer helps to enhance bioavailability of the drug, improves dosing accuracy i.e., single unit dosage form, has the potential to allow the use of bitter tasting drug into the formulation and improves patient compliance.[12,13] Benign prostatic hyperplasia is a condition in which there is enlargement of prostate gland without malignancy. The bladder wall thickens and loses the ability to empty completely.

Evaluation [14-18]

Thickness

Three random wafers should be selected from each batch and the thickness measurement at three different places using a Vernier calliper.

Weight uniformity

For each formulation, select three randomly patches. For weight variation test, 10 wafers from each batch should be weighed individually by digital electronic balance and the average weight and relative standard deviation ha to be calculated.

Surface pH determination

The surface pH of fast dissolving wafers determine in order to investigate the possibility of any side effects in vivo. As an acidic or alkaline pH may cause irritation to the oral mucosa, it is important to keep the surface pH as close to neutral as possible. The wafer to be tested was placed in a petridish and moistened with 0.2 ml of distilled water. The electrode of pH meter placed on the surface of wafer to determine the surface pH.

Folding endurance

This should be determined by repeatedly folding one wafers at the same place until it break. The number of times the wafers could be folded at the same place without breaking cracking give the value of folding endurance.

Percentage of moisture content

The wafers weigh individually and keep in desiccators containing activated silica at Room temperature for 24 hrs. Individual wafers weighed repeatedly until they will show a Constant weight. The percentage of moisture content should be calculated as the difference between initial and final weight with respect to final weight.

Disintegrating time

The most important criteria of present work is to dosage form should be dissolved within few seconds. The incorporation of polymers to minimizes the disintegrating time. In vitro disintegration time determine by placing the wafer in a petridish containing 10ml distilled water with swirling every 10 sec. The time at which the wafer disintegrated should be noted.

In vitro dissolution study

The in vitro dissolution test will be perform using the USP dissolution apparatus II (Paddle Type). The dissolution studies carry out at 37±0.5°C; with stirring speed of 50 rpm In 900 ml phosphate buffer (pH 6.8). Wafers size required for dose delivery (2.5×2.5 cm2) Five ml aliquot of dissolution media has to be collected at time intervals of 1, 2, 5, 10 and 15 minutes and replaced with equal volumes of phosphate buffer (pH 6.8).

Determination and Comparison of vitamin C

With the Moringa plant's significance in mind, vitamin C levels in dry and fresh leaves as well as stems were measured using three separate techniques: titration, spectrophotometric analysis, and high performances liquid chromatography (HPLC). [19] Titration, spectrophotometer, and high performances liquid chromatography are the three techniques that were utilised in accordance with past research on vitamin C determination (HPLC). For the purpose of determining the amount of vitamin C, fresh and dried leaves as well as stem samples were employed. Ascorbic acid of analytical grade was utilised to create the standard curve. In the experiment, lemon and mosambi were used as controls to measure the amount of vitamin C. The effectiveness of each of the three methods employed to quantify vitamin C was compared.[20] The amount of vitamin C discovered in fresh Moringa oleifera leaves ranged from 0.78 mg/g (by HPLC) to 0.87 mg/g using an enzymatic technique. The vitamin C concentration of Moringa oleifera leaves was nearly higher than that of lemons and higher than that of mosambi.[21] These findings unambiguously showed that Moringa oleifera leaves are an abundant source of vitamin C, especially when compared to the well-known vitamin C-rich fruits lemon and mosambi. By using several techniques, it was discovered that Moringa leaves contained substantially less vitamin C than fresh leaves, ranging from 0.07 to 0.14 mg/g. [22] The oxidative breakdown of vitamin C, which is catalysed by heat, may be the reason of the fall in vitamin C level after drying. It suggests that the drying process has a negative impact on the level of vitamin C. Using various techniques, it was discovered that Moringa oleifera stem samples had substantially lower levels of vitamin C than fresh leaves, ranging from 0.10 to 0.15 mg/g. The results of this study indicate that when compared to citrus fruits (lemon and Mosambi), *Moringa* may offer a greater supply of vitamin C. This confirms that the Moringa plant is a valuable source of vitamin C.[23]

Overview on Formulation of oral wafers

Solvent casting may be used to create drug-containing fast dissolving wafers. The optimised amounts of plasticizer and drug dissolve in 95% ethanol and then added to the polymeric solution. The optimised amounts of drug dissolve in 2ml of water and kept on sonication for proper dispersion. The optimised amounts of polymers dissolved in 5ml of water and stirred continuously for 1 hour. Using a magnetic stirrer, the polymeric solution was stirred for 30 minutes before being left undisturbed until the air bubbles were released. The aqueous solution was cast in a glass mould with dimensions of 2.5 x 2.5 cm and 10 wafers, and it was dried both at controlled room temperature (25°30°C, 45%RH) and at higher temperature (microwave oven). At a controlled room temperature, the wafers dried in about 48 hours. The dried wafers were carefully taken off the glass plates and cut to the appropriate sizes for testing. The wafers were kept in airtight plastic bags until use.[24]

CONCLUSION

In comparison to traditional oral dosage forms, wafers as innovative drug delivery methods may offer superior biopharmaceutical characteristics, greater efficacy, and improved safety. Future prospects for the Flash release wafer are bright thanks to the presence of cutting-edge technologies and broad market acceptance. Future advancements in the fast-dissolving medication delivery method have a lot of potential. According to the current report's findings, flash release oral Wafers are the most palatable and precise oral dosage form since they don't pass through the hepatic system and exhibit a greater therapeutic response. Compared to traditional dose forms and fast-acting tablets, fast-acting wafers provide a number of benefits. The pharmaceutical companies like this dose form since it is both widely accepted in industry and by patients, particularly children and the elderly. Due to their lower price and higher customer compliance, oral wafers can take the role of over-the-counter (OTC) medications, both generic and name brand. Due in part to its function as a cofactor for propyl and Lysol hydroxylase activity, which is crucial for collagen production, wound healing, and immune boosting, ascorbic acid is needed for the growth and repair of all tissues. By using ascorbic acid in the form of oral wafer (novel drug delivery system) can give beneficial to both that is patient as well as producers. By taking this formulation of ascorbic acid, patient immunity will be boost and this vitamin C extracted form herbal source that is Moringa oleifera (drumstick) part used is leave, so it synthetic source of vitamin C so the chance of toxicity will be less.

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Conflict of Interest
Authors have none to declare

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