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FORMULATION AND EVALUATION OF PRICKLY PEAR FRUIT SYRUP

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ABSTRACT

The present study is aimed to identify the phytochemical composition of the crude extract of cactus prickly pear fruit juice as naturally helpful as Expectorants, Anti-diabetics, Anti-asthmatic conditions as well as Hyperlipidaemia condition (the condition of high cholesterol levels). Prickly pear can reduce hepatic levels of cholesterol. Prickly pear is a fruit that grows on the leaves of the nopales cacti, belonging to the genus opuntia, its scientific name is opuntia ficus-indica. It is also referred to as Nagfani in Hindi. The fruits are known as a source of a varied number of nutritional compounds like amino acids, vitamins, carotenes, minerals, sugar(fructose), lipids, phenolic compounds, Flavonoid's that may beneficial for immunity booster.

This study shows that the prickly pear / cactus fruit in the form of simple syrup are may be useful as a food for nutraceutical benefits and as medicinal benefits in certain condition.

Keywords: Cactus Pear Fruit Juice, Expectorants, Diabetes, Anti-Asthmatic, Cholesterol, Flavonoids.

I. INTRODUCTION

The cactus pear tree belongs to the genus opuntia of the cactaceae family. Containing almost 300 species utilised by human. However, only a few cactus plants may be cultivated for the production of fruits [1]. The cactus pear grows in conditions where few other plants can survive because of its ability to thrive in harsh conditions, such as extremely high temperatures and limited water supply. The tree can grow up to 5 m tall with the step that is divided into multiple green flattened leaf pads, called cladodes or nopalitos, covered with a dull [2].

Cactus pear produces orange flowers, which give rise to oval-shaped thorny fruits with colours ranging from yellow to red and purple, and it ripens between January and March. In other countries, such as Mexico, the entire plant, including the stem (cladode), and the fruit is used for medicinal purposes, animal feed and the production of other food products [3]. The entire plant is reported to have antiviral and anti-inflammatory properties; hence, it is used to decrease blood sugar levels in people with type 2 diabetes and lessens the unpleasant effects of a hangover due to its anti- inflammatory effects . Cactus as a type of plant that grows in hot, dry areas such as deserts. The stem of a cactus plant is very thick and it has sharp points which are like needles. The plant does not have leaves.

The growing demand for nutraceuticals is paralleled by an increased effort in developing natural products for the prevention or treatment of human diseases. According to several studies demonstrating both cactus fruit and cladode yielding high values of important nutrients, such as betalains, amino compounds including taurine, minerals, vitamins, as well as further antioxidants, the cactus pear (Opuntia spp.) appears to be an excellent candidate for the inclusion in food.

Cacti vary in size based on their species. Perhaps the smallest cacti species is *Blossfeldia liliputana*, a South American plant that's less than an inch (2.5centimeters) in diameter when fully grown. The tallest cactus, the Mexican giant cardon, reaches over 60 feet (18 meters).

The flowers of cacti are usually perfect (bisexual), containing both male reproductive organs (stamens) and female parts (a pistil). The flowers occur singly, rather than in groups, although many discrete flowers may be present on a cactus at the same time. The flowers of most species of cacti are large and showy, and they can be colored white, red, pink, orange, or yellow, but not blue. The sepals of the calyx are petal-like in shape and color, and they combine with the numerous petals to form an attractive, often richly scented, nectar-producing flower, designed to lure such pollinators as hawk-moths, bees, bats, and birds, especially hummingbirds and small doves. The fruit is a many- seeded berry [4].

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Fig 1:

The cactus pear fruit also called prickly pear fruit is an oval elongated berry, with a thick pericarp, a juicy pulp with a considerable number of seeds and a semi-hard rind with thorns. The pericarp and the edible pulp may have different colors such as green, greenish white, canary yellow, lemon yellow, red, cherry-red, or purple hues [5]. The average weight of prickly pears fruits varies from 100 to 160 g depending on the origin site and cultivation. The usable part of the fruit is composed of peel (48%– 52%) and pulp (48%–52%). The pulp can be further subdivided into seeds and strained pulp (44%– 45%), the latter being the basis for fruit and juice products [6].

A Prickly pear fruit has long been known in traditional medicine for treating a number of pathologies such as Cough, Dibetecs, Asthama, ulcer, dyspnea, liver conditions, wounds and fatigue. Different studies using European and Asian varieties of cactus pears have shown notable antioxidant activities that reduce significantly the oxidative stress in patients and may prevent chronic pathologies. In this sense, some preparations of fleshy stems (cladodes) have been tested for the treatment of diabetes symptomatology in humans and animal models [7]. Some authors have also reported that the fresh stems and nopal are a good source of fiber that also helps to reduce the blood sugar and plasma cholesterol levels [8]. The cactus pear fruit may be considered a functional food; this feature has been attributed to its bioactive compounds such as vitamin C and vitamin E, polyphenols, carotenoids, flavonoid compounds (e.g., kaempferol, quercetin, and isorhamnetin), taurine and pigments among them [9]. betalains are water-soluble pigments. Two betalain derivatives are present in cactus-pears: betacyanin, responsible for their red-purple color, and betaxanthin, for their yellow-orange color. These pigments have shown beneficial effects on the redox-regulated pathways involved in cell growth, insulin signalling pathway and inflammation and have not shown toxic effects in humans [10,11].

Uses of Cactus include the following.

- Cactus can reduce body fat and also can keep the heart strong.
- Cactus fruit in diet can help to reduce the risk of strokes and other vascular diseases.
- Consuming cactus plants also helps to protect nerve cells. Cactus is rich in fibre and antioxidants.
- This plant helps to keep the atmosphere of the house positive as it helps to clean the air as it removes pollutants from the air and thus improves the quality of air.
- Cactus water is made from the fruit of cactus and it's very healthy to drink as it is low in calories and provides nutrients to the body.
- Eating cacti is also good for losing weight.
- The Cactus plant also helps to cure diabetes as it helps to decrease the blood sugar level and helps people to become healthy.
- Cactus is an excellent source of vitamins like A, C, and E.
- It is loaded with vitamin C. Regular consumption of cactus juice helps to eliminate viruses from the body and thus strengthens a person's immunity.

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1.1 BOTANICAL ASPECTS, MORPHOLOGY AND PRODUCTION

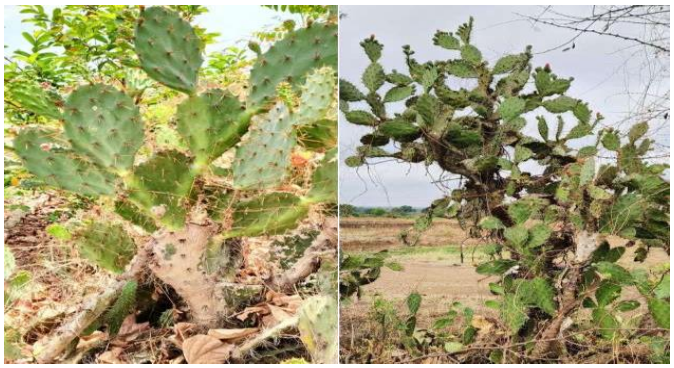

Fig 2:

1.1.1 Botanical Aspects

The term cactus (Cactaceae) refers to a group of approximately 1,600 species in 130 genera subdivided in the three subfamilies Pereskioideae, Opuntioideae and Cactoideae. The most common and widespread Opuntia genus covered in this review regroups a number of more than 300 species, among which over 100 have been found in wild habitats in Mexico, 60 of them being endemic [12]. The prickly pear cactus(Opuntia spp.), more recently renamed cactus pear, and the cholla (Cylindropuntia spp.)

1.1.2 Morphology

Cactus pear plants show a widespread and shallow root system ready to absorb water even from mist or a light rain. This allows the plants to take in water and store it sponge-like in the parenchyma. It has been demonstrated that the ability of Cactaceae to retain water even under unfavorable climatic conditions is due to the high mucilage production in both cladodes and fruits [13].

From a morphological point of view, the cactus pear plant can be divided into the root, the vegetative part, the fruit and the flower. The vegetative or vegetable part, frequently addressed as pads, joints, or cladodes are modified stems which replace the leaves in their photosynthetic function. They are succulent and bear organs with an ovoid or elongated form of 18–25 cm length. The outer cladode, the chlorenchyma, is crucial for its photosynthetic action; the inner part is composed of a white medullar parenchyma mainly for water storage.

Cactus pear fruit seeds exhibit considerable variations in form, size, structure, embryo characteristics, and teste colour. They represent about 10-15% of the edible pulp and are usually discarded as waste after pulp extraction. Several authors have reported a great variation in the number of seeds, from 1-5 to more than 2000 per fruit. This variation is observed within and/or between species depending on factors such as the age and size of the plant, and the number of flowers per plant. Seed vitality under natural or controlled storage conditions will depend on many factors, including seed type, maturity stage, viability and moisture content during storage, temperature and degree of fungal or bacterial infection [14].

1.1.3 Production

The plant is used mainly for fruit production, although in some countries it is used as a vegetable for human consumption and also as fodder. The high season for harvesting Opuntia cactus fruits is from April to August in Africa and America , and November to December in the Mediterranean regions [15].

Unfortunately, cactus fruits have a short shelf life from 3–4 weeks, thus limiting long-term storage and worldwide distribution. Typically, a high pH value which varies from 5.3 to 7.1 is found, and the very low acidity compromises extended fruit storage. Various efforts to reduce postharvest decay have therefore been carried out, taking into account reduction of microbial contamination while maintaining the nutritional as well as sensorial properties . Peeled fruits are good for eight days at 4°C when packed in special films, while the same temperature was recommended to control microbial spoilage. It must be noted that each variety and fruits from different harvest seasons might require changing preharvest treatments and storage conditions. Sterilization of processed fruits at greater than 115o C is required to avoid growth of pathogenic micro-organisms. Alternatively, after acidification (pH 4.0-4.3), products only require less severe pasteurization temperatures below 100° C for preservation [16].

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1.2 Health Benefits Of Prickly Pear Cactus

1) Potential Role In Weight Control

Obesity is a global epidemic and needs to be managed at the earliest. Instead of resorting to extreme measures like harmful medications or surgery, a simple solution to this problem could be consuming plenty of dietary fiber. Prickly pear fruit contains fiber that will make you feel full for longer and reduce hunger pangs. It also helps in the elimination of dietary fat by binding it and excreting it from the system. As the intestines do not get a chance to absorb the dietary fat, this fruit effectively helps in weight control and even weight loss.

2) Helps to Lower Cholesterol / Antihyperlipidemic

Prickly pear fruits help to reduce the cholesterol levels in the blood. Its fiber (pectin) content held responsible for eliminate LDL Cholesterol from the body. Experimental investigation shown that prickly pear can reduce both plasma levels and hepatic levels of cholesterol. Phytosterols found in cactus seed oil can alter cholesterol metabolism in a positive way. Hyperlipidemia, condition of high cholesterol levels, can also be brought under control.

3) Fights Against Cancer Cells

The flavonoid compounds in prickly pear lower the risk of breast, prostate, stomach, pancreatic, ovarian, cervical, and lung cancers. They were shown to inhibit the growth of cancer cells in the lab and mice models. These compounds have the ability to remove free radicals and improve the activities of pro-oxidant enzymes.

4) To Prevents The Ulcers

A physical and mental stress condition can cause changes in the gastrointestinal mucosa and result in gastric ulcers. Inflammation occurs by increasing in the pro-inflammatory compounds that damage the gastric wall. Prickly pear exerts a positive effect on the gastric mucosa, facilitated by a compound betanin found in this fruit. The gastric mucus production is regulated, and developing ulcers are highly reduced by the consumption of prickly pear fruits.

5) To Reduced High Blood Glucose Level

Cactus pear show hypoglycemic activity. This means that the ingestion of this fruit or its extract can lower high blood glucose levels as well as maintain normal levels. By conducting Different experiments on both diabetic and antidiabetic rats have shown a decrease in blood glucose levels. The main mechanism of this reduction is a decrease in the intestinal absorption of glucose. Due to fiber and pectin content are considered responsible for this activity. Once the blood sugar levels are brought under control, type II diabetes can be managed easily.

6) Protects The Liver

If Consumeing prickly pear fruit juice or in the form of jams or jellies to prevent liver damage. It contains plenty of antioxidants that can reduce the oxidative stress caused by certain carcinogenous compounds on the liver. It exerts hepatoprotective activity that mainly involves eliminating free radicals and increasing the body's antioxidant activity against these compounds.

7) Immune System Booster

The vitamin C content of prickly pear is responsible for this particular health benefit. Vitamin C boosts the body's immune response against various infections. It increases the production of white blood cells that undertake the process of killing and eliminating infectious microorganisms from the body. Vitamin C also acts as an antioxidant and reduces the free radical damage throughout the body. This also gives the immune system a boost.

8) Protects Against Heart Disease

The fiber content of prickly pear helps reduce cholesterol levels in the body and maintain blood pressure. Hence, hypertension and bad cholesterol are brought under control. These factors are associated with atherosclerosis , coronary heart disease, and other heart diseases. Cactus fruit's antioxidants also help to enhance cardiovascular health. The biologically active flavonoids in prickly pears normalize the blood platelet stickiness, which helps to maintain good cardiovascular health.

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9) High Blood Pressure

A Prickly pear fruit is rich in the mineral potassium. When ingested, this mineral can reduce the pressure on the blood vessels and lower the elevated blood pressure levels. Regular intake of prickly pear can maintain normal blood pressure levels and give relief from hypertension. The betalain found in this fruit also strengthens the inner walls of the blood vessels, further aiding in the promotion of cardiovascular health [17].

1.3 Medicinal and industrial applications of prickly pear fruits

1. Anti-cancer effect

Most recent studies suggests that the cactus pear fruit extract inhibits the proliferation of cervical, ovarian and bladder cancer cell lines in vitro, andsuppresses tumor growth in the nude mice ovarian cancer model in vivo.

These experiments showed that inhibition was dose- (1, 5, 10 and 25% cactus pear extract) and time- (1, 3 or 5 days treatment) dependent on in vitro-cultured cancer cells. The intra-peritoneal administration of cactus extract solution into mice did not affect the animal body weight, which indicated that cactus did not have a significant toxic effect in animals. More importantly, tumor growth inhibition was comparable to the synthetic retinoid N-(4- hydroxyphernyl) retinamide (4-HPR), which is currently used as a chemopreventive agent in ovarian cancer chemoprevention[18].

Growth inhibition of cultured-cancer cells was associated with an increase in apoptotic cells and the cell cycle arrest at the G1-phase. Moreover, the inducedgrowth inhibition seems dependent on the P53 pathway, which is the major tumor suppressor[19].

2. Anti-oxidant properties

The presence of several antioxidants (ascorbic acid, carotenoids, reduced glutathione, cysteine, taurine and flavonoids such as quercetin, kaempferol and isorhamnetin) has been detected in the fruits and vegetables of different varieties of cactus prickly pear. More recently, the antioxidant properties of the most frequent cactus pear betalains (betanin and indicaxanthin) have been revealed [20].

3. Anti-viral effect

An interesting study by Ahmad et al demonstrated that administration of a cactus stem extract (Opuntia streptacantha) to mice, horses, and humans inhibits intracellular replication of a number of DNA- and RNA-viruses such as Herpes simplex virus Type 2, Equine herpes virus, pseudorabies virus, influenza virus, respiratory syncitial disease virus and HIV-1[21].

4. Anti- inflammatory effect

Numerous studies have evocated the analgesic and anti-inflammatory actions of the genus Opuntia by using the fruit extract phytosterols from fruit and stem extracts. Gastric lesions in rat animal studies were reduced by fruit powders. Finally, betanin and indicaxanthin stimulated an inhibitory effect on the chlorination activity of myeloperoxidase at neutral rather than at pH 5 [22].

5. Anti-diabetic (type II) effect

The prickly pear cactus stems have been used traditionally to treat diabetes in Mexico. Nowadays, Opuntia spp. is amongst the majority of products recommended by Italian herbalists that may be efficacious in reducing glycemia. A certain kind of studies have demonstrated the hypoglycemic activity of the prickly pear cactus extract on non-diabetics and diabetic-induced rats or diabetic humans. In a study on rats, the combination of insulin and purified extract of cactus (Opuntia fuliginosa Griffiths) was found to reduce blood glucose and glycated hemoglobin levels to normal. In this study, the oral dose of extract necessary to control diabetes contrast with the high quantities of insulin required for an equivalent hypoglycemic effect[23].

6. Anti- hyperlipidaemic and hypercholesterolemic effects

Experimental evidence suggest that cactus pear reduces cholesterol levels in human blood and modify low density lipoprotein (LDL) composition. Galati et al.[24] have found that the cholesterol, LDL and triglyceride plasma levels of rats were strongly reduced after 30 days of a daily administration of lyophilized cladodes of Opuntia ficus indica L. Mill. Recently, Ennouri et al.[25] observed a decrease in plasma total cholesterol and LDL (VLDL) cholesterol with no effect on HDL-cholesterol concentrations after addition of seed oil to the diet in rat.

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7. Further uses

Natural colorants from plant sources are receiving growing interest from both food manufacturers and consumers in the continuing replacement of synthetic dyes. Betalains present in fruit peel and pulp, but also in the flowers represent a potential healthy alternative. Because of the wide range of colors available, cactus fruits are highly appreciated in the countries of origin, e.g., Mexico, Argentina, and southern Italy for different purposes. Unfortunately, fruits are still considered a specialty in Western industrial countries, and processed products based on cactus are extremely rare. Therefore, a number of studies have recently dealt with the practical relevance of cactus fruit processing to open up ways for increased Opuntia fruit commercialization, such as juice and concentrate production for food coloring purposes [26].

Juice obtained from the strained pulp is suggested to be a good source of natural sweeteners and colorants. Cactus pear represents a viable alternative to red beet for food coloring purposes: it neither exhibits negative sensorial impact nor high nitrate levels, but offers a broad color range. Both the particular ratio of betaxanthins and betacyanins, as well as their total concentrations, has shown to determine their visual appearance covering a broad coloring range from bright yellow to red-violet. Therefore, cactus pear juice preparations are expected to be a suitable coloring foodstuff for low acid products such as ice-cream or yogurt. For complete exploitation of the fruit and resulting wastes, the residual seeds may be used for oil extraction, whereas the peels are considered a rich source of pectin, polyunsaturated fatty acids, natural antioxidant vitamins and sterols [27].

1.4 Chemical composition of prickly pear fruits

Prickly pear is a fruit that grows on the leaves of the Nopales cacti, belonging to the genus Opuntia, its scientific name is Opuntia ficus-indica. It is also referred to as Nagfani in Hindi, Nagajemudu in Telugu, Kallimullpazham in Malayalam, and Dindla in Gujarati. The younger plants are edible and often part of the Mexican diet. The other edible parts of the prickly pear cactus are the flowers, stems, and the leaves. Widely known as “cactus pear”, prickly pear by different names in different countries and regions like Tuna, Nopal, Nopales, Barberry figs, Indian figs. Prickly pear is a cylindrical fruit that has a firm outer skin with barbs and softer inner flesh, which is edible. It is green initially and turns reddish-pink as it matures in most plants. It can be eaten raw, boiled, or grilled. It is also used to make juice and jams. These tasty, oval fruits sprout from the tops of prickly cactus leaves and range in various colors from deep red-green to yellow or purple. Its taste is similar to watermelon/raspberries and it has a cucumber-like fragrance.The fruits are known as a source of a varied number of nutritional compounds. Cactus pear fruits exhibit an ascorbic acid and a titratable acidity of with pH values ranging from 5.0 to 6.6. Its soluble solids content of is greater than that present in other fruits, such as prunes, apricots, and peaches. Generally, cladodes are rich in pectin, mucilage and minerals, whereas the fruits are good sources of vitamins, amino acids and betalains. While the seed endosperm was reported to consist of arabinanrich polysaccharides, the principal seed coat component was D-xylan. In addition to lipids, seeds have been reported to accumulate proanthocyanidins . The fruit skin polysaccharide fraction has been subject to thorough investigations, whereas the pectin substances in fruit pulp remain to be characterized. The flowers predominantly accumulate betalains and colorless phenolics [28].

1.4.1. Amino acids, vitamins and carotenes –

Various numbers of amino are also found in cactus fruits. Vitamins are nutritionally important cactus pear fruit constituents. The fat soluble vitamin E or tocopherols, and beta-carotene are found in the lipid fraction of both the cactus fruit seed and pulp. The vitamin E homologues isoforms gamma- and delta- tocopherol are the main components in seed and pulp oils, respectively, amounting to about 80% of the total vitamin E content. Similar to beta-carotene, it is predominant in pulp lipids. Carotenes and vitamin E improve the stability of the fatty oil through their antioxidative properties[29].

Ascorbic acid, often erroneously addressed as vitamin C, is the third major vitamin in cactus pears. It is important to note that the total vitamin C content of cactus fruits might have been underestimated due to the presence of dehydroascorbic acid that has not been considered so far. Finally, only trace amounts of vitamin B1, vitamin B6, niacin, riboflavin, and pantothenic acid have been reported. Phytochemical investigation of Opuntia revealed a great number of amino acids, eight of which are essential. Cactus fruits contain high levels of amino acids, especially proline, taurine and serine [30].

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1.4.2. Minerals, sugars and organic acids

It has been observed that various studies on Opuntia composition, fruit pulp is considered a good source of minerals, especially calcium, potassium and magnesium. The seeds are rich in minerals and sulphur amino acids [31].

The fairly high sugar content and low acidity render the fruits a delicious, sweet but sometimes a bland taste. The sugar pattern in the fruit pulp is very simple and consists of glucose and fructose in virtually equal amounts, while the organic acid pattern is dominated by citric acid. Due to the high water content of the fruit, a total caloric value of 50 kcal/100 g is attained, which is comparable to that of other fruits such as pears, apricots and oranges. Directly absorbed, high glucose concentrations in cactus fruits represent an energy source instantly available for brain and nerve cells, while fructose being sweeter may enhance the fruit's flavor [32].

1.4.3. Lipids

Fruit pulp provides lower yields of oil. Furthermore, it has been shown that the seed oil contains a significant amount of neutral lipid, while the polar lipids are at higher levels in pulp oil. Both oils are a rich source of essential fatty acids and sterols. Linoleic acid, as well as beta-sitosterol and campesterol, are the major constituents of the fatty acid and sterol fractions, respectively. Finally, the peel fraction contains lipids [33]. It is important to remember that fat soluble vitamins such as alpha-, beta-, delta-, and gamma-tocopherols, vitamin K1 and beta-carotene are associated with the cactus fruit seed and pulp oils, and will prevent the lipid fractions from oxidative damage.

1.4.4. Phenolic compounds

Phenolics comprise a wide variety of compounds, divided into several classes such as hydroxybenzoic acids, hydroxycinnamic acids, anthocyanins, proanthocyanidins, flavonols, flavones, flavanols, flavanones, isoflavones, stilbenes and lignans, that occur in a great number of fruits (grapefruits, oranges, berries, dark grapes, apples, etc.).The presence of phenolics has been detected in cactus pulp fruit. It has been reported an antioxidative effect due to the major flavonoids encountered in cactus fruits (quercetin, kaempferol and isorhamnetin). There is clear evidence that these compounds are more efficient antioxidants than vitamins, since phenolic compounds are able to delay prooxidative effects on proteins, DNA and lipids by the generation of stable radicals. Furthermore, O. ficus indica polyphenolic compounds have been shown to induce a hyperpolarization of the plasma membrane and to raise the intracellular pool of calcium in human Jurkat T-cell lines. When fruits are investigated, it must be taken into account that higher phenolic contents are expected in the peel, rather than the pulp. Consequently, from a nutritional point of view processing both peel and pulp appears to be advantageous[33].

1.4.5. Betalains

The most obvious feature of cactus pear fruits and flowers are the yellow (betaxanthins) and red (betacyanins) betalains, nitrogen-containing vacuolar pigments that replace anthocyanins in most plant families of the Caryophyllales including the Cactaceae. While their characterization in cactus flowers has been scarce, their identification in cactus pear fruit has been of renewed interest recently. In addition to color, the same pigments have shown antioxidant properties being higher than for ascorbic acid [34].

1.5 COLLECTION OF PLANT AND MATERIALS

The cactus plant source was collected from Herbal Garden of Dr. R.N. Lahoti Institude of Pharmaceutical Education & Research Center Sultanpur,443301.

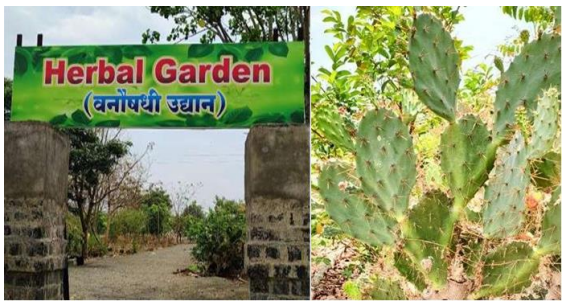

Fig 3:

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1.6 Reagents and chemicals

The other chemicals required for identification test and formulation are, Fehling's solution A & B, Benedict's reagent, Tommer's reagent, Barfoed's reagent, A-napthol solution, Conc.HCL, Phenyl hydrazine hydrochloride, Acetate buffer, conc.H2SO4, Glyacial acetic acid, Ferric chloride, Chloroform,

Ninhydrin reagent, Conc.HNO3, NaOH, Millon's reagent, Fougler's reagents, Sodium benzoate, Methylparaben, Propylparaben are collected from Dr. R.N. Lahoti Institude of Pharmaceutical Education & Research Center Sultanpur, 443301.

II. EXTRACTION OF PRICKLY PEAR FRUIT JUICE

1. The cactus fruit are collected from the cactus plant of the herbal garden of Dr.R.N. Lahoti institute of pharmaceutical education and research centre sultanpur by using protective hand glows.

Fig 4:

2. The collecting of fresh fruit from plant thus fruit dipped into the warm water for few minutes for cleaning and removing of dust particles.

Fig 5:

3. Clean and fresh fruits of prickly pear is kept for drying at room temperature.
4. Then the fruits are introduced over the flame of burner for removing of spine are present on fruit.
5. Normal heating process or brush helps to remove spine of cactus fruit.
6. A outer layer or peel of fruit is remove & cut to a apex & bottom base portion of fruits.

Fig 6:

7. The remaining middle portion that cut into four pieces for grinding by using sutaible grinder.

Fig 7:

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8. Later grinding of fruit parts into the juice was passes from the sieve number 44.

Fig 8:

9. To remove or separated out the seeds containing in fruit juice. 10. The extracted or isolated juice extract is store in well closed container.

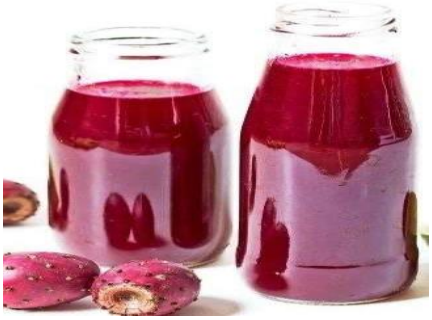

Fig 9:

III. IDENTIFICATION OF PHYTOCHEMICAL'S OF CACTUS FRUIT

Table 1:

SR.NO	TEST	OBSERVATION	INFERENCE	REMARK
1.	Solubility test	Soluble	Mono & disaccharides may be present	+ve
2.	Fehling's test	Yellow colour observed	Reducing sugar may be present	+ve
3.	Benedict's test	Yellow orange colour observed	Reducing sugar may be present	+ve
4.	Tommer's test	yellow or red colour not observed	Reducing suger may not be present	-ve
5.	Barford's test	Brick red precipitate observed at the bottom of test tube	Reducing sugar may be present	+ve
6.	Rapid furfural test	Deep purple colour observed	Ketoses like fructose, sucrose may be present	+ve
7.	Fougler's test	Blue colour observed	Fructose my be present	+ve
8.	Ninhydrin test	Violet colour observed	Amino acids may be present	+ve
9.	Xanthoproteic test	Yellow orange colour observed	Aromatic amino acids may be present	+ve
10.	Aldehyde test	No Violet ring at	Tryphtophan may not be	-ve

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		junction	present	
11.	Millon's test	Brick red colour	Tyrosine may be present	+ve
12.	Salkowski test	Upper chloroform layer show red colour while lower H2SO4 layer shows green fluorescence	Cholesterolpresent may be	+ve
13.	Flavonoid's test	Intense yellow colour appeared & it became colourless by addition of few drop of dilute acid	Flavonoid present may be	+ve
14.	Litmus test	blue litmus paper turns into red	Phenol may be present	+ve
15.	Ferric chloride test	Green colour observed	Catechol may be present	+ve
16.	Keller killiani test	Deep blue colour at the junction of two liquids observed	Cardiac glycosides may be present	+ve

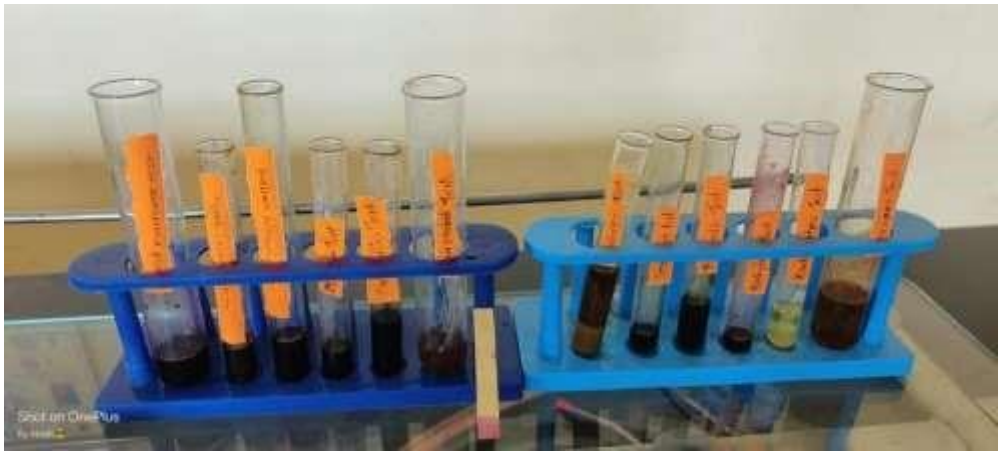

Fig 10:

IV. FORMULATION AND EVALUATION OF PRICKLY PEAR FRUIT SYRUP

4.1 Raw material and extraction of juice

The fruit juice was extracted from cactus fruit. There are 18 fresh fruits were collected for extraction process of juice among them near about 120 ml quantity of juice was collected from the fruits of cactus plant.

4.2 Formulation of Prickly Pear Fruit Syrup

The syrup was prepared in three different formulas that are F1, F2 & F3.

Formulation table

Table 2:

Sr. No	Ingredient's	F1	F2	F3
1.	Fruit juice	58ml	58ml	58ml
2.	Sweetner	Sucrose	Maltose (26.68	Fructose

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		(26.68 gm)	gm)	(26.68 gm)
3.	Sodium benzoate	0.15 mg	0.30 mg	0.45 mg
4.	Citric acid	0.075 mg	0.15 mg	0.225 mg
5.	Lemon juice	1 ml	1 ml	1 ml

4.3 Procedure -

1. Take a 58 ml extract of collected fruit juice into the beacker.
2. Add 26.68gm of sucrose (F1), maltose (F2) & fructose(F3) accordingly in fruit juice as a sweetener.
3. Heat the solution until the sweetener were completely dissolved into it.
4. Then keep the solution a side at room temperature.
5. After the cooling of formulation add sodium benzoate and citric acid as a preservative.
6. Later add 1 ml of lemon juice as flavouring agent.
7. Keep the syrup into well closed container for evaluation.

4.4 Evaluation

Table 3:

SR. No	Parameters	F1	F2	F3
1	Appearance	Clear against white& black background	Clear against white& black background	Clear against white & black background
2	colour	Pink to redish	Pink to redish	Pink to redish
3	odour	Bubblegum / watermelon	Bubblegum / watermelon	Bubblegum / watermelon
4	test	Sweetish	Sweetish	Sweetish
5	PH	6.4	4.31	6.5
6	Viscosity	Slightly viscous	Slightly viscous	Slightly viscous

1. **Appearance:-** The developed formulation were inspected visually for clarity of cactus fruit syrup F1, F2 & F3 by observing against white & black background. It was found that all formulation F1, F2 & F3 cleared against white & black background.
2. **PH measurement:-** The PH of each developed formulation F1, F2 & F3 determined by using PH meter. The PH meter was first calibrated by using solution of PH-4 to PH-7 & it was found that all formulation F1, F2 & F3 shown PH – 4.31 to 6.5 rang respectivly.
3. **Colour :-** The developed formulation were inspected visually for colour of cactus fruit syrup F1, F2 & F3 by observing against white & black background. It was found that all formulation F1, F2 & F3 pink & redish against white & black background.

V. CONCLUSION

This study shows that the prickly pear / cactus fruit syrup may be benefecial as a food and nutraceutical source to fullfill medicinal values naturally. This study helps for identification and formulation of cactus/ prickly pear fruit syrups successfully which have multiple applications like it helps to lower the cholesterol, fight aginst cancer cells (show anti-cancer activity), prevent ulcer, regulate blood sugar level (help in type-II diabetics), liver tonic, it helps to boost the natural immunity and regulate blood pressure. As per the formulation & evaluation as peers it conclude that formulating three different constituent syrup formulation F1, F2 & F3.

According to the preparation of syrup F1, F2 & F3. On the basis of evaluation parameter and formulation F3 (fructose) show better result and out comes compare to F1 & F2.

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