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ANALYSIS OF PROXIMATE, PHYTOCHEMICAL, AND BACTERIAL GROWTH IN FUDGE PREPARED BY USING DEHYDRATED FIG

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ABSTRACT

One of the most significant agricultural products of the tropics and subtropics is the fig fruit (Ficus carica L.). The fig has long been a part of the cuisine in the Middle East and the Mediterranean region and is revered as a sign of long life. Alternative medicines or formulation based on natural sources are good option in diseases cure and prevention. The current study focuses on the nutritional, phytochemical, antioxidant, and antibacterial properties of fudge prepared with mechanically dehydrated fig (Ficus carica), also called "Anjir" in India, which is commonly consumed. The purpose of this study is to undertake a preliminary phytochemical analysis to assess the antioxidant activity and phytochemical makeup of proceed product fudge of dehydrated fig powder. Fudge in aqueous form underwent preliminary phytochemical investigation. Phytochemicals like flavonoids, alkaloids, coumarins, quinones, and tannins have been discovered in developed product. The DPPH technique was also used to measure the antioxidants potential of fudge. Fudge, a processed product made from dehydrated figs, scored highly on the sensory evaluation. The use of mechanically dehydrated fig fruit in various products expanded the range of food items that offer a good complement with the appropriate nutritional content. The organoleptic evaluation of Fudge from dehydrated fig based on sensory evaluation between semi-trained group of people of Babasaheb Bhimrao Ambedkar University, Lucknow. Fudge has a two-week shelf life when kept in the refrigerator. The results of proximate analysis of fudge in 100g are: Fat- 4.76, protein-39.17, total enegy-274.78, CHO-48.19

Keywords: Fig, Fudge, phytochemical, proximate analysis, antimicrobial activity

I. INTRODUCTION

Fig fruits popularly known as “Anjeer” in India, a delicious fruit developed from a breed of Umbar. The common fig (Ficus carica L.) is a member of the Moraceae family, which also includes the Umbar, Banyan, Peepul, Jack fruit, and Mulberry. One of the oldest fruits that humans have ever consumed is the fig. Because they are a significant source of carbohydrates and have the highest dietary index value among fruits, figs are very essential in terms of nutrition. One of the earliest cultivated plants is said to be the common fig (Ficus carica L.). Fig (F. Carica) is used in native medicinal system for different disorders such as gastrointestinal (colic, indigestion, loss of appetite, and diarrhea), respiratory (sore throats, cough, and bronchial problems), inflammatory, and cardiovascular disorders. Their fruits have been used as sustenance for humans and their animals for ages, whether fresh or dried. Fig is a deciduous tree having wide-range of disease management activities as it is a rich source of antioxidants. According to the Food and Agriculture Organization of the United Nations the world production of fig fruit is stable, with a decade average of approximately 1.1 million tons per year. Traditionally as well as scientifically various experiments it has been confirmed that fig has potential role in diseases cure. Figs have gained popularity not only for their delicious flavour but perhaps also for their potential health benefits. Dried fruits are those that have had the majority of their water content removed, either naturally (sun drying) or artificially (using dryers or dehydrators, for example). Due to the extensive equipment used and rigorous examination and optimization of the drying parameters at each stage of the process, it has become increasingly sophisticated and complex in modern times. In terms of the chemical and biological changes in the product during the dehydration process, emerging innovative approaches have been thoroughly examined. Additionally, the elimination of water extends the period of storage by preventing the growth of microorganisms and hazardous chemical reactions. Fruits with high fibre content include figs, prunes, and raisins. A fully matured fig's bell- or pear-shaped body and luscious interior are naturally rich in phytonutrients, antioxidants, concentrated minerals, and vitamins that promote health. fig fruits can be made into a variety of value-added products, the producer

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may not only receive a greater wage, but fig products may also be available to consumers for a longer period of time. The microbiological stability may be ensured due to a decrease in water activity caused by evaporation as a result of heating. Additionally, concentrated fig pulp can be utilized to make a variety of goods. Therefore, the goal of the current study was to concentrate fig pulp and examine the qualitative parameters of that pulp during storage as well as the economics of production. Drying causes water removal result changing in textures such as shrinkage and fruit hardening. The product prepared from the dehydrated fig powder is fudge, which is a type of confection. Traditionally, it is very well known by us that fruits are most important source of nutrient in our daily food habit. Many studies and research describe the importance of fruits in our life for the maintenance of our bodies. Because of this, dehydrated fig powder can be used to produce a variety of food products. For its potential to be used as a functional food, "Anjir," a common fig, was examined for its nutritional, phytochemical, antioxidant, and antibacterial properties.

II. MATERIAL AND METHOD

The making and processing of fudge made with dried fruit is covered in this section.

TOOLS: Dehydrator, Mixer Grinder, Refrigerator, Weighing Machine, Spoon, Gas Stove, Pan, Plates, knife

COLLECTION OF RAW INGREDIENTS: From the neighbourhood grocery store in Telibagh, Lucknow, and Uttar Pradesh, dried fig packets, dried dates packets, butter, milk, vanilla essence, and sodium bicarbonate were procured.

1.1 Collection and Preparation of Fudge

The study was carried out at the Babasaheb Bhimrao Ambedkar University's School of Home Science Department at Central University in Vidiya Vihar Raibareli, Lucknow, 226025.We bought figs in quantity in the dried form from the Lucknow neighbourhood market. The fig was chopped to enhance surface area before being placed on an aluminium tray and kept under close observation for 48 to 72 hours at 75°C. To prevent the fig from burning for a long time due to temperature, it should routinely have its appearance checked. This guarantees that nothing is missed while drying the fig to eliminate the moisture. The fig was put in a grinder to be turned into powder after the dehydration period. Consequently, fig powder undergoes mechanical dehydration. The fig powder was mechanically dehydrated and used to make fudge. Fig powder (25g), dates syrup (50g), which can be used in place of sugar, butter (5g), milk (15ml), water (15ml), vanilla essence (3 drops), sodium bicarbonate, and optionally adding chopped dried fruits are the ingredients that go into making this. Fudge is created by gradually heating manually added ingredients for a certain period of time, removing it from the heat, and beating it until the appropriate consistency is attained. The mixture is then poured into a greased tin and shaped as desired after cooling in the refrigerator.

III. CHEMICALS AND REAGENT

Petroleum ether, Distilled water, Methanal, Sulphuric acid, Sodium hydroxide, Pumice powder, potassium sulphate, copper sulphate, selenium oxide, Nutrient agar, Nutrient broth, Hydrochloric acid, Ferric chloride.

IV. NUTRITIONAL PROFILING

The nutritional profile was carried out to assess the potential quality of the dried Fudge sample.

4.1 The ASH Content

The ash content in dry sample was determined by incinerating 2g sample in a Muffle Furnace. 2g of the dried powdered sample was taken in reweighed crucible which was then placed uncovered in a muffle furnace at 550 ºC to allow charring for 4 hours. The crucible was then taken out, covered with the lid and cooled in a desiccator to avoid any moisture. The crucible was then weighed without the lid using a weighing balance. The total ash content (in %) was calculated by the formula given below.

Formula – Ash % = (w3 – w1) ×100 ÷ w2 - w1 (gm)

W1 = Weight of empty crucible.

W2 = Weight of the sample + (before drying)

W3 = weight of crucible + sample (after ashing)

Or ASH% = Weight of ASH X 100

Weight of Sample

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4.2 The Moisture Content

The moisture content was determined using the method given by AOAC. In order to completely eliminate any moisture, 10g of the dried powdered sample was placed in a petri plate that had already been sterilized, weighed, and placed in a hot air oven at 120 o C for three hours. Once the sample-filled glass petri plates' weight stabilises, they are cooled in a desiccator before being reweighed.

The percentage of total moisture content in the sample was determined using the formula below:

Moisture content – w1 – w2 ×100 ÷ weight of sample

W1 = Initial weight

W2 = Final weight

4.3 Fat content

The Fat content was determined by using partial drying of a weighed sample prior to a Soxhlet extraction. fudge samples weighing 5 grammes were measured, placed in thimbles using dry paper, and then cotton wool plugs were added. After drying, the thimbles were put into a Soxhlet system. Each round bottom extraction flask received 50 ml of petroleum ether as a solvent after being dried and weighed. The samples were extracted in a boiling position for 15 minutes. For three hours, the extraction was done continually. After cooling, this was reweighed. The fat content formula was as follows:

Fat = weight of flask after – weight of flask before × 100 ÷ weight of sample

4.4 Protein Content

The protein was determined by using Kjeldahl method. The fudge sample was weighed into the digestion flask at a weight of 1 gramme. The sample was treated with Kjeldahl catalyst (10 gm potassium sulphate, 2 gramme copper sulphate, and 0.25 gm selenium oxide). The sample was treated with 20 ml of strong sulfuric acid before being fixed for 8 hours in the digestion unit (4500 C) of the Kjedahl apparatus in the fume cupboard. After cooling, the pure yellow digest turned into a colourless liquid, which was put into a volumetric flask measuring 100 ml and topped off with purified water. As an indicator, 20 ml of a 4% solution of boric acid was pipette into a conical flask. After that, 75 cc of distilled water were added to the sample to dilute it.

A small amount of the digested—about 10 ml—was distilled after being made alkaline with 20 ml of sodium hydroxide (20%). The distillery's steam outlet was shut off, and the timing of the boric acid solution's transition to green was set. 15 minutes were spent distilling the mixture. After that, the filtrate was tested against 0.1 N of hydrochloric acid. The protein content was calculated Protein formula –

Nitrogen = (sample titer – blank titer) - N of Hcl ×14 ×100×100 ÷ weight of sample × Aliquot take × for distillation ×1000

4.5 Carbohydrate Content

Carbohydrates content was calculated by using the following formula:

Total Carbohydrates content % = 100 – [moisture (%) + protein content (%) + ash (%) + fat (%)]

4.6 Total Energy

The following formulas were used to compute the energy content, or calorific value, in kilocalories. equation:

Kcal = (3.36 × % protein content) + (3.60 × % total carbohydrate content) + (8.37 × % fat)

V. ANTIOXIDANT ANALYSIS

DPPH scavenging activity was determined by the method of Blois, 2000. The antioxidant activity of 2, 2-Diphenyl-1- Picrylhydrazyl (DPPH) was calculated via spectrophotometer with small modifications. Dark blue is the colour of DPPH in methanol. The antioxidant molecule turns yellow when reduced, from purple, which enables DPPH to gain electrons. When measured by the enzyme 1,1-diphenyl 1 - 2 pyridyl hydroxylase (DPPH), DPPH exhibits significant absorbance at 517 nm.

Briefly, 1 ml of optimised fudge was made at various concentrations and combined with 0.1 ml of DPPH solution. One millilitre of methanol was made as a control sample, and it was incubated for 30 minutes at room temperature in the darkroom. Blank was prepared without extract solution. Methanol was used as a reference. Then optimal density was taken at 517nm. After incubation, the absorbance of the sample was read at 517 nm

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using a UV Visible spectrophotometer. The following formula was used to calculate the radical scavenging activity, which was given in percentages of scavenging activity:

%DPPH scavenging activity = OD control – OD sample ×100 ÷ OD control

VI. DETERMINATION OF SHELF-LIFE ANALYSIS

6.1 Determination of pH

The pH value of fudge sample is determined by using pH meter. 10 ml of distilled water and 1 g of fudge sample were combined in a beaker. The pH was measured using a pH metre. The pH meter's reading should be verified. The pH metre was calibrated using a standard buffer that has a pH between 4.0 and 7.0.

6.2 Total Titratable acidity

30 ml of water was used to dissolve a 2 gramme sample.100 ml of mixture after filtering has been created. The filtrate was pipetted into a beaker with 10 ml. Add two or three drops of the phenolphthalein indicator. The standard 0.01 N NaOH solution was titrated against until a pale pink coloration was achieved. Burette reading was observed.

6.3 TSS (Total Soluble Solid)

Total Soluble solid determined by using Digital Refractometer. It is based on the principle of refraction of light. The refractometer prism surface was cleaned and dried. Then, the placed a small amount of sample drops on to the prism of the refractometer. After look through the eyepiece while pointing the prism in the direction of good light*not directly at the sun. Focused and took the reading of where the base of the blue colour sits on the scale. Then, recorded the % Brix

6.4 Antimicrobial analysis

The agar well diffusion method was used to assess the extracts' antimicrobial properties against three Gram-positive and two Gram-negative bacterial test pathogens.

100 mg/ml, 50 mg/ml, and 25 mg/ml final concentrations of the extracts were reconstituted. The spread plate method was used to inoculate 100µl of the 24-hour-old bacterial inoculums onto nutrient agar. Using a sterile cork borer, wells (6 mm in diameter) were drilled into the agar, and 80 ml of extracts were then added to each well. The inoculated plates were then kept in an incubator for 24 hours at 37° C. By measuring the diameter of the zone of inhibition and reporting the results on a millimetre scale, the antibacterial activity was assessed. One of the wells on each plate was filled with methanol as a control.

VII. PHYTOCHEMICALS

7.1 Phytochemical screening for flavonoid content of Fudge

Drop by drop, add 3–4 ml of sodium hydroxide to 1 ml of extract. The presence of yellow colour indicates that the fudge contains flavonoid content.

7.2 Phytochemical screening for quinones content of fudge

Briefly add 1 ml of extract into test tube and concentrated sulfuric acid up to 1 ml. The red colour indicates the presence of quinone

7.3 Phytochemical screening for alkaloids content of fudge (Wagner's test)

Two millilitres of fudge extract, two millilitres of 1% concentrated hydrochloric acid, and a couple of drops of Wagner's reagent were placed in a test tube. Alkaloids in fudge extract produce positive results when they are green or white in colour.

7.4 Phytochemical screening for tannin content of fudge (Ferric chloride test)

One millilitre of fudge extract should be added to one millilitre of 5% FeCl3 in a test tube. Dark blue and green-black results showed that tannin was contained in an extract.

7.5 Phytochemical screening for saponin content of fudge (foam test)

5ml of fudge extract was vigorously shaken with 5 ml of distilled water in a test tube. The appearance of foam which lasted 5 min confirmed the presence of saponins.

7.6 Phytochemical screening for coumarin content of fudge

3 mL of 10 % NaOH was added to 2 mL aqueous fudge extract and yellow colour was observed in positive results.

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VIII. RESULT

8.1 Nutritional profile of fudge

Table 1. Proximate results of fudge

S. NO.	TESTS	RESULTS
4.	Protein	39.17
5.	Fat	4.76
6.	Moisture	4.266
7.	Ash	3.61
8.	Total energy	274.786
9.	% of total CHO content	48.194

8.2 Determination of shelf life

Table 2. pH, Titratable Acidity & TSS result of fudge

Parameter	**Fudge**
Ph	7.4
Titratable Acidity %	1.8 %
TSS	83.9

8.3 Phytochemical analysis of fudge

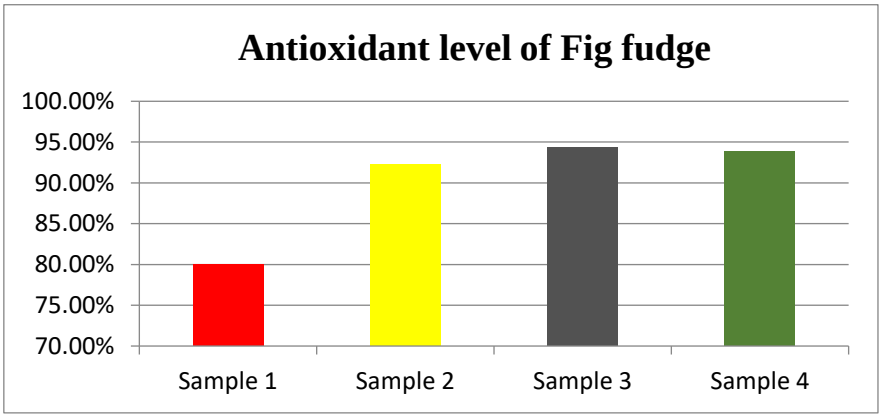
Table 3. Microbial Analysis result of fudge

Parameter	**Fudge**
Microbial	1.21cfu/gm

8.4 Antioxidant analysis

Table 4. Phytochemicals result of Fudge

Parameters	Fudge
TANINS	-
SAPONINS	+
FLAVONOIDS	+
ALKALOIDS	+
QUNIONES	+
COUMARIN	+



IX. CONCLUSION

In conclusion, we discovered that the product prepared by using dried fruit powder of Ficus carica contained the majority of the physiologically active phytochemicals in its aqueous, hydroalcoholic, and chloroform extracts. The presence of the aforementioned phytochemicals, which have the potential to be turned into valuable medications for human use, may be the cause of the therapeutic effects. We looked at the fudge made with dried fig fruit powder's nutritional value, phytochemical makeup, antioxidant potential, antibacterial activity, and use as a functional food. It was discovered that the antioxidant and antibacterial activity was good. Due to the aforementioned qualities of dried fig powder, fudge was created as a value-added product that combines the healing and health-promoting qualities of dehydrated fig powder. Therefore, there is a tonne of room for future pharmacological research and its application as a nutraceutical.

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