

A critical review of jujube-based food products: Understanding their history, culture, health and nutritional benefits

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Abstract: A wide variety of food dishes created from the jujube fruit, also known as Chinese dates, are referred to as "jujube-based food products." The jujube fruit is a flexible component that may be used in a wide range of foods, from beverages and sauces to snacks and sweets. Jujube sweets, tea, juice, breads, and sauce are a few examples of cuisine items made from this fruit. One of the foods produced using jujube utilising the fruit as a component is jujube bread. The jujube fruit is an abundant source of vitamins, minerals, and bioactive substances including flavonoids and triterpene acids. The paper summarises the jujube-based food items' history, culture, and nutritional and health advantages. Here, we specifically discuss jujube bread. According to the literature that is currently available, jujube bread has a high content of dietary fibre, vitamins, and minerals, as well as antioxidants, which may have a number of health benefits, including enhancing immune function, reducing oxidative stress, and improving digestion. Jujube bread has also been demonstrated to have the ability to lower blood pressure, blood sugar, and cholesterol levels, so enhancing cardiovascular health. To completely understand the health impacts of jujube bread eating, additional study is necessary. Jujube fruit is so used as a traditional and useful cuisine in every country. Jujube has an excellent natural flavour that many kids enjoy, so it may take the place of artificial flavours in bread to appeal to them and meet their nutritional needs. It can be used to prepare various foods, like bread, or it can be consumed as part of a regular diet. Here, the emphasis is mainly on the nutritional and sensory value of jujube breads and their prospective usage in the creation of culinary items like jujube bread. Regarding these aspects, fresh jujube as well as food items containing jujube have been found to provide health advantages. As a result, this review could be helpful for foods made from fresh jujube and that interest both food researchers and businesspeople.

1. Introduction

A plant with unusual therapeutic capabilities is called jujube, commonly known as a red date or a Chinese date. It is commonly grown in South Khorasan, Iran, and belongs to the Rhamnaceae family's *Ziziphus* genus. Jujube fruits are full of vitamins A, B, and C, calcium, phosphorus, fructose, sucrose, glucose, and amino acids. Around the world, they are eaten either fresh, dried, or prepared in different ways. Jujube is used both in cooking and as a supplement to health care since it may help with digestion, sleep, and hair development, among other things. The characteristics and use of the jujube plant, the significance of bread as a staple diet, and initiatives to boost bread's nutritious content. It also includes a number of research that looked at the use of different chemicals and additions to improve the quality and shelf life of bread. Many people across the world use bread as a staple diet because it contains vitamins, protein, and energy. In Iran, bread provides a sizable amount of the daily protein and calorie requirements. However, there have been efforts to improve the nutritional content of bread by including replacement and functional substances such different kinds of fibre. Studies have also looked at the usage of chemicals and materials for processing aids to enhance the bread's quality and shelf life. These include plant extracts like rice bran and potato puree that can enhance the sensory qualities of bread without changing its flavour, texture, or colour, as well as hydrocolloids like sodium alginate, carrageenan, and xanthan that help limit moisture loss and avoid staling. In order to promote improved health and productivity, the overall objective is to develop a new product that combines the nutritional advantages of jujube with the usefulness and popularity of bread.

2. Review of literature

Jujube bread is a particular variety of bread that is baked using jujube fruit or powder, along with flour, sugar, and other components. Despite the paucity of study, particularly on jujube bread, several studies have looked at the possible health advantages of jujube fruit, the main component of the bread.

Jujube fruit extract was discovered to have anti-inflammatory properties and to be able to decrease oxidative stress in rats with induced colitis, according to a 2017 study published in the general of medical food. This implies that jujube fruit may have advantages for the health of the digestive system. Another research indicated that jujube fruit extract might stop the development of several bacteria, including *Staphylococcus*

aureus and Escherichia coli, and this finding was published in the journal of food science in 2016. This suggests that jujube fruit may have anti-microbial properties.

Vitamin C, potassium, iron, and other elements found in jujube fruit, which is a rich source of vitamins and minerals, are crucial for a balanced diet and can promote heart health, immune system function, and other conditions. Jujubes, which provide the supplementary nutrition to wheat flour, are known to be rich in minerals, dietary fibre, polysaccharides, vitamins, and other important elements. The specific volume, humidity content, and elasticity of the bread rapidly reduced with the addition of more jujube powder, but the softness and toughness gradually rose. According to a researcher's study, adding jujube powder increases the total phenol content and antioxidant activity of bread. We may use 4-7% jujube flour while baking bread.

A loaf of giant knotweed rhizome red jujube health-care bread was created and disclosed by Rashawn Najjaa, Biswas, and Lu. It is made from fresh ingredients like giant braided rhizome, red jujube, lotus root starch, and wheat flour through steps like preprocessing, dosing, modulation, agitation, forming, baking, packaging, and examination. The finished product has an aroma that is unique to the giant knotweed rhizome and red jujube, is fine and smooth to the touch, rich in vegetable protein and dietary fibres, and has the ability to clear away heat and noxious materials, brace the middle warmer and benefit vital energy, nourish the blood and salve, strengthen the spleen, promote appetite, and other similar functions. The bread may be consumed by diabetics as a sugar-free item because sweet tea is clearly utilised as a sweetening ingredient throughout the preparation process to replace white granulated sugar. In China, the bread covers the product gap, and at the moment, the rhizome of gigantic knotweed is extensively employed. The procedure is straightforward, and getting the bread is simple.

3. History and culture of Jujube

One of the earliest fruit trees to be domesticated, jujube is also known as Chinese date or Chinese jujube. In terms of its economic, ecological, and social significance, jujube is the most significant species in the vast plant family Rhamnaceae. Its history of agriculture and exercise dates back to the Neolithic era, about 7000 years ago. It is grown on 2 million hectares of land in China, with an approximate yearly yield of approximately 8 million tonnes. Six regions of countries—Xinjiang, Hebei, Shanxi, Shaanxi, and Inner Mongolia—produce around 90% of the world's jujube. Currently, it is the most widely cultivated fruit species, the most produced dried fruit, and the primary source of income for almost 20 million farmers in China. Jujube was first grown commercially in China, South Korea, Iran, Israel, the United States, Italy, Australia, and other nations as recently as 2000 years ago after being introduced in nearby nations like Korea and Japan. Since then, it has expanded to many more nations. Due to its unique qualities, jujube should be regarded as a super fruit for the future. Jujube will become more and more essential in arid and semiarid marginal regions and is adaptable to drought as well as barren, salty soil.

4. Health benefits of jujube bread

Jujube fruit, which is used to make jujube bread, is nutrient-rich and an excellent source of calcium, potassium, and vitamin C. Jujube fruits contain a considerable quantity of iron, magnesium, and zinc, as well as a high level of dietary fibre, according to a study that was published in the journal of food science and technology. Jujube fruit and bread are both abundant in dietary fibre, which can help to decrease cholesterol levels, support digestive health, and avoid constipation. Jujube fruit extract had a laxative effect, according to a study that was published in the journal of ethnopharmacology, and it might be used to treat constipation. Jujube fruit's antioxidant capabilities, which are found in the fruit, can assist to shield the body from harm brought on by free radicals. Jujube fruit extract was discovered to have significant levels of antioxidant activity, according to a study that was published in the journal medical food. Jujube fruit immune system support: According to certain study, jujube fruit can strengthen the immune system and enhance general health. According to a research in the journal of medical food, jujube fruit extract can improve a mouse's immunological response. Jujube fruit extract was found to increase insulin sensitivity in rats, according to a study published in the journal of agriculture and food chemistry. Jujube fruit has a low glycemic index, which means it can help control blood sugar levels and may be a good option for people with diabetes. These smaller fruits aid in enhancing blood circulation and are rich in nutrients like potassium, phosphorus, manganese, iron, and zinc. To keep your heart healthy, you definitely need a mix of these elements. Iron aids in increasing haemoglobin levels, which prevents anaemia. These elements are crucial for controlling the body's blood flow.

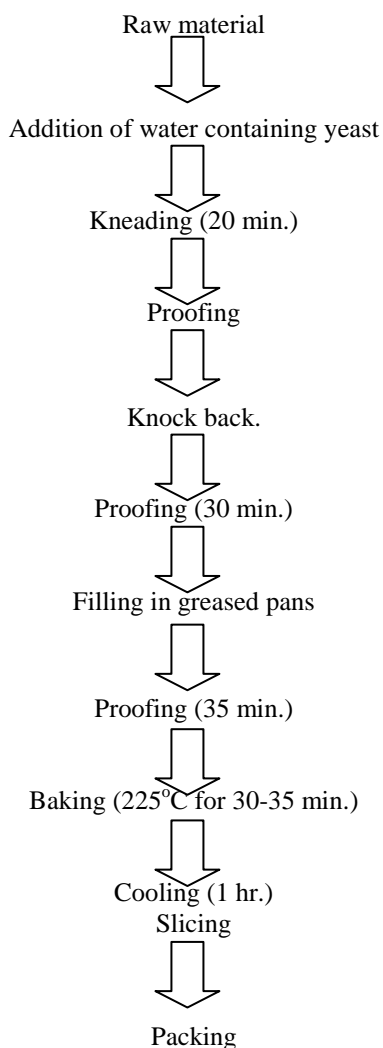
5. Materials and Methods

Preparation of jujube extract and bread

Dried jujube is used to make jujube extract. It is well-washed and stored in an ambient environment. A 1:4 amount of water was used as the solvent. The ultimate brix value was 60, and the extraction temperature was 5 +

80 °C. After washing, the fruit was scratched, and water was then extracted in a 1:4 ratio for almost 3 hours at the aforementioned temperature. The extract and pulp were mixed once they reached brix 14 and then passed through a cotton cloth. The remaining trash was once again cleaned, boiled, and the extract was filtered in a Hoover to boost its effectiveness. The concentration was finally increased at 45 °C using a rotational vacuum concentrator [13]. Using a rotary evaporator made by Handoff Corporation of Germany 4003, the process was carried out for two hours under vacuum at 72 mbar and 45 °C in order to achieve the proper concentration with a brix of 14. Currently, flour from the Golmaal Flour Factory (in Mashhad, Iran) was acquired at an extraction level of 81%. The flour used for the tests was produced together and kept in the fridge for this reason. Additional experiment-related components, such as sugar, liquid oils, vanilla from a bakery supply shop, fresh eggs, and yoghurt, were produced one day ahead of the regular cake-making day and stored in the refrigerator. 100 percent wheat flour, 55 percent sugar powder, 30 percent oil, 75 percent egg, 80 percent milk, 0.5 percent vanilla, and 4 or 6 percent Jujube essence from the previous step were all included in the cake dough. To make the cake dough, sugar powder, oil, and jujube extract are blended for 4 minutes at 128 rpm with an electric mixer until a cream with air bubbles forms. The wheat flour mixture was then combined with the vanilla and gradually added to the cream. In this investigation, the combination was supplemented with jujube extract at concentrations of 2, 4, and 6%. A 40 grammes sample of dough was then created using a cream pump and put in specially manufactured cake paper cups [13]. Here is a flowchart for creating vinegar, wine, juice, and bread.

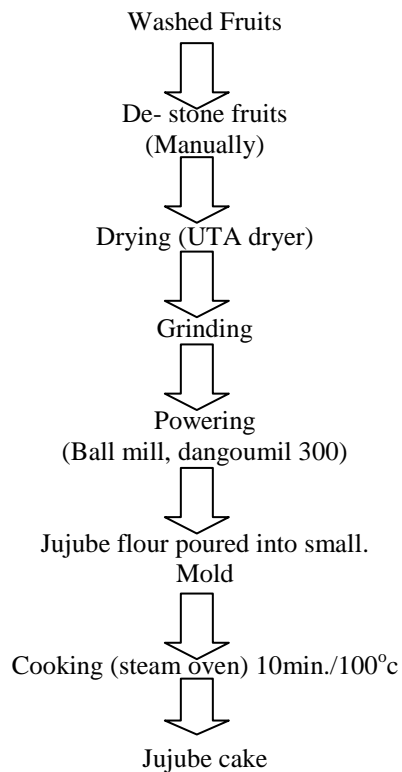
Bread flow chart



Source: ResearchGate

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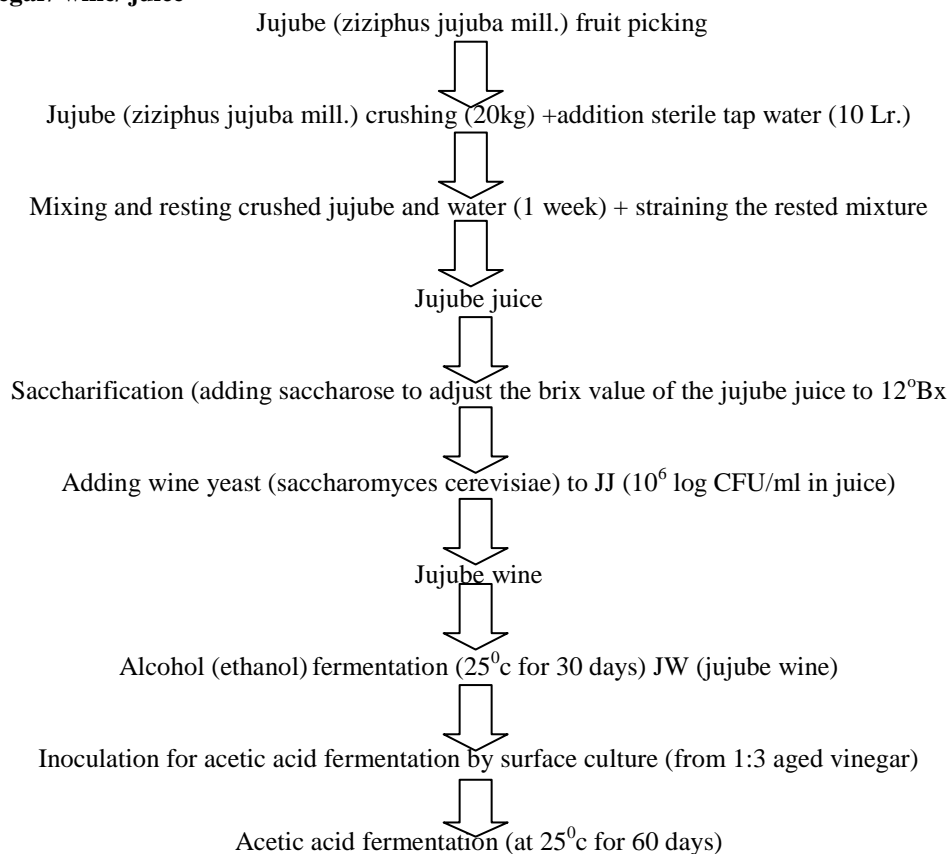
Jujube cake flow chart

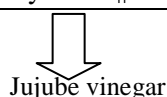


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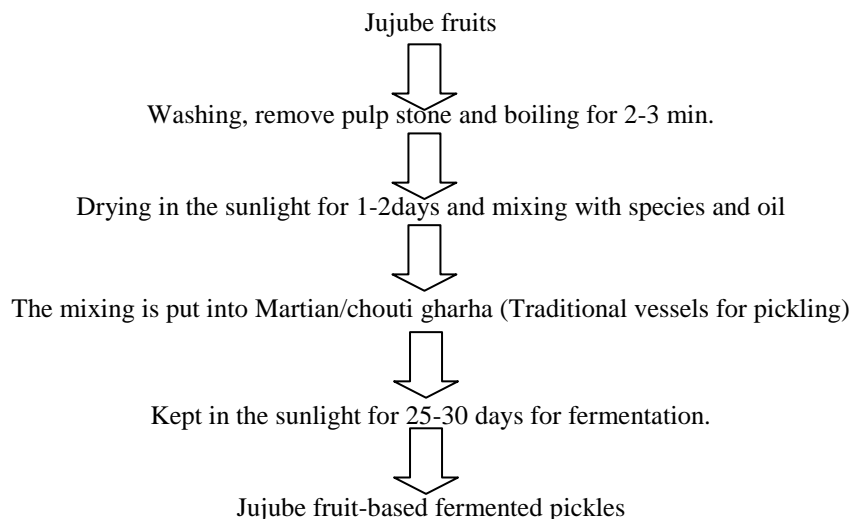
Jujube vinegar/ wine/ juice





Source: MDPI
By: Havva nilgun budak

Jujube pickle



Source: ResearchGate
By: Monika, Savitri, Angmo, & Bhalla

6. Nutritional benefits of jujube fruit

Jujube has a high nutritional value since it includes a variety of vitamins (including ascorbic acid, thiamine, and riboflavin), minerals, fibres, proteins, fats, and phytochemicals. According to [3], the nutrients and phytochemicals in jujube may be broken down into three groups: macronutrients, micronutrients, and bioactive substances.

7. Health benefits of jujube

The jujube's function in anticancer, anti-inflammatory, anti-obesity, immunostimulant, antioxidant, hepatoprotective, and gastrointestinal protective actions as well as in the prevention of foam cell formation in macrophages are among its health advantages. The jujube fruit, a major component in jujube cake, has been the subject of several research about its possible health advantages. Here are a few illustrations:

7.1 Antioxidant activity

Jujube fruit contains significant levels of antioxidant activity, which can help shield the body from oxidative stress and stave against chronic illnesses, according to a study that was published in the journal Food Science and Biotechnology. Additionally, according to the study (Lee, S. J., et al. (2015)), jujube fruit shows promise as a natural antioxidant in food items. Jujube (Ziziphus jujube) fruit extracts' antioxidant capacity and phenolic content, as well as how they affect pork meatballs' quality while kept chilled. 24(3), 1083–1090; Food Science and Biotechnology.

7.2 Immune-boosting properties:

Vitamin C, which is renowned for stimulating the immune system, is abundant in jujube fruit. According to a research in the Journal of Ethnopharmacology, jujube fruit extract can boost white blood cell production in mice to improve immunological function. The jujube fruit's polysaccharides have immune-boosting properties.

7.3 Digestive benefits:

Dietary fibre from jujube fruit is beneficial for maintaining digestive health. By boosting the synthesis of short-chain fatty acids (SCFAs), which are crucial for maintaining a healthy gut microbiota, jujube fruit extract can help enhance intestinal health, according to a study published in the journal Food & Function (source: Liu, Y., et al. (2018). By modifying the intestinal microbiota in rats, jujube fruit extract encourages the development of Bifidobacterium and Lactobacillus. 6163–6174 in Food & Function, 9(12)

7.4 Bone health benefits:

Calcium, which is necessary for healthy bones and teeth, is present in jujube fruit in enough amounts. In rats with osteoporosis, jujube fruit extract can help reduce bone loss, according to a research published in the Journal of Medicinal Food (Li, Y., et al., 2017). Rats with ovariectomies do not lose bone mass when given jujube fruit extract. Medicinal Food Journal, 20(5), 522–527.

These studies collectively imply that jujube fruit, a major component of jujube cake, may have a number of possible health advantages. To completely comprehend the impact of jujube fruit on human health, additional study is necessary.

8. Conclusion

According to this study, it is possible to anticipate the biological activities of understudied natural foods or medicines, like jujube fruits, by gathering information on their ethnobotanical and nutritional components. This knowledge may then be used to interpret findings from phytochemical investigations. For those who live in places with a high concentration of natural resources but limited access to quality healthcare, research on jujube fruits and their products may be of particular importance. Additionally, it offers details that can be helpful in forecasting potential medicinal applications for jujube fruits as well as medication or dietary interactions. The jujube fruit is a dietary supplement that contains significant amounts of bioactive substances and natural antioxidant substances. The shelf life of jujube is rather limited. Therefore, the greatest method for keeping fresh jujube for a long period is to prepare it into goods. The greatest jujube products include jujube powder, jujube vinegar, and fermented jujube juice. This is due to the fact that jujube powder can be kept for a very long time and is also utilised in various cuisine preparations. Jujube products may indeed have good antioxidant, anti-obesity, and anticancer properties, according to research. These goods can thus be used to make useful foods. Further biological investigations, particularly clinical-based studies, are suggested to investigate the health-promoting effects of jujube products since fresh jujube contains a wide range of biological activity. The toxicity and safety of jujube-based goods must also be investigated before being mandated since the processing of jujube fruit to generate products may result in the production of harmful components. Jujube bread is a tasty and wholesome bread that uses the jujube fruit in its composition. This kind of bread is a fantastic way to enjoy the health advantages of jujubes while also giving your meals a hint of sweetness and nuttiness. Jujube bread is a flexible choice that can be eaten on its own or used in sandwiches, toast, and other dishes, whether it is made with fresh or dried jujubes and various types of wheat. Its chewy consistency, distinctive flavour, and health advantages make it a wonderful addition to any meal. Jujube bread is worth a try if you're seeking to try a different kind of bread.

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