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An Analysis of Health Benefits of Plums

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ABSTRACT: ***The plum (Prunus sp.) is a member of the Rosaceae, or apple family. Despite the fact that plums are a general term for a variety of fruits, only two kinds, European plums (Prunus domestica) and Japanese plums (Prunus salicina), are widely cultivated throughout the globe. While both kinds are primarily eaten as fresh fruit, European plums may also be dried to produce 'prunes' or 'dried plums,' which are high in health-promoting components such as antioxidants, anthocyanins, and soluble fibers. In addition to drying, both plums are also turned into jam, jelly, and spread, allowing them to be used throughout the year. Plums are often grafted for propagation, but they also have severe incompatibility problems, necessitating the planting of several cultivars to guarantee a decent yield. Plum breeding is done at a number of governmental institutes as well as by a few private breeders. The main goals of these breeding projects are to prolong the growing season and enhance the size and shelf life of crops after harvest. Several more similar fruits are cultivated commercially in various areas of the globe, in addition to these "real plums." Damsons (Prunus insititia), interspecific plum hybrids, and golden European plums are among them.***

KEYWORDS: ***Fruit, Health, Plum, Prunus Salicina, Sugar.***

1. INTRODUCTION

Plums are one of the world's most significant stone fruit crops. Plums also include apricot, cherry, and peach, which are all common stone fruits. There are about 2000 different kinds of plums, although just a handful are commercially important. These are produced in temperate zones, with China, Romania, and the United States of America leading the way in plum production[1].

Plums are a rich source of chemicals that have a positive impact on human health and help to prevent the onset of many illnesses. All throughout the globe, they are usually eaten fresh. The drying of fresh plums, canning, and beverage preparation are the most common methods of plum processing. Despite the fact that sun drying plums was formerly popular, plums are now mainly dehydrated. Because plums have a high sugar content, dehydration to the required moisture level under sub atmospheric conditions is preferred to preserve nutritional and sensory quality. Plums are dried using a variety of traditional and new drying methods, including hot air drying, sun drying, vacuum drying, microwave drying, high pressure aided drying, and osmotic dehydration. Plums are often dried to achieve minimal microbial loads and to create a more stable product that will last throughout the year[2].

In today's global market, increased competitiveness refers to ways to enhance process efficiency and desired product quality. As a result, in order to enhance globalization and consumer awareness, it is essential to reduce negative impacts such as physical and chemical changes during the processing of plums. Plums suffer oxidative damage, browning, flavor loss, and shrinkage during the conventional air drying method, resulting in poorer sensory and nutritional quality. Osmotic dehydration may be a beneficial technique for plum drying since

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it improves product quality and reduces drying time. It is a pre-treatment for fruits and vegetables before drying and other heat-assisted processing such as canning, freezing, and minimum processing since osmotic dehydration does not reduce product moisture. The goal of this article is to look at plums' physical features, health advantages, nutritional, and antioxidant capabilities.

1.1 Background:

With so many distinct kinds of plums, it's no surprise that they have diverse histories and origins all across the globe.

Cultivation has been practiced from ancient times, perhaps longer than any other fruit save the apple. Plums are said to have originated in China around 470 BC, according to the earliest available evidence. European plums are believed to have been found in the region around Eastern Europe or Western Asia about two thousand years ago. There were 300 kinds of European plums recorded in ancient Rome. In the 17th century, the pilgrims brought European plums to the United States. Chinese plums, not Japanese plums, are the origins of the fruit. It was first brought to Japan between 200 and 400 years ago , from whence it spread across the globe. Plums may have been one of the earliest fruits that humans tamed. Plums, olives, grapes, and figs have all been discovered at Neolithic archaeological sites. Plum is now grown in every temperate climate country on the planet. The European plum (Prunusdomestica) was originally grown in Europe, followed by the American plum (Prunus Americana) in America, the cherry plum (Prunuscerasifera) in South Asia, and the Damson plum (Prunussalicina) in Western Asia[3].

1.2 Characteristics of Plums:

Plums are drupe fruits that belong to the Prunus subgenus. The genus Prunus has approximately 2000 species, according to one researcher. They are available in a range of sizes and hues, including yellow, white, green, and red flesh. A dusty-white covering on mature plum fruit may give them a glaucous look. Plums include phenolic acids, anthocyanins, carotenoids, minerals, and pectins, among other beneficial components. Plums have been utilized in Indian medicine for decades as a component of natural remedies for leucorrhea, irregular menstruation, and miscarriage. The nutrients in plums influence their nutritional value and flavor.

1.3 Nutritional Value of Plums:

Plums include phenolic acids, anthocyanins, carotenoids, minerals, and pectins, among other beneficial components. Plums are an important part of our diet, both in terms of their nutritional and dietary importance. These fruits are becoming a more common subject of nutritional research on people and animals to determine the impact of plum intake on the body's functioning. Plums have been utilized in Indian medicine for decades as a component of natural remedies for leucorrhea, irregular menstruation, and miscarriage. Plums have a low calorie count but a great nutritional value. Carbohydrates, primarily sucrose, glucose, and fructose, organic acids, such as citric and malic acids, fiber (pectins), tannins, aromatic compounds, and enzymes are all present. Mineral content in plums increases as the fruit ripens. The nutritional content and flavor of plums are determined by these compounds[4].

1.4 Antioxidant and Total Phenolic content of Plums:

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Phenolic compounds are an interesting and rare class of bioactive chemicals found all over the world. In recent years, there has been a lot of interest in determining the total antioxidant capacities (TAC) and total phenolic content (TP) of plums because of their richness in health-promoting components and their ability to prevent the occurrence of several diseases, as well as their excellent nutrient content. Antioxidant components such as phenolic acids, anthocyanins, and other flavonoids are abundant in these fruits. In plums, the most abundant phenolic components are caffeic acid derivatives such as 3-O-caffeicquinic (neochlorogenic acid), 5-O-caffeicquinic (chlorogenic acid), and 4-O-caffeicquinic (cryptochlorogenic acid), as well as caffeic acid, with lesser quantities of anthocyanins, flavanols, and flavonols[5].

According to published research, the amount of phenolic acids in plums varies greatly depending on the type, ambient circumstances, and testing techniques used. Fruit processing modifies fruit microstructure and changes polyphenol concentration, resulting in the loss or enrichment of certain polyphenols and affecting their access and availability.

1.5 Production of dried plums:

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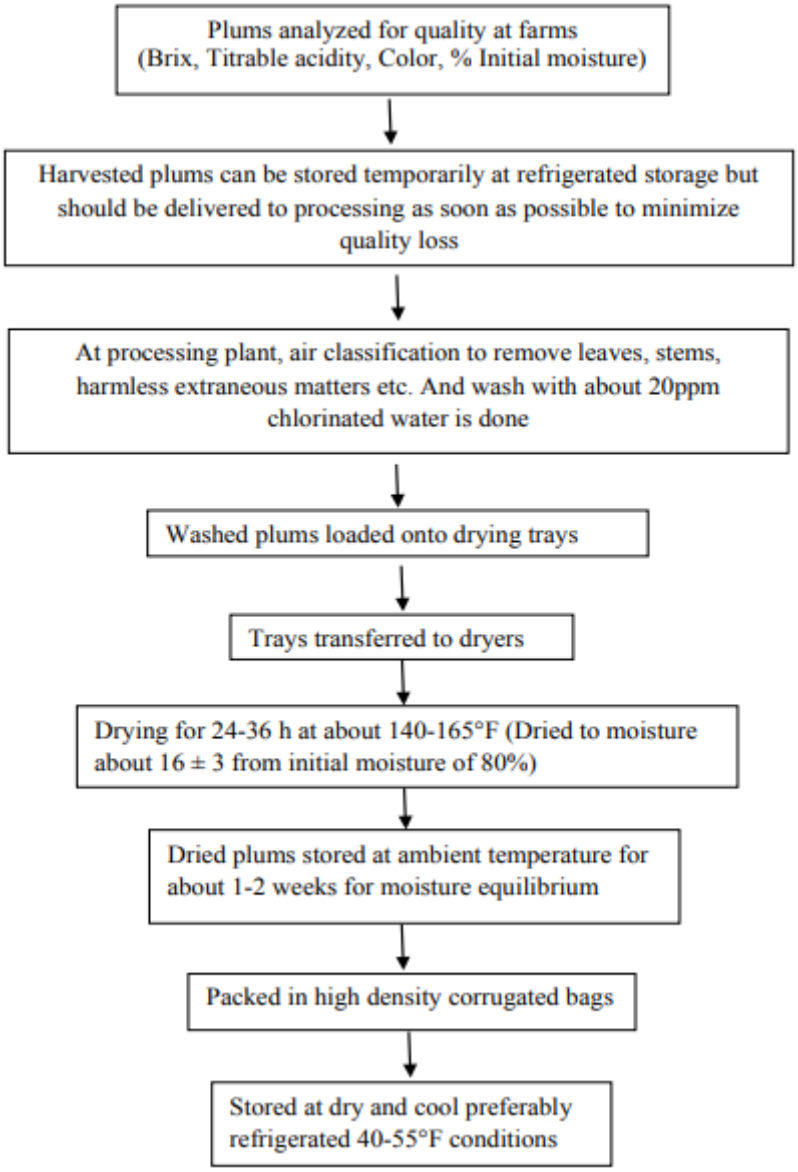

Figure 1: Representation of process of production of dried plums.

Figure 1 represents process of production of dried plums. Prunes are the dried fruits of Prunus domestica L. varieties that originated in Western Asia's Caucasus area. The La Petite d'Agen prune, a native of southwest France, was brought to the Santa Clara Valley of California by Frenchman Louis Pellier in 1856. In the United States, sophisticated dehydrators have mostly supplanted the traditional technique of drying prunes in the sun. Prunes are now dried in a long tunnel dehydrator. Fruits are dried to approximately 18% moisture, which has a low enough water activity to prevent microbial deterioration and enable for long-term preservation. For drying plums, forced-draft tunnel dehydrators are often utilized, with a drying period of 24–36 hours depending on the size and soluble solids content of the prunes. The yield of dried prunes is about 33%. In a vacuum shelf drier, traditional dried prunes are occasionally dried to very low moisture content. The final low moisture dried plums have a moisture content of less than 4%. Dehydration to such a low moisture level can only be accomplished at sub-atmospheric

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settings due to the high sugar content of dried plums. California and the Pacific Northwest generate about 75% of the world's dried prune supply. Prunes are a key commodity in the dried fruit business. Before the prune business began in the United States, the technique of drying fresh fruits to make dried plums on a large scale was used in Europe, especially in France, Italy, and Austria. Prunes are another food with a high nutritional and dietary value, and their appeal as a healthy snack has grown significantly in recent years[6].

1.6 Industrial Uses:

Plums have a broad range of industrial applications. Although a tiny proportion of Japanese plums are dried, they are mainly consumed fresh. The majority of European plums are dried (prunes), boiled (greengages), canned (greengages, yellow egg, damsons, other European plums), or used in jams (plums, greengages, damsons) or jellies (greengages, yellow egg, damsons, other European plums) (American plums). Plum purée is used as a baby meal while prune juice is used as a laxative. Some plums are grown as ornamentals in residential gardens and are used as rootstocks (e.g., marianna, myrobalan). Others are utilized in breeding programs (e.g., P. simoni). Plums are fermented and distilled into a brandy in certain areas of Europe. It is known as slivovitz in Romania, Hungary, and Yugoslavia (Montenegro, Serbia), but the name varies depending on the cultivar used in other areas of Europe[7].

1.7 PLANT DISEASES CAUSED BY VIRUSES:

1.7.1 Plum pox:

Plum pox, sometimes known as sharka, is found in Europe, Asia, Chile, and, since 1999, North America. Plum, peach, nectarine, and apricot are all affected. It causes huge losses in fruit quantity and quality, as well as weakening affected plants. Plum pox is the most serious disease that affects these plants when it is present. Severe mottling, diffuse or brilliant rings, vein yellowing, and elongated line patterns may be seen on the leaves of affected trees. Dark-colored rings or patches on the skin, brown or reddish discoloration in the flesh, and brown spots on the stones are all indications of infected plum fruits (pits). The majority of infected fruits ripen early. Peach fruits feature mottled rings and deformation, while apricot fruits have more distorted rings, necrotic rings and bumps, and stones with prominent whitish-yellow rings.

The nonpersistently transmitted plum pox virus (760 by 12 nm) is spread via budding and grafting, as well as by various aphid species. The virus is self-replicating in affected trees. Plum pox is very tough to eradicate. The use of resistant or tolerant cultivars, as well as the planting of virus-free trees in locations distant from affected orchards, is beneficial. Inoculum in the orchard may be reduced by quickly detecting and removing diseased plants. Cross-protecting plants with mild plum pox virus strains and genetically modifying them to express the plum pox virus coat protein gene are both being investigated.

1.8 Polyphenols in the Prevention and Treatment of Vascular and Cardiac Disease, and Cancer:

Polyphenols such as chlorogenic acid, neochlorogenic acid, caffeic acid, coumaric acid, rutin, and proanthocyanidin are abundant in fresh and dried plums (also known as prunes). The health-protective properties of phenolics from dried plums have gotten a lot of attention in recent years.

Prunes have a greater total phenolic content and total antioxidant capacity than other dry fruits like dates, figs, and raisins. Dried plums and their related fibers, as well as phenolic substances,

may have a beneficial impact on lipid metabolism. In moderate hypercholesterolemic males, daily intake of prunes (100 g, or the equivalent of 12 prunes) for 8 weeks was found to lower total and LDL cholesterol. More recently, postmenopausal women were studied to see whether consuming dried plums for a year reduced cardiovascular disease risk factors. C-reactive protein levels in the blood were reduced after a three-month intervention, but there were no significant changes in lipid profiles or atherogenic risk ratios. To present, high-quality clinical evidence is insufficient to draw any conclusions on the potential benefits of plum polyphenols on cardiovascular health.

Plums include vitamins and minerals that may help to heal illnesses, boost the immune system, and according to current study, plums can even help to cure cancers including breast and colon cancer. Plums are rich in unique phytonutrients or anti-cancer compounds termed neochlorogenic and chlorogenic acid, even in their dried state known as ‘prunes.' When plum phenols came into contact with breast cancer cells, the cancer cells were destroyed. Fruits contain phenols, which are organic chemicals. They are somewhat acidic and may have characteristics like fragrance, flavor, or color. The extract of plums is significant due to its high phenolic content. These peaches and plums' chlorogenic and neochlorogenic phenols were shown to destroy breast cancer cells while causing no damage to healthy cells. The most aggressive kinds of breast cancer cells perished as a result of these fruit phenols, whereas healthy cells remained unharmed.

2. LITERATURE REVIEW

Milala J et al. discussed Composition and properties of the polyphenolic extracts obtained from industrial plum pomaces in which they discussed how the polyphenol content of pure extracts derived from plum pomace collected from a contemporary fruit transformation plant's production lines was studied. Water was used to extract the polyphenols from the pomaces. These water extracts were filtered and freeze-dried on an Amberlite polymer substrate. High polyphenol content (up to 50 g/100 g) was measured using a spectrophotometric technique with Folin-Ciocalteu reagent in the final formulations. High flavanol content (up to 10 g/100 g) and antioxidant capabilities were found in the plum preparations chosen. The plum preparations also included substantial quantities of hydroxycinnamic acids and flavonols. Two of the extracts showed significant antibacterial activity against Listeria. Plum pomaces were shown to be a suitable raw material for the manufacture of highly concentrated polyphenol preparations with potential biological characteristics in this study[8].

Hedayatizadeh M et al. discussed plum drying in which they discussed how Plum is widely consumed throughout the globe, therefore drying as a popular method of extending its shelf life is unavoidable. However, due to the high moisture content of this agricultural product, drying it requires a lot of energy. As a result, any energy-saving method for drying such a low-cost product is enthusiastically welcomed by the plum drying business. Based on a study of publications on plum drying, it was determined that the research on plum drying may be divided into three categories: Plum pre-treatments that primarily concentrate on increasing the pace of drying via the use of mechanical/chemical techniques, primarily with energy conservation in mind; mathematical modeling and simulation of plum drying for forecasting the process and plum drying kinetics. Fortunately, the pre-treatments employed were shown to be efficient in reducing plum drying time and overall energy use[9].

Pourafshar S et al. discussed Bone-protective effects of dried plum in postmenopausal women in which they discussed how Osteoporosis is a chronic age-related illness marked by a decrease

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of bone quantity and quality, as well as a higher risk of fragility fractures. The termination of ovarian hormone production, which promotes rapid bone loss, puts postmenopausal women at the highest risk of developing osteoporosis. Osteoporosis will affect an increasing number of postmenopausal women as the population ages. Certain lifestyle variables, such as diet and exercise, have been shown to lower the risk of osteoporosis and therefore play an essential role in bone health. In terms of nutrition, growing data indicates that dried plum (Prunus domestica L.) may prevent and reverse bone mass and structure loss in an ovariectomized rat model of osteoporosis, as well as in osteopenic postmenopausal women. The effectiveness of dried plum in preventing and correcting bone loss associated with ovarian hormone insufficiency in rat models and humans is shown here. Finally, the findings of a recent follow-up research show that postmenopausal women who ingested 100 grams of dried plum per day during our one-year clinical trial five years ago maintained more bone mineral density than those who received a comparable control. Furthermore, we discuss the potential processes through which bioactive chemicals in dried plum exert bone-protective benefits. Overall, the results of our and previous research clearly indicate that dried plum in its whole form is a promising and effective functional food treatment for reducing bone loss in postmenopausal women, with the potential for long-term bone protection[10].

3. DISCUSSION

Plums are a rich source of chemicals that have a positive impact on human health and help to prevent the onset of many illnesses. Bioactive substances found in plums include phenolic acids, anthocyanins, carotenoids, flavanols, and organic acids. Acids (such as citric and malic acids), pectin, tannins, aromatic compounds, enzymes, minerals (such as potassium, phosphorus, calcium, and magnesium, organic), and vitamins A, B, C, and K Caffeic phenolic chemicals are the most abundant in plums. 4-O-caffeicquinic (neochlorogenic acid), 3-O-caffeicquinic (neochlorogenic acid), 5-O-caffeicquinic (chlorogenic acid), and 3-O-caffeicquinic (neochlorogenic acid) (crypto-chlorogenic acid). Plums are utilized in Indian medicine as a component of natural medicines for leucorrhea, irregular menstruation, and other ailments.

Periods of menstruation and miscarriage Plum may help prevent heart disease, lung cancer, and mouth cancer, as well as reduce blood sugar, blood pressure, Alzheimer's disease, muscle degeneration, enhance memory, increase bone health, and regulate digestive system function. Plums are used in dairy products. Yoghurt, pies, biscuits, lassi, ice cream, and other foods, in the form of extract, pulp, powder, or dried chunks, would undoubtedly improve the nutritional and flavor quality.

4. CONCLUSION

Medicinal herbs have been utilized by the indigenous peoples for the treatment of a variety of illnesses since ancient times. Plum (Prunus domestica L.) is a medicinal plant that grows between 6 and 15 meters tall and belongs to the Rosaceae family. It is believed to have originated around the Caspian Sea and may be found in Kashmir, Pakistan's Swat region, and India. We attempted to shed light on its categorization and chemistry in this article. Antioxidant, antibacterial, antihaemolytic, cholinesterase inhibitory, cytotoxic (anticancer), hepatoprotective, antihyperlipidemic, anti-inflammatory, antidiabetic, larvicidal, and repellant properties are among its numerous anti-disease properties. As a result, this study covers its categorization, pharmacological activity, and phytochemicals in depth.

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