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Unveiling the Medicinal Potential of Plum (Prunus domestica L.): A Comprehensive Review

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Abstract

The medical plants have been used utilized historically by the indigenous peoples of the subcontinent for the treatment of various illnesses since ancient times. Plum (Prunus domestica L) is also a medicinal plant about 6-15 meter having this Rosaceae family. It is believed to be from located in the various province of India and Pakistan. In this study we have attempted to through the light on the chemistry and classification involved in it. It bears a wide range of anti-disease activities like antioxidant, antimicrobial, antithaemolytic, anticancer, anti-thyperlipidemic and anti-inflammatory, anti-fungal and anti-bacterial activities. Therefore, the review provides a general overview of its classification, pharmacological activities, as well as the phytochemical constituents.

Keywords: Heavy metals, prunus domestica, classification, antioxidant, anticancer.

INTRODUCTION:

Prunus domestica is a medical plant that holds the solution to various diseases [1]. Prunus domestica is one of the plum, species Government publications, lists of books and other references give the scientific name of a subject indicated in the caption at the top of the page. A part from 'Li Zi', 'LI Zi Salicina', 'Prunus Subcordiata' and 'Prunus Sunititia', the term 'plum' usually point to the top of the plum [2]. Today there are in excess of 40 sorts of plum and plum fruit splits move on one side [3]. Locally known as the 'Plum', Prunus Domestica is reported to have been found 2000 years ago around the Caspian Sea and is in the Rosaceae family [4]. Rosaceae is ranked the 19th largest category among plants and is recognized as one of the cheapest groups of plants [5]. This family has herbs or shrub, or sometimes trees, of which some may be climbing or rhizomatous or thorny. Most flowers in the Rosacean family are pompous, sexually reproduced but not exclusively, and arrangement of flowers is solitary to quintuple. As a rule, Rosaceae plants contain from 15 to many stamens, among which a large number of some species. Sometimes 10 or fewer. The threads are amazing or base mixed on the nectary disc. In Rosaceae: the hypanthium is flat to deeply lobed or even cylindrical and separated from or adherent to them, usually enlarged in fruit [6]. This family normally consists of about 95 to 125 regular genera and are the plum trees which are between 6 to 15 meters tall [7].

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THE GENUS *PRUNUS*:

The genus Prunus is productively important as most of the types are a source of fruits, ornamental plants, timber and oils [8].This genus is comprised of about 400 genus [9]. This genus is scattered in temperate, tropical and subtropical regions of Africa, South America, Australia and Asia [10]. According to the main morphology of the fruit, the classification of Prunus has been controversial. And some researchers divide it into third, fourth, fifth, sixth and even seventh-level genera and subgenera within a general concept (Table 2) [11].

Table 1: Classification of the *Prunus domestica L.*

❖	Kingdom	Plantae
❖	Subkingdom	Tracheobionta (Vascular plants)
❖	Super-divison	Spermatophyta (Seed plants)
❖	Divison	Magnoliophyta (Flowering plant)
❖	Class	Magnoliopsida (Dicotyledons)
❖	Subclass	Rosidae
❖	Order	Rosales
❖	Family	Rosaceae (Rose family)
❖	Subfamily	Amygdaloideae
❖	Tribe	Amygdaleae
❖	Genus	*Prunus*
❖	Sub-genus	*Prunus* subg. *Prunus*
❖	Section	*Prunus* sect. *prunus*
❖	Species	*Prunus domestica*

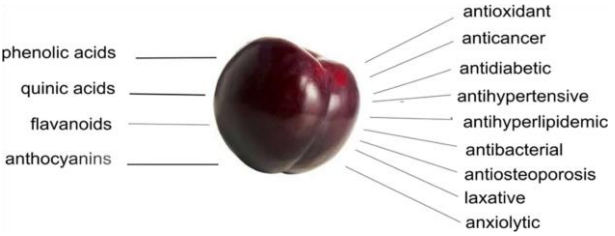

Figure.1 Prunus Domestica

Chemistry:

Prunus domestica are regarding as a rich source of organic acids of industrial application from glycerol of yeast production [12]. Polyphenols and carotenoids are thought to be valuable resources of plum [13] however the leave content of phenol is not richly known this refer the leave can be acquired and reachable inexpensive source of compound of phenol and spontaneously existing antioxidant which is broadly used in application in the development and evolution field of food industries and herbal medicine [14].

Here it could be noted that vegetables and fruits are the natural ingredient of organic acid. They are involved in the regulation of most of the sensory attributes of fruits and vegetables most importantly the taste, smell and colour. They are also used as a eatables substance for the preparation of juices and vegetable drinks, beverages and fruits. Citric, malic and tartaric are the examples of acids added to enhance the quality of the beverages depending on the type of the product and ascorbic acid being an antioxidant [15]. Said secondary outcome are utilized as relatively cheap sources and

new of active compound peptides [16]. Putamen of fruits like Prunus Domestica. Has a outer part coating the seed. These used seeds are sources of proteins and lipids and as such they can be inexpensive resources of substance that can be used in pharmaceuticals, food and cosmetic. The information on the amount of lipid content within the plum seed has been considered [17].According to reports, the fruits of the plums in their hometown are used in combination with India and other drugs to treat leucorhoea after abortion, irregular menstrual and weak diseases [18]. Ripe cherry fruits are used to improve immunity, improve vision, and prevent asthma, gout, hypercholesterolemia, cardiovascular disease Alzheimer's disease, anemia, and gout [19].

Numerous investigations have revealed that the fruits of plum have upper levels of antioxidants, including the function of the nervous system [20]. The fruits of plums contain a variety of phenolic compounds, which are caffeoylquinic acid isomer [21]. The latter was reported to have an oxygen radical absorbance capacity (ORAC) of 28.4% in its ethanol Extract, which itself indicates the fruit's healthful properties. Plums are a reliable source of many compounds [22] consisting of anthocyanins, flavonoid glycosides, carbohydrate, abscisic acid, Flavonoid dihydroflavonol lignans, quinic acid and Bipyrrole, carotenoid pigments,tannins and Bipyrrole

Table 2: Chemical Characteristics of Plum Varieties:

Variety	soluble solids ($g\ kg^{-1}$)	titratable acidity ($g\ kg^{-1}$)	Moisture ($g\ kg^{-1}$)	SS/A	Protein ($g\ kg^{-1}$)		pH	ascorbic acid ($mg\ kg^{-1}$)
Baneasa 3/5	128.4 (0.00	12.8 (0.10	863.5 (0.6	10.03 (0.08	7.2 (0.25	3.35 (0.03		71.7 (0.00
S. Fruhzwetche	141.7 (0.20	12.8 (0.11	856.6 (2.6	7.62 (0.24	10.9 (0.06	3.62 (0.08		116.3 (1.65
T. Timpuriu	125.3 (1.23	12.8 (0.12	867.0 (0.7	5.70 (0.08	7.6 (0.24	3.35 (0.01		96.6 (0.00
Baneasa 9/13	93.9 (0.00	12.8 (0.13	898.5 (0.9	9.03 (0.07	8.5 (0.03	3.20 (0.01		132.4 (5.51
Prune 2740			844.3 (1.6					
G. Prize	130.0 (0.85	23.4 (0.05	860.4 (0.8	5.56 (0.05	6.3 (0.07	3.30 (0.01		284.2 (4.65
K. Damson	191.9 (0.47	9.8 (0.08	806.8 (0.9	19.58 (0.21	6.7 (0.03	3.38 (0.01		165.1 (1.30
Giant	174.6 (0.70	22.3 (0.05	820.6 (0.9	7.83 (0.01	5.9 (0.01	3.32 (0.01		227.9 (7.15
I. Epineuse	244.5 (0.00	9.2 (0.00	745.2 (0.7	26.58 (0.24	8.5 (0.43	4.00 (0.05		58.2 (2.60
Victoria		10.1 (0.00	814.6 (0.1	16.46 (0.01	6.9 (0.01	3.28 (0.01		192.6 (0.00
Stanley	158.6 (0.00	12.0 (0.05	834.1 (0.1	13.22 (0.05	6.4 (0.02	3.80 (0.01		234.3 (7.55
Mean	155.5	15.1	837.4	12.16	7.5	3.46		157.9

Phenolic Contents:

The European plum also commonly called Prunus domestica is said to contain a number of phenolics that explain the antioxidant effects and possible health benefits [23]. Phenolic compounds are a large group of plant Secondary metabolites which have several bio activities such as antioxidant, anti-inflammatory and antimicrobial reactions [24].

Phenolic content in Prunus domestica may differ with the cultivar, ripeness and conditions in which the fruit was grown [25]. However, some common phenolic compounds found in Prunus domestica include: Flavonoids are a kind of phenolic compounds present in many plant based foods. Based on the literature Prunus domestica contains flavonoids such as quercetin, kaempferol, and catechins. Some of these compounds contain antioxidants and anti-inflammatory agents which may have a

contribution in Prunus domestica's health boosting effects. Another class of phenolic compounds present in Prunus domestical the phenomenon acids and anthocyanins also in small quantity. Some of the well-known polyphenols include chlorogenic, caffeic, and ferulic among others polyphenols. Phenolic acids act as antioxidants and possess also,the anti-inflammatory activity. Anthocyanin's are water soluble pigments that responsible for the red, purple or blue color of the fruits and vegetables and one such variety is the Prunus domestica. These compounds are antioxidants and might be involved in color and nutritive qualities of Prunus domestica. Tannins are polyphenolic compounds of the skin and seeds origin from Prunus domestica. These compounds help in giving the fruit an astringency taste and they possess antioxidant activity.

Research has it that the phenolic compounds present in Prunus domestica have diverse health enhancing efficiency, which may include antioxidants, anti-inflammatory properties, and cardio protective and anticancer properties in chronic diseases. Nevertheless, additional studies are required to identify the exact impact of these substances on human health and their functioning.

Antioxidant activity:

Antioxidants in their broad perspective are usually expected to counter the oxidative process responsible for diseases through eliminating free radicals as well as reactive oxygen species. Hence, the removal of free radicals from the living system can be strictly required to prevent the oxidative reaction resulting to the degraded aging operation [26].Conservation of this by offering organisms with antioxidant phytochemicals by the way of vegetables and fruits, decreasing their risk of chronic diseases such as cardiovascular disease and cancer [27]. Studies have found that plums have higher total phenolic content and total antioxidant capacity than other dried fruits such as figs, raisins and dates [28]. Pruning take out and its juice were located to inhibit LDL oxidation and LDL was considered to be the cause of heart disease [29]. Fruits have been found to be rich in cathelic acid, hydroxycin, primary toxic acid, primitive acid, act, epicatechin, coumarins, lignans and lignans and lavanoids. Two lignan glycosides were isolated from plum fruit and have good oxygen free radical scavenging activity.

Heavy Metals in *Prunus Domestica*:

Absorption of heavy metals is often related to several factors, including the type of soil, contamination levels, and farming methods in the case of Prunus domestica [30], and many other plants. Heavy metals are those elements that have relatively high atomic numbers and are toxic in occurrence in higher concentrations [31]. The most known heavy metals are: lead, cadmium, arsenic, mercury, and chromium that are present in various industries and effects.

Overall the Prunus domestica can be considered as non-hyper accumulator of heavy metals because plants of this species do not accumulate specific high levels of these metals. Nevertheless, anyplant, including Prunus domestica, is capable of absorbing and incorporating heavy metals from the soil, especially if the latter is polluted.

The concentration of heavy metals in Prunus domestica fruit can vary depending on factors such as: If the conditions for growth of Prunus domestica are influenced by contaminants in soil – heavy metals produced by industrial polluted water, mining or other similar reasons that are polluted with heavy metals, then it can accumulate the same metals in even higher concentration. This of course means that by

using contaminated water in irrigation, or fertilizers or pesticides, heavy metals can find their way into the plant. There are some regions that directly have more intense concentrations of some heavy metals in the soil and therefore it can impact on the degree of such metals found in Prunus domestica. It is noteworthy that one species of Prunus domestica and its rootstocks may be more or less effective in terms of heavy metals uptake and accumulation. It is important to note that PD is not listed among plants with high risk of heavy metal contamination However, awareness of the current state of the soil as well as the practices of the agriculture should not be underestimated because of the accumulation of heavy metals. Furthermore, regulatory authorities put maximum allowable limits for heavy metals in the foods products for consumers' safety.

Pharmacological activities:

Prunus domestica, is truly a ontology for many biochemical actions. A few are as listed:

Anti-Bacterial effect:

European plum or Prunus domestica is a fruit that was used in the past to be "cure" several diseases and among the characteristics of this fruit is the ability to fight bacteria [32]. However, in relation to the various details about the investigational data concerning the specific antibacterial action of the Prunus domestica studies have shown that there are certain extracts belonging to this category that possesses antibacterial properties. Prunus domestica has several phenolic compounds; flavonoids and phenolic acids among them which is that inhibits the growth of bacteria. Compounds in such category Arrest bacterial cell wall synthesis, Inhibit bacterial enzymes and Imitate bacterial DNA synthesis. Tannins are also other compound present in Prunus domestica with probable antibacterial effect. Tannins bind with the bacterial proteins and enzymes where they can precipitate and hence kill bacterial cells. These are pigments which make plum have the purple, red or blue natural color of some fruits such as plums. The emphasis is accorded to the antibacterial properties of anthocyanins and the later are deemed to be capable of limiting the growth of certain bacterial organisms. As it was found, Prunus domestica contains citric acid and malic acid that set such environment which is not exciting to bacteria. These components give an indication of antibacterial functionality, however, it is noteworthy to explain their functionality and mode of operation; this the green orchard plum Prunus domestica needs more research on. Also, it is stated that the previous practices of using plants to get the natural source of medicine involves such knowledge as informal and they may not be in accordance with the findings. That is why, it is advisable to consult a healthcare provider before taking Prunus domestica or any other natural medicine that is used to treat bacterial infections.

Anti-fungal effect:

Bitter almond, Prunus, domestica Mill, has been employed for several medicinal uses, including possible impacts on antifungal action [33]. While scientific research on its specific antifungal effects is limited, several components found in Prunus domestica suggest potential efficacy against fungi:While scientific research on its specific antifungal effects is limited, several components found in Prunus domestica suggest potential efficacy against fungi:p domestica have multiple forms of phenolic compounds, which include flavonoids and phenolic acids, and therefore research on the antifungal activity of P. domestica. They can dissolve the cell membrane of the fungi, prevent the action of some enzymes in the fungal cells and prevent replication of fungal DNA. It

was also possible to note that tannins isolated from Prunus domestica samples can display antifungal effects. Tannins can chelate with proteins and enzymes of the fungi which inactivates them, thus causing death of fungi cells. Cite evidences that speak of the presence of antimicrobial peptides in Prunus domestica which may have antifungal effects. Some of them are capable of acting as fungicides and can directly affect the growth of fungi. Franchet also reported that seeds of Prunus domestica may comprise any of the essential oils that are purported to possess antifungal abilities. These oils may contain substances like terpenoids and phenols that have realistic capability to fight the fungal infections. There are also organic acid compounds including citric acid and malic acid contained in Prunus domestica; the compounds make the growth medium to be in an acidic state that is not suitable for the growth of fungi.

However, these components indicate the possible antifungal effect and it is necessary to state that more detailed investigation was not carried out to evaluate the mechanism and efficiency of the Prunus domestica in regard to the fungi. Further, the uses of plants for curing many ailments are been done in the past using word of mouth methods and therefore ways not matching with modem discoveries. As with any herbal treatment for fungal infections, it is wise to consult a healthcare practitioner before taking Prunus domestica.

CONCLUSION:

We have provided an up to date review article for the case study of prunus domestica in this study we have mentioned the chemistry,phenolic contents,antioxidant activity and biological activites of prunus domestica. Various atomic absorption reported methods have been studied and they are mentioned with sited references.This study report the future use of prunus domestica in the treatment of bacterial,fungal and other microbes infections several sensitive and precise methods are introduced for the chemical,biological and physical study of prunus domestica. The chemistry of prunus domestica is also studied.

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