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A Brief Study of Paneer Dodi Plant: Phytochemical properties and Pharmacognostic Effects

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Abstract - A great vegetation have been said to cure various health problems and ailments in ancient systems of medicine. Withania coagulans (W. coagulans) Dual (also Paneer Dodi Plant) , also called as 'Indian cheese maker'or'vegetable rennet,' is a medicinal plant belonging to the Solanaceae family. It is a tiny gray-whitish shrub that grows eastern direction of the Mediterranean and into South Asia. In various areas of Pak. and India, it is used as a medicinal plant. W. coagulans is commonly utilised in diabetic situations in the Ayurvedic school of medicine. Nervous tiredness, incapacity, sleeplessness, wasting disorders, inability to thrive in children, and impotence are all treated with W. coagulans. They're also used to treat liver problems, asthma, and biliousness. The active chemicals extracted from the plant, in particular withanolides, are thought to have antibacterial, anti-inflammatory, anticancer, hepatoprotective, anti-hyperglycemic, cardiovascular, immuno-suppressive, free radical scavenging, and CNS depressing properties. This review focuses on Biological Processes involved in some of the isolated W. coagulans components, as well as phytochemistry and pharmacognostic aspects of plant extracts.

Keywords - Indian cheese maker, Anti-inflammatory, Withanolides, Cyclophosphamide ,Paneer Dodi Plant , hepatoprotective, anti-hyperglycemic, cardiovascular, immuno-suppressive

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INTRODUCTION

Effectiveness of a great number of plants has been documented in the treatment of various health issues and ailments in ancient systems of medicine. The use of plants and botanical extracts to treat various diseases is referred to as herbalism, which is an example of traditional or healing practices.

The Charaka and Sushrusha Samhitas include detailed descriptions of different therapeutic herbs. In the growth of novel herbal medications, medicinal herbs leads a significant role. In the US, at least one plant-derived component is found in around 25% of pharmaceutical prescriptions[1]. Withania coagulans (W. coagulans) Dual is a medicinal plant that belongs to the Solanaceae family. Withania has two species: W. somnifera and W. coagulans, both of which are found in the Mediterranean region . It can be found throughout Pakistan and India[2].

Figure 1: Withania coagulansfruits (Paneer Dodi)

coagulans is a kind of coagulant. Because the fruits and leaves of this plant are employed as a coagulant, Dunal is also known as "Indian cheese maker" or "vegetable rennet." The core & husks of the berry, which are packed with an enzyme known as withanin, which has milk-coagulating action, are responsible for the fruits' milk coagulating ability. When one ounce of W. coagulans fruits are

combined with one cup of water that is simmering , a decoction is created, from which one table spoonful can coagulate a milk by the gallon in under an hour. The berry of W. coagulans are extensively used in Pakistan to coagulate milk, which is known as 'paneer.'The milk of buffalo or sheep is heated to 100 degrees Fahrenheit and then treated with crushed plant berries wrapped in a towel. The milk will curdle in 30-40 minutes as a result of this.The plant's sweet fruits are sedative, emetic, alterative, and diuretic, according to reports. 'Liv 52,' a hepatoprotective herbal mixture containing components derived from W. coagulans and Withania somnifera, is a composite Ayurvedic medicine. Dyspepsia, flatulent colic, and other intestinal illnesses are also treated with them.The berries are utilised as a blood purifier in several sections of the Pakistani-Indian subcontinent. The twigs are eaten for tooth cleaning, and the plant's smoke is inhaled for toothache relief [3,4]. W. coagulans is also employed in the treatment of nervous exhaustion, handicap, insomnia, wasting diseases, children's failure to thrive, and impotence. Its fruits are used to treat liver problems, asthma, and biliary problems. The plant's flowers are beneficial in the treatment of diabetes[5]. In the autumn, the root is picked and dried for later use[6]. Because the plant is hazardous by nature, it should be used with caution.[7] Antimicrobial, anti-inflammatory, anticancer, hepatoprotective, anti-hyperglycemic, cardiovascular, immunosuppressive, free radical scavenging, and central nervous system depressive actions have been explained for this plant[8].

Taxonomy:

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnolipsida

Order : Solanales

Family : Solanaceae

Genus : *Withania*

Species : *W. coagulans*

PHYTOCHEMICAL PROPERTIES

Aq. and CH_3OH extraction of W. coagulans fruits reveal a variety of phytoconstituents contained in the plant, making it noteworthy for its usage by traditional practitioners. Both extracts contained alkaloids, steroids, phenolic compounds, tannins, saponins, carbohydrates, proteins, amino acids, and organic acids, according to phytochemical analysis[9].

Coagulin F [27-hydroxy-14,20-epoxy-1-oxo-(22R)-witha- 3,5,24-trienolide], coagulin G[17beta,27-dihydroxy-14,20-epoxy-1-oxo-(22R)-witha-2,5,24-trienolide], coagulanolide (17S,20S,22R) - [14alpha,15alpha,17bet[10-13].

PHARMACOGNOSTIC IMPACT

Aq. and chloroform extraction prepared from W. coagulans foods demonstrates pharmacological impact on blood sugars, blood lipids, as well as muscle mass in type 2 diabetes mellitus rats when administered alone or in combination once daily p.o. at a dose of 1 gramme per kilogramm body mass for 14 days in different groups of normoglycemic and hyperglycemic rats[14,15]. These extracts caused significant decreases in blood levels of glucose, triglyceride, total cholesterol, and L In addition, an aqueous extract of the plant's fruits significantly decreased blood and hepatic LPO levels in streptozotocin-induced diabetes rats and db/db mice[16,17] when given at the same dose. The most effective dose of the plant extract to reduce Concentration of glucose in the blood during fasting maximum by 33.2 percent at 4h in normal rats was found to be 1g/ kg body weight. Glucose Tolerance Test tests of normal, sub, and moderate diabetic rats, on the other hand, revealed maximal reductions of 15.7, 28.9, and 37.8% at 3 hours, respectively, demonstrating hypoglycemic ad antidiabetic effects of W. coagulans aqueous extract[18].

Healing action for wounds

The hydroalcoholic portion of the CH3OH extracts of W. coagulans was applied topically at a concentration of 10 percent weight-to-weight (w/w) and taken orally at a dose of 500 milligramme per kilogram of body weight in diabetic rats that had been induced with streptozotocin. When compared to diabetic controls, the hydroalcoholic fraction demonstrated a substantial increase in wound contraction rate in both topical (10 percent w/w ointment) and oral (500 mg/kg body weight, p.o.) forms[20].

Effects on the cardiovascular system

The seeds of W. coagulans were used to extract a new withanolide, which was then evaluated for its impact on the cardiovascular system. Its chemical composition is comparable to that of aglycones of cardiac glycosides, which are found in related molecules (mol. wt. 488 6, m. p. 260-261 degrees). At a concentration of 5 mg/kg body weight, withanolide induced a substantial decrease in blood pressure in dogs (34.21 mm Hg), which could be reversed by hydrocortisone but not by isokinetic or strattera. The blood pressure decline was reversed by hydrocortisone. In rabbit Langendorff treatment and ECG investigations, it was found to have myocardial depressive impact; nevertheless, in perfused frog's hearts, it was found to have mildly +ve inotropic impacts.

Effects on the liver that are hepatoprotective

The effect of 3-hydroxy-2,3-dihydrowithanolide F, a chemical isolated from W. coagulans, on CCl4-induced hepatotoxicity was investigated, and the compound was found to have a significant protective effect. On a weight basis, it is more active than hydrocortisone[22], according to a study of protective characteristics.

Influences on the body's immune response

In addition to the ten previously discovered withanolides, numbers 7 through 16, six new withanolides called withacoagulins A through F (numbers 1-6, respectively) were separated from the aerial portions of W. coagulans. T- and B-cell proliferation were strongly inhibited by these substances, which included crude preparations of this herb[23].

Diuretic effect

The diuretic efficacy of an aq. extract of the seeds of W. coagulans was investigated by employing an in vivo Lipschitz prototype, albeit with a few minor adjustments, including using fluoxetine as the precious metal.When conrasted to the control group, the findings revealed a substantial rise in urine volume of 78.12 percent at the 500 milligramme per kilogram body weight dosage and 72.03 percent at the 760 mg/kg mass index dose. When constrasted to the controls, urinary electrolytes bodily wastes were found to be higher at both doses tested [24].

Effects that are antimutagenic and anticarcinogenic

The presence of phytoconstituents determines whether or not a herbal medication is genotoxic. W. coagulans includes withanolides, which have been proven to have anticancer action, as well as flavonoids, which have antimutagenic and anticarcinogenic properties.

The underlying mechanism of W. coagulans' anti-mutagenic activity is still unknown. On cyclophosphamide-induced micronucleus production in cells taken from mouse blood cells, the antimutagenic effect of W. coagulans fruit extracts was studied. The results showed that a single intravenous treatment with W. coagulans fruit extract at doses of 500, 1000, and 1500 milligram per kilogram weight gain even before to 24 hours significantly reduced the generation of micronuclei in mouse stem cells in a doses-reliable way 25. This was in comparison to the group that had been treated with cyclophosphamide.

Anti-inflammatory properties

Various extracts made from W. coagulans seeds have been found to have anti-inflammatory effects [26].

Antifungal activity

Two novel withanolides, 14,15-epoxywithanolide I [(20S,22R) 17,20-dihydroxy-14,15-epoxy-1-oxowitha-3,5,24-trienolide] and 17-hydroxywithanolide K (20S,22R) 14,17,20-trihydroxy-1-oxo-witha-2,5,24-trien-olide], obtained from an ethanolic extract of the whole plant of W. coagulans [27].

Antibacterial and antihelmintic activities

The volatile oil obtained from alcoholic extract of fruits of*W. coagulans* hasantibacterial activity against *S. aureus*and *Vibrio cholera,* and it is also found to haveantihelmintic activity[28,29].

CONCLUSION

From the dawn of cultural, medicinal herbs have been an integral element of human society in the fight against disease. W. coagulans has been discovered to possess a large number of biologically active chemicals that are chemically varied and have significant medicinal promise. Because of very less research has been done on the biological activity and potential medical applications of the chemicals, further research is required to fully utilise their therapeutic potential in the fight against disease. Despite the fact that crude extractions from different components of W. coagulans, particularly fruits, have uses in medicine, contemporary pharmaceuticals can only be developed after extensive research into their bioactivity, mechanism of action, pharmacotherapeutics, and toxicity, as well as proper standardisation and clinical trials.

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