

## The phytochemical and pharmacological screening of *Withania coagulans*

Sanskruti Pawar \*, Shubhangi Manikpuriya and Gajanan Sanap

Late Bhagirathi Yashwantrao Pathrikar College of Pharmacy, India.

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### Abstract

In ancient system of the drug, colorful shops shows to cure colorful health disorders and conditions. *Withania coagulans* Dunal, is generally known as 'Indian bubbish maker' Or 'Vegetable Rennet' because The part of withaniai. E fruits and Leaves are used as a coagulant. *Withania coagulans* (*Withania coagulans*) dunal belongs To Family solanaceae. *Withania coagulans* dunal is a argentine- whitish In colour, It's small under shrub It is distributed In east of The mediterranean region. It is one of The most important medicinal factory and It's veritably useful In ayurveda. In ayurvedic system Of drug, *Withania coagulans* is extensively Used In diabetic Cases, antimicrobial, antitumour and also shows other colorful exertion. Coagulin H Insulated From *Withania coagulans* displayed effect On The vulnerable response. The Dried Flowers were uprooted consecutively by methanol and water. *Withania coagulans* Show remedial effect Of The Part of whole factory *Withania coagulans* dunal is A Rigid, argentine- whitish Small Shrub, about 30- 150 Cm Altitudinous. The leaves are about 2.5-7.5 Cm long and 1.5 Cm broad. The Seeds Are Dark Brown, Observance Shaped, rough with sharp Fruity smell. dunal Flower may contain nioactive element to Treat colorful conditions. *Withania coagulans* is pharmacological Important remedial Factory, generally Known As Rishyagandha. It's used In treatment of colorful conditions like Indigestion, diabetes mellitus, liver diseases, sanctification Of blood and controls blood Pressure. In addition, It's reported To control tube glucose situations and precluding renal complications. A standard protocol was Followed For The birth Of *Withania coagulans*. The fruits of *Withania coagulans* 0.28 G/ 100 ml) Were Soaked In distilled water overnight followed by a mechanical dissipation using A sterile cotton wood and filtration through rubbish cloth.

**Keywords:** Paneer Doda; Withanolides; Hypoglycemic Property; Therapeutic Qualities; Diuretic effect And *Withania coagulans* Dunal

### 1. Introduction

Lately, *Withania coagulans* fruit excerpt was estimated and shows colorful remedial uses against mortal bone cancer antitumor, antidiabetics, central nervous system and vero cell lines By Ahmad Etal. It was observed that the excerpt was active against mortal bone cancer and colorful diseases while noncancerous vero cell lines remain Innocent. (6) The world Health association expert commission recommended That The significance to probe the colorful effect of the factory Of *Withania coagulans*. The hypoglycaemic, antihyperlipidemic, antitumor, hepatoprotective, central nervous system, and colorful agents from factory origin used. It's substantially traditional drug For treatment of diabetic mellitus and hyperlipidemia. The antihyperglycemic agents Have Been Concentrated On Shops used In traditional drug because That shows Better Result Than Lately Synthetic medicines. (5) The present study shows *Withania coagulans* shows hyperglycemia effect, and reduced The pro inflammatory labels In feathers, antidiurtic effect which may latterly reduce The development and progression Of Renal injury In diabetes. (14) *Withania coagulans* is veritably useful source, all part of the *Withania coagulans* show remedial parcels. It Shows colorful type Of bioactive composites and they're responsible for Its pharmacological conditioning, natural conditioning. The withanolides, saponins, alkaloids, tannins, falvonoids, phenol present In It 4) The major source of bioactive phytoconstituents Insulated From The factory Of *Withania coagulans* are lactone steroids Called Withanolides. (7,8) In withanolides present C- type of ergostane

\* Corresponding author: Sanskruti Pawar.

steroidal nucleus With  $\Gamma$ - Or  $\Delta$ - Lactone, and connected side Chain Of The C- carbon snippet.( 8) according To The literature survey of the family of withanolides have slightly explored in shops bearing withanolide and related ergostane- Type of steroids( 11 – 13).( 12) The shrub of family of *Withania coagulans* wide distribution In India and It's also set up In colorful statei. the punjab, Rajasthan, Simla, kumaun and garhwal regions. 6) The dry fruits are generally or generally used for The treatment of The colorful diseases and used To diabetes In northern corridor of india.( 6) no wonder, The fruit Is also generally appertained To As ' Tukhm-E-Hayat. The family Shows colorful type of conditioningviz. hypoglycemic( 4,14) hypolipidemic, Free Radical scavenging, cardiovascular, hepatoprotective, anti-inflammatory, reduce Oxidative tress, crack mending, antitumor, Immuno- suppressive, cytotoxic, antifungal and antibacterial properties( 11)

### 1.1. Common name

*Puneeria coagulans* stocks, Indian rennet, Indian cheese maker, Vegetable rennet, Panir ke phool

### 1.2. Vernacular names

Sanskrit	Rishyagandha
Hindi	Punir dodi
English	Vegetable Rennet
Chinese	Ning gu shui qie

### 1.3. Taxonomical classification

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Asterids
Family	Solanaceae
Genus	<i>Withania</i>
Species	<i>Withania coagulans</i>
Binomial name	<i>Withnia coagulans</i>



**Figure 1** *Withania coagulans* flower



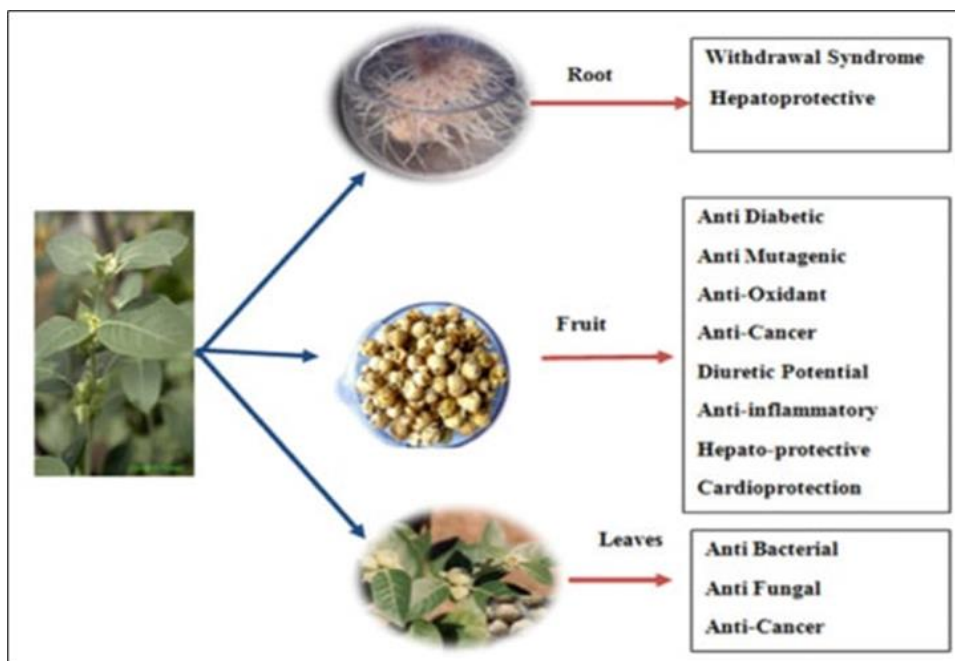
**Figure 2** *Withania coagulans* plant

#### 1.4. Chemical Constituents

Aqueous and methanolic extraction of The fruits of *Withania coagulans* shows various type of The Constituents.<sup>[7]</sup> The berries of *Withania coagulans* contain the milk-coagulating enzyme, protein, phenolic compound, Tannins, saponins, carbohydrate organic acid, two type of esterases, free amino acids, fatty oil, an essential oil and alkaloids.<sup>[3,7]</sup> the various type of amino acids Present I.E Proline, Hydroxyproline, Valine, Tyrosine, Aspartic Acid, Glycine Asparagin, Cysteine And Glutamic Acid. Fourteen Alkaloidal Fractions Have Been Isolated From The Alcoholic Extract Of The Fruits.<sup>[3]</sup> *Withania coagulans* Dunal Contains 17.8% Free Sugars, Consisting Of D- Galactose And D-Arabinose In The Ratio 1:1, With Maltose In Traces. Enzymatic Studies Showed The Absence Of A B-Galactosidic Linkage In The Polysaccharide. The Seeds Of *Withania coagulans* Are Reported To Contain 12–14% Fatty Oil.<sup>[8]</sup>

#### 1.5. Morphological characteristics

*Withania* is a small under shrub 30-150cm height, erect, gray in colour, perennial in branch, with strong disagreeable odour. The stems of *withania* are dark brownish colour and it is erect. (3) The leaves are lanceolate, alternate manner, simple, entire, clothed with a persistent greyish tomentum on both sides., narrowed into 5-20 mm long petioles.<sup>[3,9]</sup> The leaves are about 2.5-7.5 cm long and 1.5 cm broad, usually lanceolate oblong, sometimes ovate, obtuse, narrow at the base and very short stalked.<sup>[8]</sup> Flowers are generally small, greenish in colour, axillary, monoecious or bisexual. Seeds are normally many, discoid, reniform and yellow. The number of chromosome is  $2n = 48$  i.e the  $n=24$  Schonbeck 1972; Hepper 1991; . Most of the seeds are very pale brown, 2.5mm across, sometimes kidney-shaped and squeezed with a rough surface and netted surface. In *Withania* flowering time is generally from October to June, whereas the fruiting time is usually from October to July.<sup>[14]</sup>



**Figure 3** Graphical Representation of Therapeutic Potential of *Withania coagulans* in Several Ailments

##### 1.5.1. Flower

The flowers are sessile, dioecious, In axillary clusters, 1 cm long, It blossoms nearly throughout the year. The flowers are dioecious, In axillary clusters. The calyx Is 6 mm long, calyx Is visibly expanded around the fruit. Clothed with grey tomentum and The Corolla Is 8 mm long, With Lobes That Are Ovate- Oblong, Subacute. The male Flowers Have Stamens approximately Level With The Top Of The Corolla-Tube, the filaments are 2 mm long And Glabrous, And The Anther 3–4 Mm Long. The ovary Is ovoid, Without Style Or Stigma. The Female Flowers Have Stamens reaching halfway Up The Corolla-Tube, The Filaments Are Approximately 0.85 Mm Long, The Anthers Smaller Than In The Male Flowers And Sterile. The Ovary Is Ovoid, glabrous, The Style Glabrous, The Stigma Mushroom-Shaped, 2-Lamellate. The berry Is 6–8 Mm In Diameter, Globose And Smooth. He Calyx Is 6 Mm Long, Clothed With grey tomentum And The Corolla Is 8 Mm Long, With Lobes That Are Ovate-Oblong, subacute. The Flowers Appear In A Brightlyyellow Or Greenish And It Carries Small berries which are Orange-Red In Color. The Male Flowers Have Stamens approximately level with The top Of The Corolla-Tube, The Filaments Are 2 Mm long and glabrous, and The Anther 3–4 Mm Long. The Ovary Is Ovoid, Without

Style Or Stigma.<sup>[3,9]</sup> The female flowers Have Stamens Reaching Halfway Up The Corolla- Tube, The filaments are approximately 0.85 Mm Long, The Anthers Smaller Than In The male flowers And Sterile. The Ovary Is Ovoid, Glabrous, The Style Glabrous, The Stigma mushroomshaped, 2-Lamellate. The Berry Is 6–8 Mm In Diameter, Globose and Smooth.<sup>[9]</sup>

### 1.5.2. Roots

The roots of ashwagandha are fleshy when dry, they're straight, spherical, tapering down, gradationally Unbranched Of about 10-17.5 Cm Long and 6- 12milimeter periphery In thick. The Main Roots are brown in colour External Side and Delicate colour Interiorly. roots are Stout, gleshy and whitish brown In Colour. Leaves Sim- Ple, petiolate, Elliptic- ovate to astronomically elliptical, Entire, exstipulate, Cunate or oblique, Rough, Up To 10 Cm long, those In The Flowery region are lower and contrary. Single concentrated epidermis present In youthful root with A 4- 5 Layers of cells Of Parenchymatous cortex whiles the endodermis being present As casparian Stripes. External most Subcaste Of cortex consists of cork cambium.

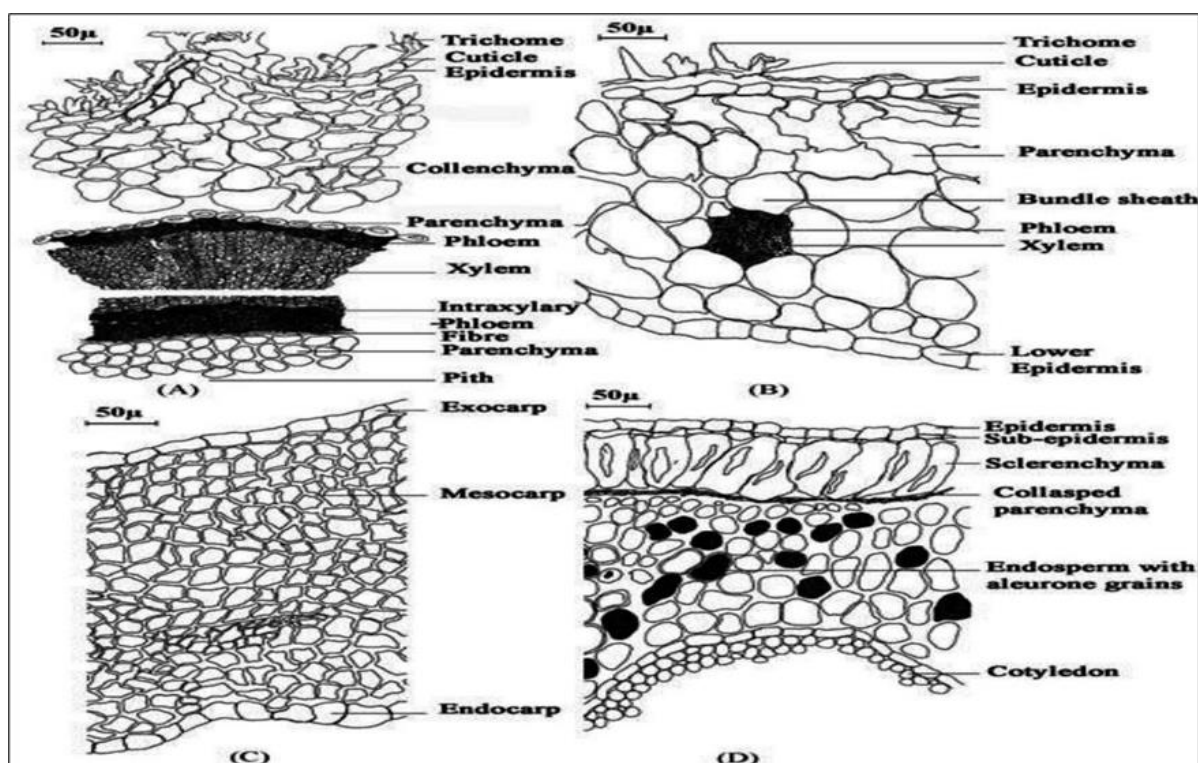


Figure 4 Morphological of root

### 1.5.3. Morphological structure of *Withania coagulans dunal*

- Transverse section of pedicel
- Transverse section of calyx
- Transverse section of pericarp
- Transverse section of seed.

## 1.6. Photochemistry with *Withania cogulans*

Table 1 Screening of Phytoconstituents in Aqueous *Withania coagulans*

Sr. No	Chemical constituents	Test	50%Ethanol Extract
1	Carbohydrate ( reducing ketohexose)	Barfoed's/ Benedict's/ test	+ve
2	Glycosides	Legal test, Baljet test	-ve - ve

3	Steroidal compounds	Salkiowski's test	- ve
4	Saponins	Foam Test	- ve
5	Amino Acid	Ninhydrin Test	- ve
6	Tannins and phenol Compound		+ ve
7	Protein	Biuret Test Xanthoprotein Test Lead Acetate Test	+ ve + ve - ve
8	Alkaloids	Dragendroff's Test / mayer's Test Hager's Test	-ve -ve
9	Flavanoids	Extract-Tin+HCl	+ve

[(+)] present phytochemicals and (-) absent phytochemicals]

### 1.6.1. Phytochemistry

*Withania* species have been studied considerably by several experimenters that subsequently led to the identification, characterization, and isolation of bioactive compounds in different corridors of a factory. It includes several steroidal lactones, tannins, flavonoids, and alkaloids (24–26). Ten new phytoconstituents were linked from air-dried *Withania coagulans* fruit uprooted with methanol and their structures were grounded on their chemical and spectral data (27). Colorful ingredients of *Withania coagulans* were estimated in three different extracts: videlicet, methanolic, hydroalcoholic, and chloroform. It was reported that total phenolic content (55.9 mg/g), total tannins (76.6 mg/g), total flavonoids (0.88 mg/g), and total flavanol (0.25 mg/g) were advanced in the methanolic extract as compared to hydroalcoholic and chloroformic (28). In a study conducted in Iran, the presence of flavonoids (5.70–6.50), anthocyanins (4.51–9.51  $\mu\text{mol/g}$ ), and total phenolics (14.91–23.7  $\mu\text{g}$  gallic acid fellow mg) were verified in *Withania coagulans* (29). The leaves of *Withania coagulans* demonstrated the situations of total phenolics (58.21 mg GEA/g) and flavonoids (47 mg rutin fellow (shaft)/g), independently (30). The important chemical ingredients of this medicinal factory are the withanolides, a series of polyhydroxy steroidal lactones, substantially present in the leaves as well as roots. They're composed of C-28 steroidal lactones grounded on the ergostane structure and the six or five membered lactone ring is formed by oxidation of C-22 and C-2 (25). Their attention varies from 0.001 to 0.5 of the dry weight (33). Two major groups include withanolides containing the modified carbocyclic structure and withanolides containing the unmodified shell (including the regular  $\beta$ -acquainted side chains and the unusual  $\alpha$ -acquainted side chains). They're classified into seven groups grounded on being derivations of ergostane and include  $5\beta$ ,  $6\beta$ -epoxides;  $6\alpha$ ,  $7\alpha$ -epoxides; 5-enes; intermediate composites;  $5\alpha$ ,  $6\alpha$ -epoxides-epoxides, and phenolic withanolides (31,34). So far, several withanolides, alkaloids, and sitoindosides (withanolide with glucose patch at carbon 27) have been reported and isolated from *Withania* species (46). One of the most salient features that withanolide-producing shops retain is to host an oxygen function in nearly all positions of side chains or carbocyclic configurations. New structural variants arise by variations in either the side chain or in the carbocyclic shell (15).

### 1.6.2. Pharmacological properties

The chemical constituents of *Withania* have always been of great interest to the scientific community. The berries of the plant are used for milk coagulation. It has always had a prominent place in Ayurvedic, Unani, and Ancient Indian systems of medicine. They show various types of biological properties. [10]

- **Wound Healing Activity**

The hydroalcoholic fraction of the methanolic extract of *Withania coagulans* was administered in the form of 10% W/W ointment topically and at a dose of 500 mg/kg body weight orally to streptozosin-induced diabetic rats showing healing of the skin.

- **Antibacterial And Antihelmintic Activities**

The volatile oil obtained from alcoholic extract of fruits of *Withania coagulans* has antibacterial activity against *S. aureus* and *Vibrio cholera*, and it is also found to have antihelmintic activity. [8] Withaferin A shows significant antibacterial activity against the gram positive microorganisms 6–100  $\mu\text{g/ml}$ , it is inactive against the gram-negative bacteria. [9]

- **Free Radical Scavenging Activity**

The aqueous extract (2 Mg/ml) shows Free Radical Scavenging Activity In An In-Vitro system using The 1,1- Diphenyl-2-Picrylhydrazyl It Is A Dark-Colored crystalline powder composed Of Stable Free Radical Molecules. This Method, Used to determine free radical scavenging activity, It was based on The reduction Of A methanolic Solution Of The Coloured Free Radical DPPH. The Decrease In absorption Of DPPH At Its Absorption Maximum Of 517 Nm Is Proportional To The concentration of free radical scavenger added to the DPPH reagent solution. The activity Was Expressed as the effective concentration at 50% .The Presence Of free Radical Scavenging Potential Might Help In protecting against oxidative damage To Pancreatic Beta Cells. [9]

- **Anti-Mutagenic Effects**

The antimutagenic activity of *Withania coagulans* fruit Extracts was Investigated On cyclophosphamide Induced micronucleus formation In mouse bone marrow cells. The Results Confirmed That A Single intraperitoneal administration of *Withania coagulans* Fruit Extract At The Doses Of 500, 1000 And 1500 Mg/Kg body weight Prior To 24 H Significantly Prevented The micronucleus formation In Dose Dependent Manner In bone marrow cells of mice as compared To Cyclophosphamide Group.[7]

- **Central Nervous System Depressant Activity**

The bioactive metabolites of *Withania coagulans* Fruit Has Been Shown Central Nervous system(CNS) Depressant activity In Mice, Rabbits And Dogs. The Extract Was hypotensive In animals and had respiratory Stimulant And Smooth Muscle Relaxant activity. Alcoholic Extract, Total Alkaloids And Aqueous Extract At Doses Of 1 G/Kg, 200–400 Mg/Kg And 5 Mg/100 G Exhibited CNS Depression In Albino Rats characterized By Sedation, Reduced Exploratory, Spontaneous Activity And hypothermia. At The Same Doses But Administered At The 30 Min Before A Hypnotic, they Potentiated Pentobarbitone Sleeping Time In Rats.[9]

- **Antidiabetic Effect**

The Present study defines The systematic Evaluation And The Role Of Minerals In glycemic potential Of aqueous extract of *Withania coagulans* Fruits In Order To develop an effective And Safe Alternative Treatment For Diabetes Mellitus. Laser Induced breakdown Spectroscopy Was Used For Glycemic Element Detection. The study Is based On The Results Of Lowering In Blood Glucose Levels Of Normal, Sub, mild and severely diabetic Rats Assessed During Fasting Blood Glucose, Glucose tolerance test and post prandial glucose Studies.[2]

- **Hepatoprotective Activity**

The present study conducted to evaluate the liver protective and oxidative stress reducing activities of Methanolic (Mfet) and aqueous methanolic fruits (Aqmfet) extracts of *Withania coagulans* Against Ccl4-Induced Liver Damage In Rats. Total Protein and Bilirubin Profiles, Uric Acid Levels Plus Uplifting The Efficacy Of Hepatic antioxidant enzymes And Protein By Minimizing Lipid Peroxidation. Total Phenolic compounds were found high In aq Mfet. Interestingly, For The First Time, Gallic acid and rutin are Identified and quantified In These Extracts And Thought To Improve hepatoprotective potential of *Withania coagulans*.[13]

- **Cytotoxic Activity**

In-vitro effects of withaferin A on P388 Cells Have Been studied. The cytotoxicity was calculated from The utilization of precursors In protein and nucleic acid synthesis and from capacity To Suppress Cell Proliferation. The Immune System Destroys Or damages Foreign Or abnormal Cells. Withaferin A Stopped Cell Proliferation And, At the same time, Killed The Cells. Cytotoxicity Was Found To Be Due To A Double bond at Position 2–3; On Dissociating This Bond The Cytotoxicity Markedly decreased.[9]

- **Anticancer And Chemoprotective Activities**

The anticancer effect of *Withania* Has Been Studied Extensively (Devi 1996; Davis and Kuttan, 2000; Prakash Et Al., 2002; Senthilnathan Et Al., 2006; winters, 2006; , and It Was Found That It Is The Most Effective agent In preventing Cancer through Its ability to reduce the Tumor Size. . It Possesses Significant antibiotic activity and Its anti-Tumor Effect Has Been studied Against malignant Nasopharyngeal (KB) Cells In vitro. Additionally, In A different Study The aqueous

extract Of *Withania coagulans* Was used For antiCytotoxic effect In Chicken lymphocytes And Remarkable inhibitory activity Of Dimethyl sulfoxide (DMSO)-Induced cytotoxicity with a decrease in TNF-G Production Was reported.[10]

- **Cardiovascular Effects**

An alcoholic solution Of 3b-Hydroxy-2,3-Dihydrowithanolidef (26) 5 Mg/Kg exhibited a moderate fall of blood pressure In mongrel Dogs (Weight 12–15 Kg). The Level Of blood Pressure and cholestrol are control In cardiovascular effect So *Withania coagulans* Help To maintain The level of blood pressure and cholestrol. The hypotensive response was blocked by atropine At The Dose (2 Mg/Kg) but not by mepyramine at dose(2 Mg/Kg) and propranolol At The (1 Mg/Kg). At The Same dose, The hypotensive response was less with a suspension Of the Withanolides (10). A steroidal lactone, withanolide ... of Fruits of *Withania coagulans*, has cardiovascular effect. A new of the cardiac glycoside, Isolated from the Fruits Of *Withania coagulans*.[16]

- **Immunomodulatory Activity**

Withaferin a shows various studies to possess both properties Immuno-activating and Immunosuppressive properties. Two types of lymphocytes are present B And T lymphocytes. B Lymphocytes are The effectors of humoral Immunity, Providing defense against Pathogens Through different functions Including Antibody production. B cells Constitute approximately 15% Of Peripheral Blood Leukocytes and arise From hemopoietic Stem Cells In The bone marrow. withaferin a Has specific immunosuppressive effects on human B And T Lymphocytes Viz. Antigen recognition and proliferative capacity Of B And TLymphocytes .

- **Hypocholesterolemic Activity**

Hypocholesterolemia Is the presence of abnormally low (Hypo-) levels of cholesterol In the blood they decrease level of Increasing cholestrol level. The aqueous axtract of fruits of *Withania coagulans* and the root powder of w.Sominefera have been reported to decrease total lipid, cholesterol and triglycerides In hypercholesterolemic animals .[10]

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## 2. Conclusions

In present review work an effort was made to examine medicinal use of *Withania coagulans*.On the basis of the extensive literature survey and findings of present study revealed that *Withania coagulans* is an impotent medicinal plant with various chemical constituent and it possesses pharmacological activities like antidiabetic, hypolipidemic, anti-inflammatory antimicrobial, antitumor, hepatoprotective, cardiovascular, immuno-suppressive, free radical scavenging and central nervous system depressant activities. etc.

The finding of the present study suggests that both methanolic and aq. extract of *Withania coagulans* shows various activities useful to disorder. Medicinal plants are part and parcel of human society to combat diseases from the dawn of civilization.

*Withania coagulans* has been found to contain a vast array of biologically active compounds, which are chemically diverse and have got an enormous therapeutic potential. Very little work has been done on the biological activity and plausible medicinal applications of the compounds and hence extensive investigation is needed to exploit their therapeutic utility to combat diseases.

The use of herbal drugs is increasing worldwide as they have fewer or no side effects as compared with synthetic drugs. Ayurveda claims therapeutic potentials of various plants.

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## Compliance with ethical standards

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No conflict of interest to be disclosed.

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