

**WITHANIA SOMNIFERA: AN OVERVIEW****Anjitha Anil, Arjun R., Ashwathy P., Raghavi R. and Saritha A. Surendran\***

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Vidyapeetham, Cochin,  
Kerala, India.**ABSTRACT**

Withania somnifera an Indian traditional medicinal herb belonging to solanaceae family also known as Ashwagandha used in medicine from the time of Ayurveda, ancient system of Indian medicine. It possesses anti-inflammatory, antistress, antioxidant, analgesic, antispasmodic, cardioprotective, adaptogenic, immunomodulatory & immunostimulant activities. It has significant stress relieving properties analogous to those of the powerful drugs used to treat depression and anxiety. Dried roots of the plant are used in treatment of nervous and sexual disorders. The drug contains biologically active constituent known as withanolides. Withaferin-A is considered as the most therapeutically

active withanolide present in leaves. Anti-inflammatory activity was assessed by HRBC membrane stabilization method & Albumin denaturation assay and this experiment shows significant anti-inflammatory activity.

**KEYWORD:** Withanolides, Solanaceae, anti-inflammatory, Ashwagandha.**INTRODUCTION**

Withania somnifera is an Indian traditional herb which is used for various treatments like nervous exhaustion, memory related conditions, tiredness, insomnia, potency issues, skin problems and coughing. In Sanskrit it is also known as Ashwagandha, it grows in dry areas of india, on the Himalayas, Baluchistan, Sri Lanka and the Mediterranean sea.<sup>[1-2]</sup> Withania somnifera is also known to possess antioxidant, antistress, analgesic, anti-inflammatory, cardioprotective, adaptogenic, antispasmodic, immunomodulatory and immunostimulant activities.<sup>[3]</sup> Withania somnifera has been considered as the major source of drug in thre treatment of diabetes mellitus in Indian medicinal system and the other ancient system in the world, long times diabetes mellitus was treated orally with their extract, these plant products are more considered to be less toxic and are more free from side effects.<sup>[4]</sup> Withania

somnifera is a perennial plant belonging to the family of Solanaceae and its pharmacological effects are attributed to the presence of withanolides which is a group steroidal lactones.<sup>[5]</sup> The present study was conducted to examine the anti-inflammatory, antioxidant and immunomodulatory activities, for in vitro anti-inflammatory activity Human red blood cells and albumin denaturation assay were performed.

### Chemical Constituents

According to the laboratory analysis 35 active biological constituents are identified in the roots of *Withania somnifera*, the biologically active constituents are alkaloids (anferine, isopellertierine) steroidal lactones (withanolides, withaferines), saponin and withanolides with a glucose at carbon 27 and *withania somnifera* which is rich in iron.<sup>[6]</sup> Roots of *withania somnifera* consist of withanolides which possess medicinal properties in large amounts. Withaferine A is considered as the first natural lactone of the withanolide series which is being isolated from the shoot.<sup>[7]</sup> Main activities are due to Withaferine A and withanolide D. Roots are the most important source of biological activities. Withanolides found to have C-28 basic skeleton with a carbon atom side chain in which C-22 and C-26 oxidized to form a six member lactone ring.

### Pharmacological Actions

Anti-inflammatory activity of *Withania somnifera* is on the basis of naturally occurring steroids, in which Withaferine A is considered as the most important component and is effective as hydrocortisone sodium succinate dose, an anti-inflammatory drug.<sup>[8]</sup>

Inflammation is a reaction by which to disrupt tissue homeostasis at its fundamental level, it is a tissue removal process aided with the help of blood derived products such as plasma proteins, fluid and leukocytes to tissues. This migration is leading to vasodilation. Injury and exposure to peregrine particle or irritants or pollutants are the activators of inflammation.<sup>[9]</sup>

#### 1. Anti-Inflammatory Activity

- **HBRC membrane stabilization method**

This method is used to study the anti-inflammatory activity. Basically observations and conclusions are made based on the stabilization of human red blood cell membrane by hypotonicity induced membrane lysis. Assay mixture is prepared by mixing 0.5mL of plant extract (500, 1000,1500,2000,2500 micro g/ml), with 1 ml phosphate buffer (pH 7.4, 0.15M), 2ml hypo saline (0.36%), 0.5 ml HBRC suspension (10%v/v). Diclofenac sodium is used as test

drug. The hemoglobin suspension was observed at 560nm in spectrophotometer. Haemolysis produced in the presence of distilled water was taken as 100%. And percentage of HBRC membrane stabilization /protection was calculated using the formula:

Percentage stabilization =  $100 - (\text{optical density of test solution}) / (\text{optical density of control}) * 100$ .<sup>[10]</sup>

- **Albumin denaturation assay**

0.2%W/V of BSA was dissolved in Tris buffer and p H was adjusted to 6.8. Both extract and standard drug was diluted to (500, 1000, 2000, 2500micro g /ml.) 5ml of 0.2%W/V BSA was transferred to eppendorf tubes containing 50 micro g/ml of extract /standard. The solution was heated at 72degree C and cooled at room temperature for 15 minutes. The absorbance of solution was read at 660nm in spectrophotometer and percentage inhibition was calculated using formula:

$$\% \text{ Inhibition} = (\text{Abs control} - \text{Abs sample}) / \text{Abs control} * 100$$
<sup>[11]</sup>

## **2. Anti Oxidant Activity**

Some chemical present in Withania possess some anti oxidant activity. Studies conducted on the rat brain shows the herb produced an increase in the levels of 3 natural antioxidants such as superoxide dismutase, catalase and glutathione peroxidase.

## **3. Anti Stress Activity**

Using the aqueous suspensions of the powdered root each herb was tested in mice which exhibit anti stress activity.

## **4. Anti Cancerous Activity**

Cancer is a hyper proliferative disorder that results in apoptosis. Withania somnifera possess its anti tumor effect due to presence of withaferine A, a withanolide.

## **5. Anti Diabetic Activity**

Experiment which is conducted on diabetic rat. Anti diabetic activity decreased due to increase in hepatic metabolism, increased insulin released from the beta cell of pancreas.

## **CONCLUSION**

Withania somnifera possess several health benefits. Thus it is considered as the important plant of rasayana in ayurveda. Plant has the ability to boost the immune functions etc,

withania somnifera used in traditional time due to its immense pharmacological activity. Important withanolide present in the root are withaferine A which is the, major active constituent possess the anti-inflammatory responses. Withania somnifera play an important role in inhibiting the growth of cancer cells. Root is used for the entire health problems, many studies demonstrated significant anti-inflammatory anti cancer, anti diabetic, anti stress and immunomodulatory and anti bacterial activity etc. which are reported in the extracts of different plant parts.

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### REFERENCES

1. P Scartezzini, E Speroni. Journal of Ethnopharmacology., 2000; 71(1-2): 23-43.
2. V. Sharma; S Sharma; et al. International Journal of Phama Tech Research., 2011; 3(1): 187-192.
3. SK Verma; A Kumar. Asian Journal of Pharmaceutical and Clinical Research., 2011; 4(1): 1-4.
4. Akhtar, F.M.; Ali, M.R; Pak. Med. Assoc, 1984; 34: 239-244.
5. Budhiraja, R.D.; Sudhir, S.J.Sci. Ind. Res., 1987; 42: 488-491.
6. Rastogy RP, Mehrotra BN, Compendium of Indian Medicinal Plants, Vol.6 Central Drug Research Institute, New Delhi, 1998.
7. Nigam KB, Kandalkar VS. Ashwagandha, In: Chadha KL, Rajendra G Advances in Horticulture Vol. 11- Medicinal and Aromatic Plants. Malhothra Publishing House, New Delhi, India, 1995; 337-359.
8. V. Dhamodaran; G. Rajeswari. Advance Biotech, 2012; 12(4): 1-3.
9. G Shing; P Kumar. Indian Journal of Pharmaceutical Science, 2011; 73(4): 473-478.
10. N Shah; H Kataria; SC Kaul; T Ishii; et al cancer science, 2009; 100(9): 1740-1747.
11. Khare CP. Indian medicinal plants –an illustrated dictionary. First Indian reprint Spiringer (india) Pvt ltd. New delhi, 2007; 717–718.