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STUDY OF PHYTOCHEMICAL ACTIVE COMPOUNDS IN EXTRACT OF *Withania somnifera*

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ABSTRACT

Withania somnifera commonly known as **Ashwagandha** is a plant used in medicine from the time of Ayurveda. The plant is a source of bioactive constituents like withanolides in root and withafarin in leaves. Some important anticancer drugs like Vinblastine, Taxol, and Vindoline are extracted from plants. Withanolides and withafarin are under research for treatment of cancer. Today's research is much concern with the natural products having anticancer activity.This article reviews the scope of studies published in favor of anticancer potential of *Withafarin-A*.

Keywords: *Withania somnifera,* DM (Diabetes mellitus), antibiotic, anti-inflammatory.

INTRODUCTION

Plant products are considered to be less toxic and more from its side-effects than synthetic drugs[1]**.** After the recommendations made by the WHO on DM, investigations on hypoglycemic agents from medicinal plants have become more important and the search for more effective and safer hypoglycemic agents has continued to be an important area of active research. Ashwagandha is a perennial plant belonging to the family solanaceae. Ayurvedic practitioners have used the roots of this plant for centuries with success to treat health conditions [2,3] .Ashwagandha is used to calm the mind, relieve weakness and nervous exhaustion, build sexual energy and promote healthy sleep. The herb is termed as rasayan in Ayurvedic practice, which means it acts as a tonic for vitality and longetivity. It is also classified as an adaptogen[4].

Fig.-1: *Withania somnifera* plant.

EXPERIMENTAL

Collection of plant material

The leaves of plant *Withania somnifera* is collected from Government Agriculture Science College, Indore and authenticated by botanist Dr. Sudeep Roy (Professor) in Department of Botany P.M.B Gujarati Science College, Indore (M.P). After collection of sample the leaves were subjected for extraction of active components by standard method.

Method of extraction

Take 100g leaves and allowed it to reflux in methanol for 3 hours. Filter it three times in 1 litre of solvent and allowed it to distill under reduced pressure. A thick paste is formed then extract it with chloroform the residue is obtained add chloroform soluble content and allow it to concentrate add charcoal and methanol and again reflux it and then filtered while hot then the obtained liquid was concentrate and keep it for overnight the crystal of withafarin –A is obtained.

Detection method

The obtained plant extract is analyzed by HPLC technique the conditions and results are given as below.

Condition

Solution A: Dissolve 0.14g of potassium dihydrogen phosphate in 900 ml of water, add 0.5 ml of phosphoric acid, dilute with water to 100ml, and mix.
Solution B: Filtered and degassed acetonitrile.

Chromatographic System

Mode: LC; Detector: UV 227nm; Column: 4.6mm x 25 cm, end-capped, Packing L1; Flow rate: 1.5 ml/min.; Result: Standard *Withania somnifera* plant extract (leaves)

Table-1

Time (min)	Solution A (%)	Solution B (%)
0	95	5
18	55	45
25	20	80
28	20	80
30	95	5
40	95	5

Table-2: HPLC Data presented in Fig.-2

S. No.	Name	RT [min]	Area [mv*s]	Height [mv]	Amount
1	withanolide iv	15.9500	122.0315	20.3519	0.0000
2	withanoside v, vi	19.6833	86.0360	16.5942	0.0000
3	withaferin A	22.2000	358.1863	68.8789	0.0000
4	withastromonaloide	22.6167	302.7911	60.0792	0.0000
5	withanolide A	23.4333	292.2397	54.1202	0.0000
6	withanone	23.8167	122.5299	21.7680	0.0000
7	withanolide B	26.9167	142.1663	19.7514	0.0000
Sum			1425.9808	261.5438	0.0000

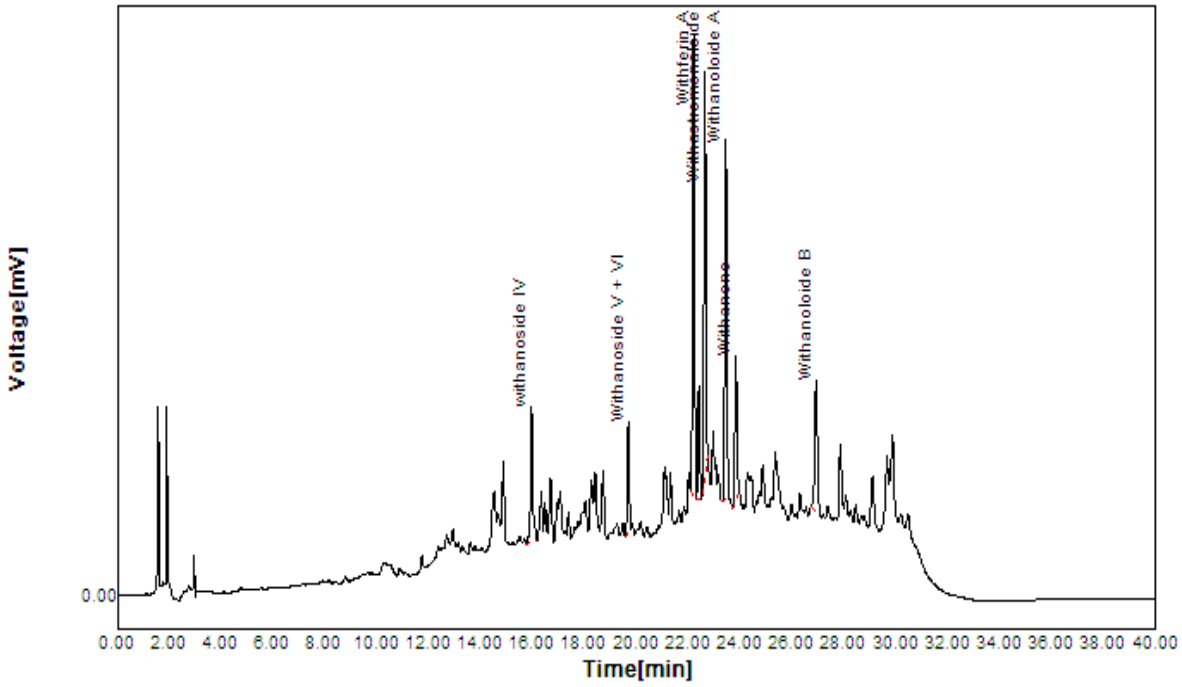

Fig.-2: HPLC (Plant)

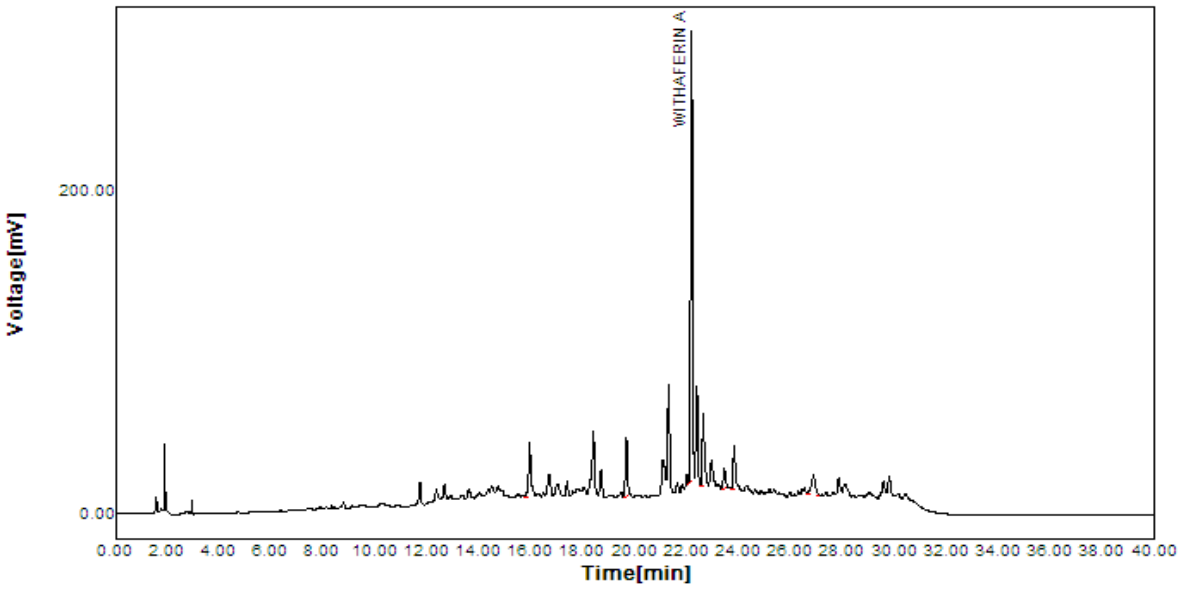

Fig.-3: HPLC (Leaves)

Pharmacological Activity

Centuries of Ayurvedic medical experience using *Withania somnifera* have revealed it to have pharmacological value as an antibiotic, aphrosidiac, anti-inflammatory, sedative, and tonic. It also related as given below:

1. Counteract the effects of stress and generally promote wellness.[5]
2. Provide potent antioxidant protection.[6, 7]
3. Stimulate the activation of immune system cells, such as lymphocytes and phagocytes.[8,9]

Table-3: HPLC Data presented in Fig.-3

S. No.	Name	RT[min]	Area [mv*s]	Height[mv]	Amount
1	Withaferin A	22.1667	1455.7786	277.4473	0.0000
sum			1455.7786	277.4473	0.0000

Anti-stress

It works as anti-stress reveals from the study conducted at the department of Pharmacology, University of Texas Health Science Centre indicated that extracts of Ashwagandha produce GABA- like activity, which may account for the herb's anti-anxiety effects.[10] Excessive neuronal activity can lead to restlessness and insomnia, but GABA inhibits the number of nerve cells that fire in the brain, and helps to induce sleep, uplift mood, and reduce anxiety.

Role as antioxidant

Researchers from Banaras Hindu University in Varanasi, India, have discovered that some of the chemicals found in Withania somnifera are powerful antioxidants.[11]

Role as Antineoplastic agent

Ashwagandha is reported to have anti-carcinogenic effects. Research on animal cell cultures has shown that the herb decreases the levels of the nuclear factor kappaB, suppresses the intercellular tumor necrosis factor, and potentiates apoptotic signaling in cancerous cell lines [12.] It works to reduce tumor size[13,14]. This herb is evaluated for its reduction in lungs tumor of mice [15.]

Anti-inflammatory activity

Research has explored the capacity of *Ashwagandha t*o works as inflammatory agent. Its naturally occurring steroidal content is much higher than that of hydrocortisone, a commonly- prescribed anti-inflammatory[16].It produced anti-inflammatory responses comparable to that of hydrocortisone sodium succinate.[17]

Other Therapeutic Benefits

These studies also shown ashwagandha to be effective in the treatment of osteoarthritis [18]inflammation [19], stroke [20]. Ashwagandha has been shown to be a potential antimicrobial agent, with antifungal activity[21], against Staphylococcus aureus and Pseudomonas aeruginosa bacteria strains.[22]

RESULTS AND DISCUSSION

The plant under testing possessed greater potential anticancer as well as anti- diabetic property. The bioactive content was isolated and extracted and was analyzed by HPLC and the observations and pharmacological property were discussed above.

CONCLUSION

The studies for *Withania somnifera* would be good natural source of potent and chemotherapeutic agent. Ashwagandha is a plant used in medicine form the time of Ayurveda, since long time in India. Ashwagandha has been used as an aphrodisiac, anti-inflammatory agent, astringent, asthma, ulcers, and insomnia. Studies on animal shows the plant is used for treatment of neurological disorders, inflammation and Parkinson's disease.

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