International Journal Dental and Medical Sciences Research
Volume 4, Issue 4, July-Aug 2022 pp 754-758 www.ijdmsrjournal.com ISSN: 2582-6018

To Study the Effect of Withania Somnifera (Ashwagandha) Supplementation on Cardiovascular Autonomic Functions in Type 2 Diabetes Mellitus

Sharma Pooja[1], Binawara Bijendra Kumar[2],Vyas Poornima[3]
[1]*PhD Scholar,Department of Physiology,S.P.Medical College,Bikaner,Rajasthan,India,*
[2]*Prinicipal & Controller,PDU Medical College,Churu, Rajasthan,India*
[3]*PhD Scholar,Department of Physiology,S.P.Medical College, Bikaner,Rajasthan,India,*

Submitted: 10-08-2022 Accepted: 25-08-2022

ABSTRACT: Raised blood glucose levels are a sign of diabetes mellitus, a dangerous long-term (or "chronic") illness that develops when the body is unable to make enough insulin, cannot efficiently utilise the insulin that is produced, or both. An important hormone generated by the pancreas is insulin. It enables circulatory glucose to reach the body's cells, where it may be stored or transformed into energy. Additionally, the metabolism of fat and protein depends on insulin. Autonomic neuropathy is additionally connected with an extended hazard of abrupt demise. Quite possibly the most neglected entanglements of diabetes is Cardiovascular Autonomic Neuropathy[1].World ethno-plant statistics about therapeutic plants reports that very nearly 800 herbs might be utilized to control diabetes mellitus. Medicinal plants have been in use for the treatment of diseases all over the world since the dawn of human civilization .Ashwagandha (Withania Somnifera) has been one of such plants in use has a special place in Ayurveda, which is an Indian system of medicine. A total 200 subjects of middle age group 36-55yrs were selected for the study and were divided in two groups. Group- I-These patients were taking conventional treatment and served as the control group. Group-II-These patients besides conventional treatment were given powder of WITHANIA SOMNIFERA (ASHWAGANDHA) root and served as study group .Cardiovascular Autonomic functions were accessed in all subjects at baseline and after 3months of Ashwagandha supplementation, a significant improvement in Autonomic functions was found in Group II subjects.

KEYWORDS: Cardiovascular autonomic neuropathy, Cold pressor test, Deep breathing test, Valsalva Manoeuvre,Lying to standing test.

I. INTRODUCTION

Type-2 diabetes mellitus between 90 to 95 percent of diabetes cases, with the biggest percentages occurring in low and middle income nations. It is a serious and widespread health problem around the world that has come about because of quick changes in culture, economy, and society, population ageing, unplanned urbanisation on the rise, dietary changes—such as an increase in the intake of heavily processed foods and drinks with added sugar leads to obesity, a decline in physical activity, bad lifestyles and behavioural patterns, under nutrition in foetuses, and a rise in the exposure of foetuses to hyperglycemia during pregnancy. Plants have been utilised in traditional medicine for thousands of years and play a major role in the creation of novel medicines. They have historically been a plentiful source of a wide range of lead compounds. Numerous medications have been discovered as a result of pharmacological testing of natural sources. Based on many medical systems like Ayurveda, Unani, and Siddha, the knowledge of medicinal plants has been acquired over many years.

Ashwagandha, also known as Withania somnifera, is a herb that has been utilised in traditional Indian medicine since the time of Ayurveda. The plant's dried roots are used to treat neurological and sexual issues. The medication is chemically composed of a class of physiologically active substances called withanolides. Withanolides have been examined for their chemical makeup and are found in large quantities in the Solanacae family. According to reports, leaves contain withaferin-A, a withanolide that is therapeutically effective.

Medicinal plants have been in use for the treatment of diseases all over the world since the dawn of human civilization .Ashwagandha (Withania Somnifera) has been one of such plants in use has a special place in Ayurveda, which is an Indian system of medicine. Cardiovascular Autonomic Neuropathy results from harm to the autonomic nerve filaments that goes in to the heart and veins and it causes anomalies in pulse control and vascular elements[2]. The fundamental motivation behind present investigation is to contemplate the

International Journal Dental and Medical Sciences Research
Volume 4, Issue 4, July-Aug 2022 pp 754-758 www.ijdmsrjournal.com ISSN: 2582-6018

impacts of Herbal supplementation of Withania somnifera on Cardiovascular Autonomic function in Type 2 diabetes mellitus subjects.

II. MATERIAL & METHOD

Data Collection

A randomised control trial study was designed to evaluate the effect of Withania Somnifera that include a total of 200 subjects of middle age group 36-55yrs and were divided in two groups. Group- I-These patients were taking conventional treatment and served as the control group. Group-II-These patients besides conventional treatment were given powder of WITHANIA SOMNIFERA (ASHWAGANDHA) root and served as study group. The research excluded individuals with liver illness, arthritis, lung TB, malabsorption, alcoholism, asthma, history of coronary heart disease, an acute myocardial infarction, valvular heart disorders, and non-cooperative patients.

Methodology

Dose:5gm of ASHWAGANDHA churna was prescribed by Ayurvedic physician twice a day (2.5gm in morning and 2.5gm in evening) along with lukewarm water on empty stomach. Dried root powder of ASHWAGANDHA (WITHANIA SOMNIFERA) churna was purchased from Patanjali chikitsalya, Bikaner. Subjects in study group was given 5 gm of Ashwagandha root powder twice a day for three months regularly.

Before starting Ashwagandha root powder ,patients were instructed about the procedure.

1. Cardiovascular Autonomic function tests: Cardiovascular autonomic reactivity parameters was assessed in both the study and control groups.

Equipmentsto be used:

1.Mercury sphygmanometer
2.ECG machine
3.Handgrip dynamometer
4. Weighing machine

Cardiovascular autonomic reactivity:

Subjects were undergone different parasympathetic and sympathetic reactivity assessments:

Parasympathetic tests	Sympathetic tests
1.Lying to standing test(LST)	1.Lying to standing test(LST)
2.Deep breathing test(DBT)	2.Cold Pressor test(CPT)
3.Valsalva manoeuvre(VM)	3.Hand grip test(HGT)

Statistical Analysis

The observations and results were analysed using standard statistical procedures .In order to compare the means ,the student's paired 't' test was applied. In all cases, p values were calculated with two tails ,and a value of less than 0.05 was taken to be statistically significant.

III. OBSERVATION TABLE AND RESULT

Table1 Age and Sex wise distribution into control andstudy group

Age Group (years)	Sex											
	Control Group						Study Group					
	Female		Male		Total		Female		Male		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
35-40	10	27.0	20	31.7	30	30.0	4	11.1	20	31.3	24	24.0
41-45	0	-	7	11.1	7	7.0	7	19.4	13	20.3	20	20.0
46-50	4	10.8	24	38.1	28	28.0	18	50.0	5	7.8	23	23.0
51-55	23	62.2	12	19.0	35	35.0	7	19.4	26	40.6	33	33.0
Total	37	37.0	63	63.0	100	100	36	36.0	64	64.0	100	100.0

International Journal Dental and Medical Sciences Research
Volume 4, Issue 4, July-Aug 2022 pp 754-758 www.ijdmsrjournal.com ISSN: 2582-6018

Table 2
Mean±SD age of subjects under both the groups

	Female		Male		Total	
	Control Group	Study Group	Control Group	Study Group	Control Group	Study Group
Mean	50.08	47.36	45.65	46.58	47.29	46.86
SD	6.59	4.12	5.89	6.56	6.49	5.81
SE	0.82	0.68	0.74	1.08	0.65	0.58
t	2.113		0.835		0.494	
p	0.038		0.405		0.622	

Table 3
Effect of Ashwagandha on Cardiovacular Autonomic function tests in Control Group

Parameters		Base Line		Post Treatment		t	p
		Mean	SD	Mean	SD		
Parasympathetic	30:15	1.24	0.88	1.33	0.96	6.583	<0.001*
	VM	1.25	0.083	1.36	0.11	11.782	<0.001*
	DBT(E/I)	1.32	0.11	1.37	0.08	5.071	<0.001*
Sympathetic	LST	8.38	2.37	8.40	2.65	0.072	0.943#
	HGT	14.28	2.46	14.36	3.34	0.263	0.793#
	CPT	105.06	10.11	97.04	9.89	6.610	<0.001*

Table 4
Effect of Ashwagandha on Cardiovacular Autonomic function tests in Study Group

Parameters		Base Line		Post Treatment		t	p
		Mean	SD	Mean	SD		
Parasympathetic	30:15	1.24	0.12	1.26	0.08	2.049	0.043*
	VM	1.25	0.17	1.25	0.08	0.551	0.583#
	DBT(E/I)	1.24	0.05	1.32	0.09	10.808	<0.001*
Sympathetic	LST	10.08	1.70	9.54	1.73	1.971	0.051#
	HGT	14.09	1.45	14.08	2.88	0.046	0.63#
	CPT	106.82	5.71	104.70	8.48	2.066	0.041*

Table 5
Comparison of Cardiovascular autonomic functions in between Control & Study group at pre-treatment

Parameters		Control Group		Study Group		t	p
		Mean	SD	Mean	SD		
Parasympathetic	30:15	1.24	0.88	1.24	0.12	0.502	0.617#
	VM	1.25	0.083	1.25	0.17	0.110	0.913#
	DBT(E/I)	1.32	0.11	1.24	0.05	7.059	<0.001*
Sympathetic	LST	8.38	2.37	10.08	1.70	5.819	<0.001*
	HGT	14.28	2.46	14.09	1.45	0.665	0.57#
	CPT	105.06	10.11	106.82	5.71	1.516	0.131#

International Journal Dental and Medical Sciences Research
Volume 4, Issue 4, July-Aug 2022 pp 754-758 www.ijdmsrjournal.com ISSN: 2582-6018

Table 6
Comparison of Cardiovascular autonomic functions in between Control & Study group at post-treatment

Parameters		Control Group		Study Group		t	p
		Mean	SD	Mean	SD		
Parasympathetic	30:15	1.33	0.96	1.26	0.08	6.062	<0.001*
	VM	1.36	0.11	1.25	0.08	8.533	<0.001*
	DBT(E/I)	1.37	0.08	1.32	0.09	4.284	<0.001*
Sympathetic	LST	8.40	2.65	9.54	1.73	3.603	<0.001*
	HGT	14.36	3.34	14.08	2.88	0.634	0.527#
	CPT	97.04	9.89	104.70	8.48	5.878	<0.001*

* $P < 0.05$ (Significant) # $P > 0.05$ (Not significant).

IV .DISCUSSION

The aim of the current research was to determine the impact of Withania somnifera (ASHWAGANDHA) on diabetic patients in the middle age range, 36-55 years, at the Sardar Patel Medical College and Diabetic Care & Research Centre, Bikaner.

In our study, after three months of treatment, Withania Somnifera root powder iproduce ihighly isignificant iimprovement in Autonomic functions in study group from their baseline values. In our study, Autonomic functions were not found to be disturbed in diabetic control and study group patients but Withania somnifera supplementation had done a significant improvement in Sympathetic and Parasympathetic Autonomic function tests(Parasympathetic – LST,VM,DBT) (Sympathetic-LST,HGT,CPT) from their observed baseline values .One reason for the normal autonomic functions test in both the groups is supposed to be related to the duration of disease ,as majority of our subjects are those who have less than or equal to five years of the this disease.

It has been shown that W. somnifera possesses cardiac protecting qualities. Withanolides, a class of steroidal lactones and alkaloids, are thought to be responsible for the pharmacological actions of the roots and leaves of iW. isomnifera.[3,4] Withania alkaloids have been shown to produce hypotensive and bradycardic effects in experimental trials. Additionally, it was discovered that the iautonomic iganglion iblocking and depressing effects on the higher cerebral centres were what caused the hypotensive effect. The alkaloids generated mild but enduring cardiotonic effects as well as acute but brief cardio-depressant effects.[5]

Antioxidant treatment may be helpful in preventing cardiovascular illnesses since oxidative stress has been demonstrated to be a significant factor in their development.[6]

According to pre-clinical investigations, Withania somnifera's antioxidant and anti-apoptotic characteristics, which together make up its antistress capabilities, are the major causes of its cardiac preventive action.[7] Antioxidant enzymes including iglutathione iperoxidase, isuperoxide idismutase, icatalase, icreatinine iphosphokinase, and ilactate idehydrogenase are all increased by it. Similar to vitamin E, a well-known antioxidant that protects against heart disease, it likewise suppresses lipid peroxidation.[8,9]

In a research by Thirunavukkarasu et al.[10], it was discovered that W. somnifera has qualities that increase energy in a heart that has been damaged by ischaemia-reperfusion, and it was also advised to take it as a dietary supplement for cardio protection. In a different investigation, cardioprotective and antioxidant effects of a polyherbal formulation comprising W. somnifera were seen in isoproterenol-induced ischemia rats.[11] In addition to its antioxidant properties, W. somnifera has also shown its ability to act as an adaptogen, which normalises physiological function by acting on the iHPA iaxis and the ineuroendocrine system. This reduces the alterations brought on by stress.[12] The proposed mechanism of iW. isomnifera extract in lowering cardiovascular alterations caused by CPT is explained by the herb's well-known antioxidant and cardio protecting properties.

V.CONCLUSION

Ashwagandha is an important medicinal plant, every part of this plant has been investigated as a source of valuable compounds, and due to its so many health benefits specially in diabetic mellitus patients, it is also considered as an adjuvant therapy for improving Autonomic dysfunctions which is common occurrence in cardiovascular Autonomic neuropathy in diabetes mellitus patients.

REFERENCES

[1]. Maser, R. E., Lenhard, M. J. and DeCherney, G. S. Cardiovascular autonomic neuropathy: the clinical significance of its determination. Endocrinologist 2000;10: 27–33 .
[2]. Schumer, M. P., Joyner, S. A. and Pfeifer, M. A Cardiovascular autonomic neuropathy testing in patients with diabetes. Diabetes Spectrum.1998;11:227–231.
[3]. Budhiraja RD, Sudhir SJ. Sci Ind Res.1987;42:488-91.
[4]. Glotter E, Kirson I, Abraham A, Lavie D.Tetrahedron.1973;29:1353-64.
[5]. Malhotra CL, Das PK, Dhalla NS, Prasad K. Studies on Withania ashwagandha, kaul III. The effect of total alkaloids on the cardiovascular system and respiration. Indian J Med Res. 1981;49:448-60.
[6]. Dhalla NS, Temsah RM, Netticadan T. Role of oxidative stress in cardiovascular diseases. J Hypertens. 2000;18(6):655-73.
[7]. Alam N, Hossain M, Khalil MI, Moniruzzaman M, Sulaiman SA, Gan SH, et al. Recent advances in elucidating the biological properties of Withania somnifera and its potential role in health benefits. Phytochem Rev. 2012;11:97-112.
[8]. Mohanty I, Arya DS, Dinda A, Talwar KK, Joshi S, Gupta SK. Mechanisms of cardioprotective effect of Withania somnifera in experimentally induced myocardial infarction. Basic Clin. Pharmacol. Toxicol. 2004;94:184-90.
[9]. Gupta SK, Mohanty I, Talwar KK, Dinda A, Joshi S, Bansal P, et al. Cardioprotection from ischemia and reperfusion injury by Withania somnifera: a hemodynamic, biochemical and histopathological assessment. Mol. Cell Biochem. 2004;260:39-47.
[10]. Thirunavukkarasu M, Penumathsa S, Juhasz B, Zhan L, Bagchi M, Yasmin T, et al. Enhanced cardiovascular function and energy level by a novel chromium (III)-supplement. Biofactors.2006;27:53-67.
[11]. Prince PSM, Selvaraju S, Devika PT, Vaithianathan. Cardioprotective effect of „Marutham" a polyherbal formulation on isoproterenol induced myocardial infarction in Wistar rats. Fitoterapia. 2008;79:433-8.
[12]. Sharma V, Sharma S, Pracheta, Paliwal R. Withania somnifera: a rejuvenating ayurvedic medicinal herb for the treatment of various human ailments. IJPRIF. 2011;3(1):187-92.