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CLINICAL STUDY OF AQUEOUS EXTRACT OF *ECLIPTA ALBA* IN MANAGEMENT OF ESSENTIAL HYPERTENSION

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ABSTRACT

Hypertension (HTN or HT) is also known as high blood pressure or arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is persistently elevated It is growing in incidence globally particularly in developing countries. It is an instrumental disease, so there is no description found directly in *Ayurvedic* classic. Hypertension is a *Tridoshaja Vyadhi* with predominance of *Vata Dosha. Vata* is a unique *dosha* which regulate and also responsible for the movement of other *dosha* (*Pitta* and *Kapha*). Moreover hypertension is multifactorial diseases, accordingly the treatment is diverse. Lots of drugs are already in use either alone or in combinations. Drugs once started usually continued for lifelong. Hence the research is still on to find a safe, cost effective and suitable drug for treatment of hypertension. For this aqueous extract of *Eclipta alba* was used results as a trial drug due to its known diuretic, hypocholesterolemic, anti-aggressive, analgesic actions. For the study 50 patients were selected from N.I.A. OPD and IPD and divided into two groups. Group A was given amlodipine 5 mgm O.D. and group B was given aqueous extract of *Eclipta alba* at dose 500 mgm B.D. for 30 days. Aqueous extract of *Eclipta alba* were found effective in reducing the systolic and diastolic blood pressure and on subjective parameters as compare to amlodipine. Aqueous extract of *Eclipta alba* shows more significant results in reduction of Sr. cholesterol ($p<0.01$), HDL ($p<0.05$) and VLDL ($p<0.05$) level as compare to amlodipine.

Keywords-*Eclipta alba*, Essential Hypertension, *Tridoshajavyadhi.*

INTRODUCTION

Hypertension (HTN or HT), also known as high blood pressure or arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is persistently elevated.[1,2] Hypertension is common disorder rising in incidence once established treatment is obligatory. It is growing in incidence globally particularly in developing countries.[3]A systematic review on the prevalence of HTN in India, for studies published between 1969 and July 2011, reported a range between 13.9 to 46.3% and 4.5 to 58.8% in urban and rural areas of India, respectively. [4]According to the WHO 2008 estimates, the prevalence of raised BP in Indians was 32.5% (33.2% in men and 31.7% in women).[5] Only about 25.6% of treated patients had their BP under control, in a multicenter study from India on aware-

ness, treatment, and adequacy of control of HTN .[6]A published literature reports regional variations in mortality and prevalence of CHD and stroke in India (south India has higher CHD mortality and eastern India has higher stroke rates).[7]Moreover hypertension is multifactorial diseases, accordindly the treatment is diverse. Lots of drugs are already in use either alone or in combinations. .Drugs once started usually continued for lifelong. Hence the research is still on to find a safe, cost effective and suitable drug for treatment of hypertension. Apart from conventional allopathic measures, there must be meticulous search for alternative treatment; therefore it is evident to look for natural options & switch on to safer indigenous system of medicine like natural herbs.

WHO (in 1980) has also recommended the evaluation of the effectiveness of plants in conditions where there are no safe modern drugs are available.

Due to wide spectrum of disease, much prevalence in the society and lack of effective medicine, the disease had been chosen for the study.

Chikitsa of any disease mainly of two types viz

- *Vyadhi Pratyanika*
- *Dosha Pratyanika*

But as Hypertension is a gift of modern era, its explanation in *Ayurvadic* classics is not available so *Vyadhi Pratyanika Chikitsa* is not found directly. The drug selected is aqueous extract of *Eclipta alba* for experimental and clinical research. Recently its diuretic and antihypertensive potentiality is claimed by folklore as[8]well as in *Ayurvedic* study which create renewed interest for scientific evaluation of the same.

AIM & OBJECTIVES

1. To study the etiopathogenesis of Essential Hypertension.
2. To study the efficacy of aqueous extract of *Eclipta alba* in management of Essential Hypertension in human beings.

MATERIALS & METHODS

Ethical Approval:

The present research work was approved by Institutional Ethical Committe(IEC) of National Institute of Ayurveda, Jaipur, vide letter No.10(5)/EC/2014/7219;dated 07.11.2014 before starting the clinical trial on patients of EHT.

Inclusion criteria:

1. Patients willing to sign the consent form for the clinical trial.
2. Patients belonging to either sex between the age group 30 to 60 years.
3. Patients who already diagnosed as E.H.T will be selected.
4. Patients having systolic B.P. upto 160 and diastolic B.P. upto 110 will be selected for the study and in any type of emergency condition patient will be treated in emergency.
5. Patients who will be fit for the clinical trial.

Exclusion criteria:

1. Renal diseases, Diabetic Mellitus.
2. Pregnancy induced hypertension.
3. Drugs like oral contraceptive pills, steroids.
4. Ventricular hypertrophy, secondary hypertension, coaractation of aorta.
5. Portal hypertension.
6. Renal artery stenosis induced hypertension.

Plan of Study:

50 patients were selected randomly from *Arogyashala* OPD & IPD, National Institute of Ayurveda, Jaipur. Total 50 patients of EHT were studied into two groups

Group-A: 25 well diagnosed patients of EHT were treated with modern medicine (Amlodipine) once a day under advise of modern consultant for 30 days (Each tablet of 5 mgm).

Group-B: 25 well diagnosed patients of EHT were treated with aqueous extract of *Eclipta alba* 500 mgm twice a day for 30 days.

Pathya-Apathya was advised to the patients of both the groups during the entire course of treatment

Follow up after every 7 days were taken for 45 days.

DRUGS & METHOD OF ITS PREPARATION-

Aqueous extract of *Eclipta alba* is used for the clinical study. Aqueous extract is used because it can dissolve a wide range of chemical substances. Extraction is done by hot percolation process or Soxhlet extraction.

CRITERIA FOR ASSESSMENT

A. Subjective Criteria

1. *Shirshool* (Headache)
2. *Bharama* (Giddiness)
3. *Klama* (Fatigue)
4. *Hrutspandan* (Palpitation)
5. *Swedhadhikyata (*Excessive sweating)
6. *Anidra* (Insomnia)

B. Objective criteria:

1. Assessment of change in Blood Pressure in supine position.
2. Heamatological Test: Hb%, TLC, DLC, ESR.
3. Biochemical Investigation:
   Renal Function Test (Blood urea, Sr. Creatinine),
   Blood sugar (Fasting),
   Lipid profile (Sr.Triglyceride, Sr.Cholesterol, HDL, LDL, VLDL.)
4. Urine analysis.
5. ECG (to exclude for LVH, prolonged QRS complex, T wave Elevation indicative of MI)
7. Chest X ray (to exclude the patient for cardiomegaly).

OBSERVATIONS

In the study out of total 17 patients (34%) belong to age group 41-50 and 13 patients (26%) belong to each age group 31-40 and 51-60. Out of total 68% patients were females. Majority 98% patients were married. Maximum 74% patients were Hindu. Out of total 94% were belong to urban area. Total 38% patients (maximum) belong to lower class. Maximum 31 patients (62%) were *Pitta Kapha prakriti* and 11 patients (22%) were *Vatta Pitta prakriti*. Out of total 31 patients (62%) were *Rajasik Prakriti*, 30 patients (60%) patients had *Vishamagni* and 19 patients (38%) were suffering from *Mandagni.* Maximum 35 patients (70%) had *Madhyam Satva* and maximum 27 patients (54%) had *Avara Satmya*. Maximum 25 patients (50%) were of *Kroora Kostha*. Out of total 23 patients (46%) had *Avara Vyayam Shakti*. Out of total 22 patients (44%) were addicted to tea, 13 patients (26%) were addicted to tobacco, 10 patients (20%) were addicted to alcohol and 5 patients (10%) were addicted to smoking. Out of total 17 patients (34%) had positive family history of Hypertension. Maximum 21 patients (42%) had positive history of taking allopathic medicine. Out of total 26 patients (52%) had moderate stress, 18 patients (36%) had severe stress and 6 patients (12%) had mild stress. Out of total 34 patients (68%) had complaint of Headache, 33 patients (66%) patients had complaint of palpitations,18 patients(36%) had complaint of excessive sweating, 28 patients (56%) had complaints of insomnia, 22 patients (44%) had complaint of giddiness,13 patients (26%) had complaint of fatigue. The majority of cases registered for the current trial belonged to lower class who includes 19 patients (38%), 16 patients (32%) were from upper lower class , 06 patients (12%) were from lower middle class, 5 patients (10%) from upper class and 4 patients(8%) were from upper middle class. Socioeconomic status is decided by the Kuppuswamy's socioeconomic status scale.

RESULTS:

All the results were calculated by using software: In stat graph pad 3. For nonparametric data Wilcoxon matched-pairs signed ranks test is used while for parametric data Paired't' Test is used and results calculated in each group. Paired't' Test was carried out at $P<0.05$, $P<0.001$, $P<0.0001$. For the inter group comparison of nonparametric variables we used Mann-Whitney test for statistical analysis & for parametric data we used Unpaired 't' Test.

Effect of therapy in subjective parameters-

Table 1: Showing Effect of Therapy in Subjective Parameters.

Variable	Group	Mean		Mean Diff.	% Relief	SD±	P	S
		BT	AT					
1.Headache								
A. Intensity of pain	Gr. A	3.1±0.7	2.1±0.5	1.2±0.2	36.21	1.12	<0.001	HS
	Gr. B	4.5±0.6	2.4±0.5	2±0.3	45.71	1.53	<0.0001	HS
B. Frequency of pain	Gr. A	1.6±0.2	1.1±0.18	0.5±0.1	32.35	0.67	<0.05	S
	Gr. B	1.6±0.19	0.66±0.13	0.91±0.16	57.90	0.82	<0.0001	HS
C. Duration of Pain	Gr. A	1.38±0.26	0.61±0.10	0.76±0.19	55.17	0.88	<0.01	HS
	Gr. B	1.9±0.25	0.70±0.15	1.2±0.2	63.01	0.93	<0.0001	HS
Giddiness	Gr. A	1.2±0.26	0.57±0.16	0.6±0.15	53.58	0.73	<0.01	HS
	Gr. B	1±0.26	0.41±0.1464	0.6±0.2	58.33	0.7755	<0.01	HS
Fatigue	Gr. A	1±0.24	0.67±0.16	0.38±0.10	36.35	0.49	<0.05	S
	Gr. B	2.1±0.2	1.16±0.20	0.87±0.16	42.85	0.79	<0.0001	HS
Palpitations	Gr. A	1.2±0.24	0.57±0.14	0.62±0.14	52.01	0.66	<0.01	HS
	Gr. B	1.54±0.28	0.70±0.18	0.83±0.2	54.04	0.86	<0.001	HS
Insomnia	Gr. A	1.38±0.21	0.57±0.14	0.80±0.11	58.61	0.51	<0.0001	HS
	Gr. B	0.87±0.20	0.29±0.11	0.58±0.14	66.66	0.71	<0.01	HS
Excessive sweating	Gr. A	0.38±0.17	0.23±0.11	0.14±0.78	37.50	0.35	>0.05	NS
	Gr. B	1.20±0.26	0.83±0.21	0.37±.1	31.04	0.49	<0.01	HS

(HS: Highly Significant S: Significant NS: Non Significant)

In group A highly significant results obtained in intensity of pain of headache (36.21%, P<0.001) and its duration (0.88%, P<0.01), giddiness (53.58, P<0.01), palpitation (52.01%, P=0.001), insomnia (58.61%, P<0.001). Significant result (36.35%, P<0.05) obtained in fatigue and frequency of pain of headache (32.35%,P<0.05). No any significant result obtained in parameter excessive sweating (P>0.05).

In group B highly significant results obtained in all parameters including headache-intensity of pain (45.71%, P<0.0001), frequency of pain (57.90%, P<0.0001), duration of pain (63.01%,P<0.0001). Giddiness (58.33%, P<0.01), fatigue (42.85%, P<0.0001), palpitation (54.04%, P<0.0001), insomnia (66.66%, P<0.01), excessive sweating (31.04%, P<0.01).

Table 2: Intergroup Comparison of Group A & Group B for Subjective Parameters

Variable		Groups	(AT) Mean	SD±	SE±	P	S
1.Headachae							
A	**Intensity of Pain**	A	1.190	1.123	0.2451	>0.05	**NS**
		B	2.000	1.532	0.3128		
B	**Frequency of Pain**	A	0.5238	0.6796	0.1483	>0.05	**NS**
		B	0.9167	0.8297	0.1694		
C	**Duration of Pain**	A	0.7619	0.8891	0.1940	>0.05	**NS**
		B	1.208	0.9315	0.1901		
2.Giddiness		A	0.6667	0.7303	0.1594	>0.05	**NS**

	B	0.5833	0.7755	0.1583		
3.Fatigue	A	0.3810	0.4976	0.1086	<0.05	**S**
	B	0.8750	0.7976	0.1628		
4.Palpitation	A	0.6190	0.6690	0.1460	>0.05	**NS**
	B	0.8333	0.8681	0.1772		
5.Insomnia	A	0.8095	0.5118	0.1117	>0.05	**NS**
	B	0.5833	0.7173	0.1464		
6.Excessive Sweating	A	0.1429	0.3586	0.0782	>0.05	**NS**
	B	0.3750	0.4945	0.1009		

(HS: Highly Significant S: Significant NS: Non Significant)

Showing intergroup comparison non significant results obtained with P value >0.05 in all subjective parameters except Fatigue (P<0.05) showing better result in group B.

Table 3: Showing Effect of Therapy on Objective Parameters (Paired't' Test)

Variable	**Group**	**Mean**		**MeanDiff.**	**% Relief**	**SD±**	**T**	**P**	**S**
		BT	**AT**						
Systolic BP	Gr.A	160.57±2.273	144.9±2.2	15.6±1.1	9.73	4.84	14.78	<0.0001	HS
	Gr.B	147±2.2	130.9±1.6	16.1±1.92	10.94	9.37	8.4	<0.0001	HS
Diastolic BP	Gr.A	101.2±1.57	83.04±1.1	18.2±1.2	17.96	5.58	14.933	<0.0001	HS
	Gr.B	100.83±1.37	86.75±1.3	14.08±2.07	13.96	10.16	6.79	<0.0001	HS

Hb% (gm %)	Gr. A	14.49±0.29	13.3±0.38	0.15±0.38	7.95	1.75	3.02	<0.01	HS
	Gr. B	13.52±0.34	13.61±0.35	0.09±0.14	0.7	0.69	0.68	>0.05	NS
TLC	Gr. A	8195.2±0.28	7614.3±223	580.95±213.77	7.08	979.6	2.718	<0.05	S
	Gr. B	7445.8±336.06	6595.8±308.1	850	14.41	219.11	3.879	<0.001	HS
Neutrophils	Gr.A	57.76±1.56	52.57±1.7	5.2±1.2	13.52	5.5	4.28	<0.001	HS
	Gr.B	61.87±2.3	59.54±2.3	2.3±1.1	3.77	5.43	2.10	<0.05	S
ESR	Gr. A	20.524±2.1	11.9±1.37	8.62±1.8	41.99	8.42	4.689	<0.001	HS
	Gr. B	17.37±3.1	12.88±2	4.5±1.59	25.89	7.802	2.82	<0.01	HS
Sr.Creatinine	Gr.A	0.95±0.03	0.75±0.04	0.2±0.59	21.69	0.1099	8.342	<0.001	HS
	Gr.B	0.8167±0.056	0.67±0.06	0.15±0.06	18.36	0.2874	2.557	<0.05	S
Blood Urea	Gr.A	29.81±1.17	26.619±1.116	3.192±0.5881	10.7	4.97	4.39	<0.001	HS
	Gr.B	31.33±1.39	27.71±1.45	3.63±1.59	11.56	7.806	2.275	<0.05	S
SGOT	Gr.A	41.28±1.8	36.81±1.69	4.47±0.56	10.84	2.6	7.88	<0.0001	HS
	Gr.B	41.2±1.9	37.75±2	3.46±2.1	8.39	10.33	1.64	>0.05	NS
SGPT	Gr.A	36.09±2.4	35.2±2.5	0.90±2.2	2.51	10.28	0.40	>0.05	NS
	Gr.B	31.08±1.93	28.67±1.58	2.41±1.48	7.77	7.28	1.62	>0.05	NS
Sr.Choleseterol	Gr.A	166±3.45	159.6±4.37	6.38±2.1	3.84	9.53	3.07	<0.01	HS
	Gr.B	180.21±3.67	162.7±3.91	17.5±3.1	9.7	15.08	5.68	<0.0001	HS
Sr. Triglyceride	Gr.A	166.3±7.68	158.2±7.4	8.05±3.16	4.84	14.47	2.55	<0.01	HS
	Gr.B	144.2±5.3	128.4±5.2	15.8±3.6	10.97	17.54	4.421	<0.01	HS
HDL	Gr.A	54.29±3.38	57.09±3.23	2.810±1.33	5.18	6.12	2.14	<0.05	S
	Gr.B	47.87±1	53.6±1.88	7.75±1.28	16.19	6.278	6.048	<0.0001	HS
LDL	Gr.A	72.89±4.26	69.48±4.1	3.4±1.5	4.7	6.83	2.29	<0.05	S

	Gr.B	102.4±4.43	93.6±4.6	8.78±2.08	8.58	10.21	4.21	<0.001	HS
VLDL	Gr.A	35.41±3.2	33.33±3.13	2.07±0.5	8.84	2.39	3.97	<0.001	HS
	Gr.B	28.57±0.89	25.18±1.08	3.38±0.98	11.84	4.81	3.44	<0.001	HS
Pulse Rate	Gr.A	80.66±1.3	77.9±1.1	2.7±0.85	3.42	3.92	3.22	<0.01	HS
	Gr.B	80.9±1.4	80.6±1.38	80.53±1.38	99.5	6.76	0.16	>0.05	NS
Respiratory	Gr.A	16.76±0.2	15.66±0.2	1.09±0.23	6.53	1.09	4.6	<0.001	HS
Rate	Gr.B	17.12±0.21	16.25±0.3	0.87±0.3	5.1	1.32	3.22	<0.01	HS
Mean Arterial	Gr.A	120.7±1.6	103.6±1.3	17±0.94	14.09	4.32	18.02	<0.0001	HS
Pressure	Gr.B	118±2.27	103.3±1.97	14.75±1.79	12.5	8.79	8.217	<0.0001	HS

(Hb-Haemoglobin **TLC-**Total Leucocytes Count; **ESR-**Erythrocyte Sedimentation Rate.

In group A among objective parameters highly significant result obtained in SBP (9.73%, P<0.0001) and DBS (17.96%, <0.0001), MAP (18.02%, P<0.0001). Also the highly significant result obtained in Sr. Cholesterol (3.84%, P<0.01), Sr.TG (4.84%, P<0.01)), VLDL (8.84%, P<0.0001), and significant result obtained in HDL(5.18,P<0.05), LDL (4.7%, P<0.05).

In group B among subjective parameters highly significant result obtained in SBP (10.94%, P<0.0001), and DBP (13.96%, P<0.0001), MAP (14.09%, 0.0001). Also the highly significant result obtained in Sr. Cholesterol (9.7%, P<0.0001), Sr.TG (10.97%, P<0.01), HDL (16.19%, P<0.0001) LDL (8.58%, P<0.001), VLDL (11.84%,P<0.001).

Table 4: Intergroup Comparison of Group A & Group B for Objective parameters

Variable	Groups	(AT) Mean	SD±	SE±	t value	P	S
Hb%	A	313.14	1440.5	314.34	0.9959	0.3312	NS
	B	0.0958	0.6925	0.1414		>0.05	
TLC	A	580.95	979.6	213.77		0.3844	
	B	850.95	1073.4	219.11	0.8789	>0.05	NS
Neutrophil	A	5.190	5.564	1.214	1.737	0.0899	NS
	B	2.333	5.435	1.109		>0.05	
ESR	A	8.619	8.423	1.838	1.694	0.0979	
	B	4.500	7.802	1.593		>0.05	NS
Sr. Creatinine	A	0.1524	0.2639	0.0576	0.0289	0.9770	
	B	0.1500	0.2874	0.0586		>0.05	NS
Blood Urea	A	3.190	2.695	0.5881	0.2558	0.7999	
	B	3.625	7.806	1.593		>0.05	NS
SGOT	A	4.476	2.600	0.5674	0.4662	0.6450	
	B	3.458	10.329	2.108		>0.05	NS
SGPT	A	0.9048	10.276	2.242	0.5620	0.5777	
	B	2.417	7.283	1.487		>0.05	NS
Sr. Cholesterol	A	6.381	9.526	2.079	2.907	0.0058	HS
	B	17.50	15.08	3.079		<0.01	
	A	8.048	14.476	3.159	1.630	0.1105	
Sr. Triglyceride	B	15.833	17.547	3.582		>0.05	NS
HDL	A	2.810	6.121	1.336	2.669	0.0108	S
	B	7.750	6.278	1.281		<0.05	

LDL	A	3.419	6.828	1.490	2.093	0.0472	S
	B	8.783	10.212	2.085		<0.05	
VLDL	A	2.076	2.399	0.5234	1.175	0.2483	NS
	B	3.383	4.811	0.9820		>0.05	
Pulse Rate	A	2.762	3.923	0.8561	1.223	0.2304	NS
	B	0.333	8.781	1.792		>0.05	
Respiratory Rate	A	1.095	1.091	0.2381	0.6102	0.5450	NS
	B	0.875	1.329	0.2713		>0.05	
Mean Arterial Pressure	A	14.105	10.656	2.325	0.9094	0.3683	NS
	B	11.165	10.997	2.245		>0.05	

In intergroup comparison among objective parameters highly significant results obtained in Sr. Cholesterol(P<0.01), significant results in HDL and LDL with P value<0.05 showing better result in group B. Remaining all objective parameters shows non-significant results with P value>0.0.5.

DISCUSSION

Hypertension (*vyanabalavaishamya*) is a *tridoshaja vyadhi* with predominance of *vata dosha. Vata* is a unique *dosha* which regulate and also responsible for the movement of other *dosha* (*pitta* and *kapha*). In the pathological state it has two different pathways of vitiation viz.by *dhatukshayajanya* and by *avarnajanya.* As per *Charaka,* [9]*vaisamya* means *vriddhi* or *hrasa* i.e. either increase or decrease. Therefore *vyanabalavaisamya* may either be considered as increased function or decreased function of *vyana vayu*. But it is also mentioned that the decreased *dosha* is not able to manifest even its own symptoms.[10] Hence in the present study hyperfunction (*vriddhi*) of *vyana vata* is considered under *vyanabalavaisamya* which produce increased force on the wall of the channels (blood vessels) to produce hypertension.

B.P is the result of cardiac output and peripheral resistance. Cardiac output depends on blood volume and cardiac factors like heart rate and contractility. More blood volume leads to increased cardiac output. A pilot study shows significant diuretic action of *Eclipta alba*. According to study it decreased potassium and increased sodium urinary losses with concomitant increase in serum potassium and reduction in serum sodium.[11] *Eclipta alba* has nootropic action[12] Nootropics also called smart drugs and cognitive enhancers are drugs, supplements, or other substances that improve cognitive function, particularly executive functions, memory, creativity, or motivation, in individuals. [13] So it has relaxant effect on C.N.S. So it reduces the H.R. and decrease the B.P. Coumarin compounds present in *Eclipta alba* has Antinociceptive action. [14]Nociception is the stimulus response process involving the stimulation of peripheral pain carrying nerve fibres (e.g. C-fibre, A-delta fibre) and the transmission of impulses along peripheral nerves of C.N.S. where the stimulus is perceived as pain.[15]So antinociceptive are the drugs which reduce the pain sensation. It means it increase the pain tolerating power of a person and helpful in reducing stress due to painful stimuli. Thus help in reducing EHT. Anti-aggressive action of *Eclipta alba* is shown by an experimental study. It is related to anxiety reducing actions. Bioactive is currently unknown. It appears to be as anti-aggressive as Diazepam at 1mg/kg in rats. [16]As majorty factor responsible for EHT is stress in today scenario. So the drug acts by reducing this factor. There are neural factors constrictor (α adrenergic) and dilator (β adrenergic) type. These factors governed by autonomic nervous system. *Eclipta alba* has neuroprotective actions with improvement in oxidative biomarkers in the brain. *Eclipta alba* has hypocholesterolemic effect. It

reduce cholesterol and Sr. triglyceride level in human. Hypercholesteremia favours atherosclerotic changes which further increase peripheral resistance and B.P. *Eclipta alba shown* to have alpha glucosidase and aldose reductase inhibitory activity. Aldose reductase enzyme is known to cause vascular injury and promote atherosclerosis especially in diabetic patients. [17]Aldose reductase involve in vascular smooth muscle cell growth and lesion formation after arterial injury. [18]Abnormal proliferation of vascular smooth muscle cells (VSMCs) ia an important feature of atherosclerosis, restenosis and hypertension. Hypertensive effect of oxidative stress is mostly due to endothelial dysfunction resulting from disturbance of vasodilator systems, particularly degradations of NO by oxygen free radicals. [19]

Studies demonstrate that hypertension may develop as a result of increased reactive oxygen species and that a variety of antioxidant therapies ameliorate hypertension. [20] Free radical scavenging activity of *Eclipta alba* have also been reported. [21]

CONCLUSION

Following conclusions can be drawn from current research project-

- In *Ayurvedic* texts, there is no straight reference of Essential Hypertension. But *Acharya* has described *Hridaya* and process of *Rasa-Rakta vikshepa* by *Vyana vayu* which is very closely related to the circulatory system in modern science.
- Hypertension (*Vyanabala Vaishamya*) is a *Tridoshaja vyadhi* with predominance of *Vata Dosha.*
- Aqueous extract of *Eclipta alba* were found effective in reducing the systolic and diastolic blood pressure in clinical trial. No adverse effects of the study drugs were observed during the study.
- The clinical study suggest that aqueous extract of *Eclipta alba* shows more significant results in reduction of Sr. Cholesterol, HDL and VLDL level as compare to Amlodipine.
- The clinical study suggest that at a significant dose Aqueous extract of *Eclipta alba* shows more percentage relief in reduction of Diastolic B.P. as compare to Systolic B.P. It shows that the drug has more action in reduction of peripheral resistance as compare to C.O.
- The study shows that recurrence of diseases occur after stopping of trial medicine.

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