

## A clinical study of *Chirabilva ghanavati* in Hyperlipidemia

### Research Article

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### Abstract

Hyperlipidaemia is a general term for elevated concentrations of any or all of the lipids in the plasma, including hyperlipoproteinemia, hypercholesterolemia etc. Hyperlipidaemia is concerned as the cause for coronary heart diseases and atherosclerosis which results from slow but sure deposition of lipids in the arteries is a chief cause of mortality worldwide. Aim of this study is to evaluate antihyperlipidaemic activity of *Chirabilva Ghanavati* prepared from bark and heart wood of *Chirabilva (Holoptelia integrifolia (Roxb.) Planch.)*. The patients suffering from Hyperlipidaemia and its related disorders like non-insulin dependent diabetes etc. were selected randomly and divided into two groups, each group contains 15 patients. The patients of group A were advised to take *Chirabilva Ghanavati* prepared from stem bark. The patients of group B were advised to take *Chirabilva Ghanavati* prepared from heart wood. The overall result showed that *Chirabilva Ghanavati* prepared from the stem bark was more effective than *Chirabilva Ghanavati* prepared from the heart wood in Hyperlipidaemia.

**Keywords:** Hyperlipidaemia, Hyperlipoproteinemia, Hypercholesterolemia, *Chirabilva Ghanavati*, Atherosclerosis, Coronary heart diseases.

### Introduction

*Ayurveda* descended on the earth more than three millenniums ago, with the great tapas, made by seers like *Bharadvaja* for the welfare of the mankind.

(1) The main utility of *Ayurveda* is-

- To maintain the health of the healthy individual and
- To cure the disease of a patient (2)

For the maintenance of the health of a healthy individual, there are many things described in *Ayurveda* such as *Dinacharya*, *Ritucharya*, Quantitative dietetics, Qualitative dietetics, *Swasthavritta*, *Sadavritta* etc. If a healthy individual fails to follow these things, then he may suffer from several diseases as in the case of *Medovridhi*.

Absence of physical activity, sleeping during day and intake of foods which increase *Kapha*, make the end product of digestion (abnormally) sweet which in turn causes increase of *Medas* (fats). This increased *Medas* obstructs the nutrient channels of remaining tissues depriving them of nutrition. (3) Fat accumulated in large quantity in the body leads to *Abaddha Medovridhi* or Hyperlipidaemia.

Today is the era of modernization and fast life. Everybody is busy and leading a stressful life. Consumption of fast foods having high calorific value

is also increasing. People have every comfort of living and they are not doing any kind of physical activity and so the body fats along with cholesterol are increasing in their body, which invites the disorders like Hypertension, Heart diseases and Hyperlipidaemia. (4)

The industrialization, stress during the work, dietary habits, lack of exercise and intake of various varieties of junk food among the daily diet e.g. fast food, frozen fruits, increased amount of soft drinks and beverages, canned foods results into the disturbance of *Agni* or metabolism and ultimately leads to clinical entity known as Hyperlipidaemia. (4)

Hyperlipidaemia is a general term for elevated concentrations of any or all of the lipids in the plasma, including hyperlipoproteinemia, hypercholesterolemia, etc. (5) Hyperlipidaemia is concerned as the cause for coronary heart diseases and atherosclerosis which results from slow but sure deposition of lipids in the arteries is a chief cause of mortality worldwide. (6)

Coronary Heart Disease (CHD) is the number one killer among the diseases and it accounts for 37% of adult deaths in the US every year. (7) Nikolai Anichkov in 1912 discovered the role of cholesterol in CHD, currently the world's most deadly disease. (8) CHD is the commonest cause of death in the UK. Average level of cholesterol is 12% higher in the UK population than in the USA and 80% of UK adults have a total cholesterol level above 200mg/dl. In India, persons suffering from the CHD are doubled in the last 20 years. (9) In South India, CHD incidences are 7.4% in rural area and 13.9% in urban area, which is higher than North India (Rural- 3% and urban 9.7%). (10) Mortality from cardiovascular disorders in India is 430/100000 in both sexes and in males it is 460 whereas in females it accounts for 400/100000 deaths per year. (11) The

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mean cholesterol in urban India is 190mg/dl whereas in rural area it is 150mg/dl. (12) Raised Cholesterol (>220 mg/dl) is prevalent in 60% population of 50-59 years age group and 55% population in 60-100 years age group in females in India whereas in males it is prevalent in 45% individuals of 40-49 years age group. (13) From point of view of High-density lipoproteins (HDL), 28.2% males and 12.9% females have HDL below 1 mmol/L. (14) Punjab state has the highest population suffering from heart disorders including ischemic heart disease (IHD) and Hypertension (HT).

### Aims and Objectives

To evaluate antihyperlipidaemic activity of *Chirabilva Ghanavati* prepared from bark and heart wood of *Chirabilva (Holoptelia integrifolia)* (Roxb.) Planch.).

### Materials and Methods

#### Selection of Patients

- Persons suffering from dyspnoea on exertion, weight gain, obesity, diabetes mellitus and hypertension were screened for Hyperlipidaemia.
- As the hyperlipidemic state is leading to many of the above said conditions, such patients were selected for the experimental trial.
- The cases were registered from the O.P.D. of the S.V. Ayurvedic College/ Hospital and were selected for the study.

#### Preparation of Medicine

##### Collection of drug

The stem bark and heart wood of the drug *Chirabilva* was collected from the natural sources in and around Tirupati. The bark and heart wood were then thoroughly cleaned, cut into pieces, dried and powdered.

##### Preparation of *Kashaya*

In order to prepare medicine, first *Kashaya* was made. The ratio of drug and water was 1: 16. The powdered bark and heart wood were then weighed and 16 times water was added separately to them and was boiled till it got reduced to  $\frac{1}{4}$ <sup>th</sup>. The filtered part, known as *Kashaya*, was prepared from both the part separately.

Weight of the drug (Heart wood or bark) - 16 kg

Water - 256 litres

Reduced to  $\frac{1}{4}$ <sup>th</sup> i.e. - 64 litres

##### Preparation of *Rasakriya*

Thus the obtained *Kashaya* was filtered through a cloth and then it was made into *Rasakriya*.

According to the principle,

##### *Kwathadinampunah pakatghantvamsararasakriya.* (15)

The *Kashaya* was again boiled and after it attained a semisolid consistency, it was further heated and after it got dried it was scraped out of the boiler.

### Preparation of granules

The obtained material was put inside the granule making machine and granules of the scraped material was obtained.

### Preparation of tablets

- Talc was added to it and further it was put into tablet making machine and tablets weighing 500mg were prepared.
- The said procedure was conducted at Srinivasa Ayurveda Pharmacy, Srinivasa Mangapuram, Tirupati.
- The above procedure was undertaken to avoid difficulty in administration of the drug to patients on OP basis.
- The patients were given a packet of medicine with 60 tablets in it.

### Rationality of selecting the drug:

- *Acharya Charak* has mentioned under *Lekhaniya Mahakashaya*. (16)
- Easily available.
- Cheap
- No previous work was found on its heart wood.
- Most of the previous works are done on bark and leaves as an anti-inflammatory, analgesic, on piles, on diabetes etc..
- Modern anti-hyperlipidaemics like statins are found to have many adverse reactions;

Hence it is the need of the hour to find an alternative drug in other systems of medicine. So in the present study *Chirabilva Ghanavati* was taken as a test drug in Hyperlipidemia.

### Inclusion criteria

Patients suffering from Hyperlipidaemia and its related disorders like non-insulin dependent diabetes in the age group of 30-60 years.

### Exclusion criteria

- Patients below 30 years and above 60 years of age.
- Patients suffering from Insulin-Dependent Diabetes Mellitus (I.D.D.M.), severe diabetes mellitus with complications, malignant disorders and renal disorders.
- Patients who have a previous history of cardiac or cerebral stroke and also in patients who underwent by-pass surgery.

### Pathological investigations

Following investigations will be carried out before and after treatment.

- Hematological investigations – Hemoglobin (Hb), Total Leukocyte Count (TLC), Differential Leukocyte Count (DLC), Erythrocyte Sedimentation Rate (ESR).
- Urine analysis – Routine and Microscopic.
- Biochemical examinations - Post-Prandial Blood Sugar (PPBS), Fasting Blood Sugar (FBS), Lipid profile.

### Diagnostic criteria

Patients were diagnosed on the basis of Lipid Profile. Any one or more of the following criteria were selected.

- Serum cholesterol (201 mg/dl or more)
- Serum Triglycerides (151 mg/dl or more)
- High-density lipoproteins (HDL) <35 mg/dl

### Grouping

The patients suffering from Hyperlipidaemia and its related disorders were selected randomly and divided into two groups.

**1. Group –A:** The patients of group A were advised to take *Chirabilva Ghanavati* prepared from stem bark

**2. Group-B:** The patients of group B were advised to take *Chirabilva Ghanavati* prepared from heart wood.

### Follow Up:

After completion of the treatment, the patients of both the groups have been examined during follow ups at the interval of two weeks.

### Duration of treatment

The course of the treatment was fixed as 45 days. The patients were instructed to avoid diet which can increase fat like oily food, butter, eggs, meat etc. Preliminary data was collected before treatment.

### Dose

The patients were given 4 tablets (each tablet weighing 500 mg) per day, 2 tablets in the morning and 2 tablets in the evening with water.

### Plan of data analysis

The data according to parameters (lipid profile) were validated and subjected for statistical evaluation and significance of result is mentioned according to ‘P’ value. The overall result is mentioned according to percentage of relief and relief in number of parameters. If all five parameters comes within normal range, the

result is considered as ‘Completely relieved’; if four parameters comes within normal range, the result is considered as ‘Markedly relieved’; if three parameters comes within normal range, the result is considered as ‘Moderately relieved’; if two or only one parameters become within normal range, the result is considered as ‘Mildly relieved’ and if no parameter come within normal range, the result is considered as ‘Unchanged’. The normal values of parameters are given below-

**Table No. 1: Normal values of lipid profile [17]**

#### Total Cholesterol

- < 200 → Desirable
- 200-239 → Borderline
- ≥240 → High

#### LDL

- < 100 →Optimal
- 100-129 → Near optimal
- 130-159 → Borderline
- 160-189→ High
- ≥ 190 → Very High

#### VLDL

- <32→ Desirable

#### HDL

- < 40 → Low
- ≥ 60 → High

#### Serum Triglycerides

- < 150 → normal
- 150-199 → Borderline
- 200-499 → High
- ≥ 500 → Very High

### Observations and results:

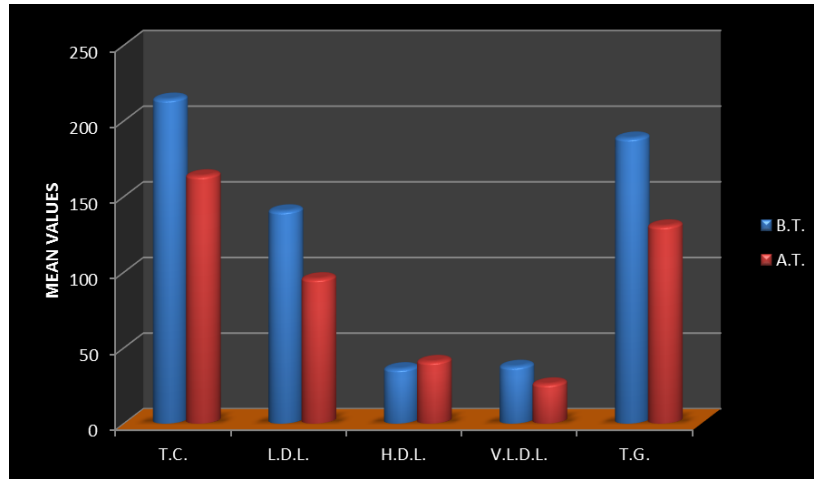
**Table No. 2: EFFECT OF MEDICINE ON LIPID PROFILE OF GROUP A PATIENTS**

Parameters	Mean (mg/dl)		Mean diff.	S.D.		S.E.		‘t’	P	Significance
	B.T.	A.T.		B.T.	A.T.	B.T.	A.T.			
T.C.	214.32	163.64	50.68	31.37	11.06	8.10	2.856	6.6309	< 0.0001	Extremely significant
L.D.L.	140.47	95.60	44.87	37.84	10.62	9.77	2.74	5.1096	0.0002	Extremely significant
H.D.L.	36.13	40.94	-5.80	2.70	5.05	0.70	1.26	5.9079	<0.0001	Extremely significant
V.L.D.L	37.72	26.107	11.61	9.28	3.78	2.39	0.97	5.3365	0.0001	Extremely significant
T.G.	188.60	130.53	58.07	46.42	18.90	11.99	4.88	5.3365	0.0001	Extremely significant

(n=15, df=14)

The P value of all the parameters were below 0.05, hence the results of treatment were very significant.

**Graph No. 1: EFFECT OF MEDICINE ON LIPID PROFILE OF GROUP A PATIENTS**



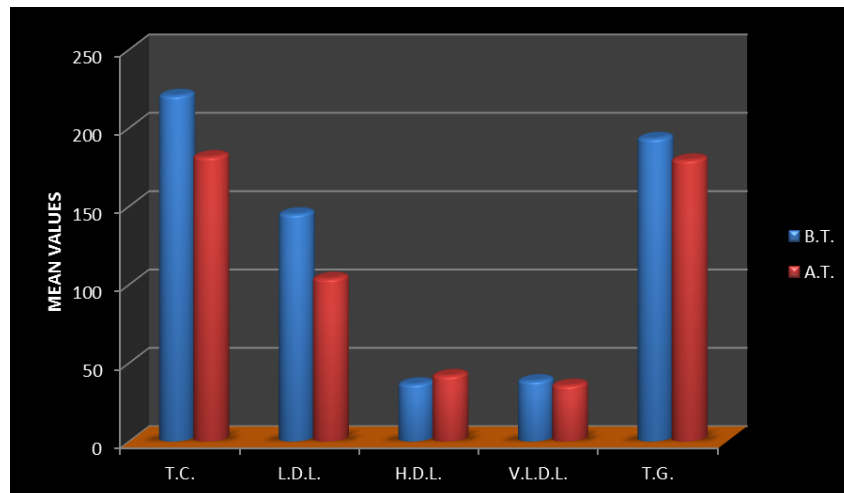
**TABLE No. 3: EFFECT OF MEDICINE ON LIPID PROFILE OF GROUP B PATIENTS**

Parameters	Mean (mg/dl)		Mean diff.	S.D.		S.E.		‘t’	P	Significance
	B.T.	A.T.		B.T.	A.T.	B.T.	A.T.			
T.C.	220.73	181.60	39.13	28.60	13.46	7.38	3.47	5.7928	< 0.0001	Extremely significant
L.D.L.	145.13	103.93	41.20	31.73	10.89	8.19	2.81	4.7567	< 0.0001	Extremely significant
H.D.L.	36.60	41.93	-5.33	2.41	5.85	0.62	1.51	3.2644	0.0029	Very significant
V.L.D.L.	38.60	35.73	2.87	4.56	2.63	1.18	0.68	2.9693	0.0102	Significant
T.G.	193.27	179.53	13.73	23.25	12.88	6.00	3.33	2.7596	0.0154	Significant

(n=15, df=14)

The P value of all the parameters were below 0.05, hence the results of treatment were very significant.

**Graph No. 2: EFFECT OF MEDICINE ON LIPID PROFILE OF GROUP B PATIENTS**

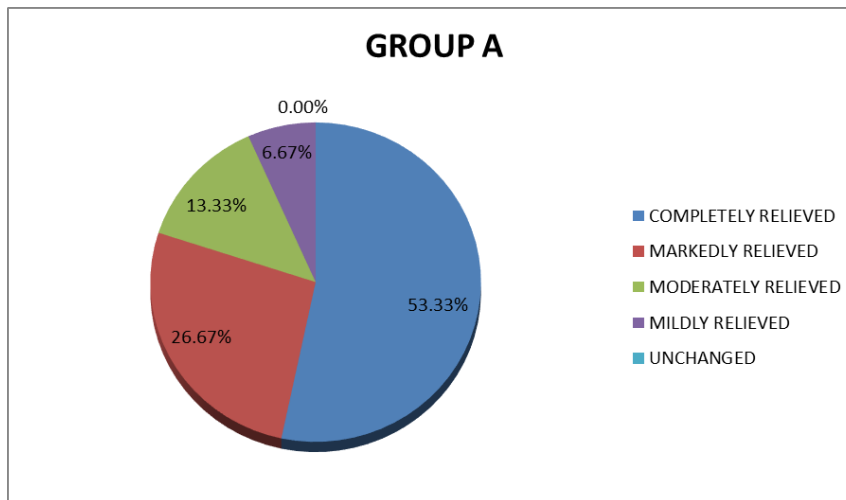


**OVERALL RESULT OF STUDY-**

**TABLE No. 4: EFFECT OF MEDICINE ON GROUP ‘A’ PATIENTS**

Result	No. of Patients	% of patients
Completely Relieved	8	53.33
Markedly Relieved	4	26.67
Moderately Relieved	2	13.33
Mildly Relieved	1	06.67
Unchanged	0	0

**Graph No. 3: EFFECT OF MEDICINE ON GROUP ‘A’ PATIENTS**

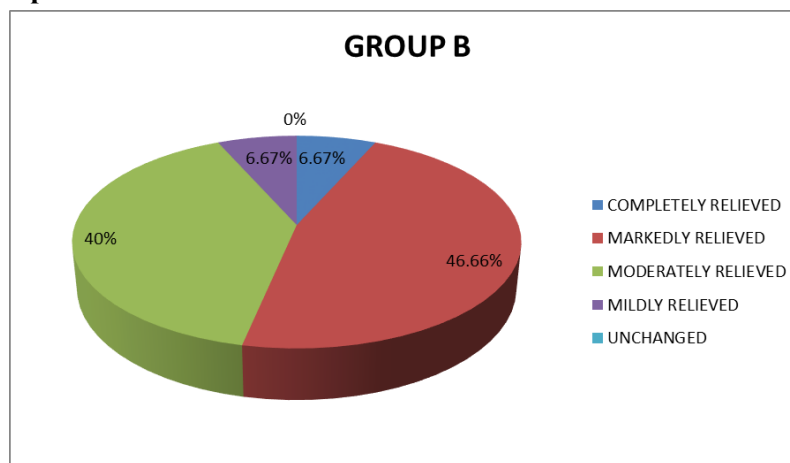


Out of 15 patients 53.33 % patients got completely relief, 26.67 % patients got marked relief, 13.33 % patients got moderate relief and 06.67 % patients got mild relief.

**TABLE No. 5: EFFECT OF MEDICINE ON GROUP ‘B’ PATIENTS**

Result	No. of Patients	% of patients
Completely Relieved	1	06.67
Markedly Relieved	7	46.66
Moderately Relieved	6	40.00
Mildly Relieved	1	06.67
Unchanged	0	0

**Graph No. 4: EFFECT OF MEDICINE ON GROUP ‘B’ PATIENTS**



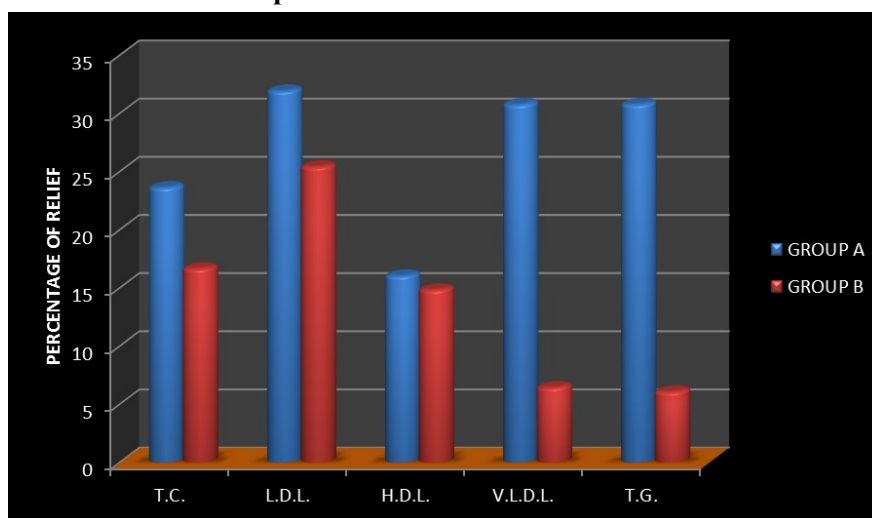
Out of 15 patients 06.67% patients got completely relief, 46.66 % patients got marked relief, 40.00% patients got moderate relief and 06.67 % patients got mild relief.

**OVERALL EFFECT OF MEDICINE ON GROUP ‘A’ & GROUP ‘B’ PATIENTS  
TABLE No. 6: OVER ALL EFFECT**

S.N.	CHANGE IN PARAMETERS*	% OF RELIEF	
		GROUP A	GROUP B
1.	TOTAL CHOLESTROL	23.64	16.66
2.	LDL	31.95	25.42
3.	HDL	-16.05	-14.84
4.	VLDL	30.78	06.45
5.	TRIGLYCERIDES	30.79	06.07

(\* Negative sign in % of relief for HDL shows percentage of increase)

**Graph No. 5: OVER ALL EFFECT**



The overall result showed that the medicine used for group A patients was more effective than the medicine used for group B patients.

**Discussion**

**Effect of Therapies:**

The effect of therapy on group A patients shows that 53.33% patients got completely relief, 26.67 % patients got marked relief, 13.33% patients got moderate relief and 06.67 % patients got mild relief and the effect of therapy on group B patients shows that 06.67% patients got completely relief, 46.66 % patients got marked relief, 40.00% patients got moderate relief and 06.67 % patients got mild relief.

**Overall effect of medicine:**

The total cholesterol level of group A patients was reduced by 23.64 % while of group B patients was reduced by 16.66 %. The L.D.L. level of group A patients was reduced by 31.95 % while of group B patients was reduced by 25.42 %. The H.D.L. level of group A patients was increased by 16.05 % while of group B patients was increased by 14.84 %. The V.L.D.L. level of group A patients was reduced by 30.78 % while of group B patients was reduced by 06.45%. The triglycerides level of group A patients was reduced by 30.79 % while of group B patients was reduced by 06.07%. All the results were statistically significant (P<0.05).

**Probable mode of action of drug:**

*Chirabilva* is the drug having *Tikta*, *Kashaya*

*Rasa; Laghu, Ruksha Guna; Usna Virya; and Katu Vipaka*. It acts on *Meda* by its *Lekhana, Medohara Karma*. Due to its *Katu, Tikta Rasa* it acts as *Meda Upashoshaka*. *Tikta Rasa* also acts as *Upashoshaka of Vasa, Majja* etc. Due to *Laghu and Ruksha Gunas*, it is reducing the excess of *Abaddha Medas* i.e. freely flowing fats in the circulation.

**Conclusion**

*Chirabilva*, one of the important drugs of *Lekhaniya Dashemani*, was taken as a trial drug to evaluate its anti hyperlipidaemic activity.

Almost all *Acharyas* have mentioned *Katu, Tikta Rasa; Laghu, Tikshna Guna; Usna Virya; Katu Vipaka* for *Chirabilva*.

The patients of group A were treated with *Chirabilva Ghanavati* prepared from the stem bark and the patients of group B were treated with *Chirabilva Ghanavati* prepared from the heart wood.

On clinical examination it was found that out of 15 patients (Group A) 53.33% patients got complete relief, 26.67 % patients got marked relief, 13.33% patients are moderate relief and 06.67 % patients got mild relief after taking *Ghanavati* prepared from the stem bark.

Out of 15 patients (Group B) 06.67% patients got complete relief, 46.66 % patients got marked relief, 40.00% patients got moderate relief and 06.67 %

patients got mild relief after taking *Ghanavati* prepared from the heart wood.

The overall result showed that *Chirabilva Ghanavati* prepared from the stem bark was more effective than *Chirabilva Ghanavati* prepared from the heart wood in Hyperlipidaemia.

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