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Original Research Article

Study of efficacy of Giloy(Tinospora cordifolia) on different Physiological & Biochemical parameters of Metabolic Syndrome

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Abstract: Tinospora cordifolia is a deciduous climbing shrub described as 'the one who protects the body against diseases'. Potential medicinal properties reported by scientific research include anti-diabetic, anti-pyretic, antispasmodic, anti-inflammatory, anti-arthritic, antioxidant, anti- allergic, anti-stress, hepato-protective, anti-malarial, immune-modulatory and anti-neoplastic activity. In our study one hundred patients of metabolic syndrome were randomized to receive conventional treatment with or without Tinospora cordifolia. In our study we found that TC therapy resulted in good glycemic control and lipid profile also improves significantly in study group after three month of TC therapy. Metabolic syndrome consists of a constellation of metabolic abnormalities that confer increased risk of cardiovascular disease and Diabetes Mellitus. The major features of the Metabolic Syndrome includes: Central obesity, hyper triglyceridemia, Low HDL cholesterol, Hyperglycemia and Hypertension. The Aim of this study to investigating the effect of Tinospora cordifolia on the risk factors in metabolic syndrome patients along with.
Keywords: Tinospora cordifolia anti-diabetic, anti-oxidant, metabolic syndrome, immuno modulator lipid profile.

INTRODUCTION

The metabolic syndrome (Syndrome X, Insulin resistance syndrome) consists of a constellation of metabolic abnormalities that confer increased risk of cardiovascular disease (CVD) and diabetes mellitus (DM) [1]. Metabolic syndrome is also known as metabolic syndrome X, cardio metabolic syndrome, Reaven's syndrome (named for Gerald reaven) and CHAOS (in Australia) [2]. Tinospora cordifolia is an Indian medicinal plant that has been used in ayurvedic preparation for the treatment of various ailments for centuries [3]. Medicinal properties of various plants have been described in ancient manuscripts like the bible and the Vedas. In India the earliest reference of medicinal plant Amrita (Giloy) is available in the Rig-Veda, Atharvaveda, Charak samhita and Sushruta samhita [4, 5]. The stem is used in dyspepsia, fever and urinary disease [6]. The biter principle present shows several medicinal application viz. Anti-inflammatory, immunomodulatory, anti-oxidant, anti-hyperglycemia, anti-hyperlipidemia, anti-tuberculosis, anti-tumor, hepatprotection,anti-osteoporotic,anti-angiogenic,anti-malarial,anti-allergic, anti-spasmodic and anti-pyretic properties [7].

Tinospora cordifolia contains different bioactive compounds such as alkaloids, diterpenoid lactones, glycosides, sesquiterpenoid; alipathic compounds phenolics, polysaccharides, steroids like tinosporine, tinosporides, tinosporaside, cordifolide, cordifol, hepatacosanol, clerodane, furano diterpen, diterpenoid furano lactone tinosporidine, columbin and beta-sitosterol. Leaves of the plant are rich in protein (11.2%) and are fairly rich in calcium and phosphorus [8].

MATERIAL AND METHOD

This study has been conducted in Department of Physiology R.N.T. Medical College, Udaipur. All 100 patients were randomly selected from the Diabetes clinic that is situated in the Diabetes care and Research centre of M.B.S. hospital, Udaipur.

Informed consent was obtained from each participant before their recruitment. The subjects were divided into two groups. Group I patients were given conventional treatment only and serve as the control group. Group II patients besides conventional treatment were given TC therapy & serve as the study group.

PROCEDURE

Patient included in the study group were asked to take one giloy tablet twice a day after meal. Each tablet contains 500 mg extract of giloy. Tablets taken

three months regularly. Before starting TC therapy base line parameters were taken for every patient i.e. waist hip ratio, body mass index, fasting blood sugar, lipid profile and glycosylated haemoglobin. Patients were evaluated after 3 month for these above mentioned parameter. These under control group were evaluated base line and after three months for these above mentioned parameter.

Exclusion criteria

Patients suffering from liver disease, arthritis, renal disease, mal-absorption, asthma, pulmonary tuberculosis, myocardial infarction, heart block disease and any other disease in addition to metabolic syndrome and non- cooperative patients with metabolic syndrome were excluded from the study.

RESULT

Effect on BMI &Waist hip ratio:-

Waist-Hip ratio and BMI not improve significantly in study group after giloy therapy.

Effect on blood pressure:-

Systolic and diastolic blood pressure not improves significantly in study group after giloy therapy.

Effect on blood glucose parameter:-

Fasting blood sugar:

The mean pre-intervention value in control and study group was 197.42 ± 53.71 and 206.72±45.5 respectively. Mean post-interventional value in control group and study group were 171.80±32.56 and 158.32±17.87 respectively. Comparison between difference of mean in control and study group were 25.62±27.54 and 50.39±34.23.

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Glycosylated Haemoglobin (HbA_1C):-

The mean pre-intervention value in control ans study group were 8.76 ±1.54 and 8.75 ±1.28 respectively. Mean post-interventional value in control group and study group were 8.23 ±1.16 and 7.34 ± 0.97 respectively. Comparison between difference of mean in control and study group were 0.53± 0.88 and 1.41 ± 0.60.

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Effect on lipid profile parameter-

Triglyceride (TG): The mean pre-intervention value in control ans study group were 178.33±15.34 and 188.28 ± 48.88 respectively. Mean post-interventional value in control group and study group were 158.0 ± 13.81 and 144.51± 29.03 respectively. Comparison between difference of mean in control and study group were 20.33± 10.34 and 43.77± 22.16

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HDL:

The mean pre-intervention value in control ans study group was 32.79 ± 3.76 and ± 32.89 respectively. Mean post-interventional value in control group and study group were 36.58 ±3.80 and 39.36 ± 4.46 respectively. Comparison between difference of mean in control and study group were 3.79 ± 3.37 and 7.18 ±2.05.

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Total Cholesterol:

The mean pre-intervention value in control ans study group were 257.40±12.16 and 264.40±26.11 respectively. Mean post-interventional value in control group and study group were 232.25±11.50 and 144.51 ± 29.03 respectively. Comparison between difference of mean in control and study group were 25.15±8.57and 36.25 ±9.90. .

LDL:

The mean pre-intervention value in control ans study group were 175.37±13.34 and 171.27±19.48 respectively. Mean post-interventional value in control group and study group were 153.75±13.64 and 142.92±17.89 respectively. Comparison between difference of mean in control and study group were 21.62 ± 9.54 and 28.35 ± 8.07.

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VLDL:

The mean pre-intervention value in control ans study group were 36.10±3.25 and 36.29±3.61 respectively. Mean post-interventional value in control group and study group were 32.85±2.50 and 29.86 ± 3.80 respectively. Comparison between difference of mean in control and study group were 3.25 ± 1.80 and 6.43 ± 3.59

Table 1 Effect of giloy therapy on different physiological & biochemical parameters in control group

		Base line		Post treatment	
		Mean	**SD**	**Mean**	**SD**
WHR		0.95	0.05	0.943	0.05
BMI		29.25	2.38	28.64	2.44
BLOOD PRESSURE	SBP	158.09	9.64	157.70	9.16
	DBP	95.33	5.38	93.55	4.77
Glycaemic control	FBS	197.42	53.71	171.80	32.56
	HbA_1C	8.76	1.54	8.23	1.16
Lipid profile	TC	257.40	12.16	232.25	11.50
	TG	178.33	15.34	158.0	13.81
	HDL	32.79	3.76	36.58	3.80
	LDL	175.37	13.34	153.75	13.64
	VLDL	36.10	3.25	32.85	2.50

Table 2 Effect of giloy therapy on different physiological & biochemical parameters in study group

		Base line		Post treatment	
		Mean	**SD**	**Mean**	**SD**
WHR		0.95	0.05	0.946	0.048
BMI		28.68	4.17	27.87	3.47
BLOOD PRESSURE	SBP	156.22	11.55	154.11	8.08
	DBP	92.0	2.97	89.45	4.30
Glycaemic control	FBS	206.72	45.25	158.32	17.87
	HbA_1C	8.75	1.28	7.34	0.97
Lipid profile	TC	264.40	26.11	228.15	22.80
	TG	188.28	48.88	144.51	29.03
	HDL	33.18	3.89	39.36	4.46
	LDL	171.27	19.48	142.92	17.89
	VLDL	36.29	3.61	29.86	3.20

Table 3 Comparison between mean of difference in physiological & biochemical parameters in both groups at 0 & 3 month

Parameters		**Control Group**		**Study Group**		**p-value**
WHR		0.007	0.02	0.004	0.02	>0.05
BMI		0.51	0.79	0.81	1.18	>0.05
BLOOD PRESSURE	SBP	0.39	0.67	2.11	1.81	>0.05
	DBP	1.78	0.80	2.55	2.21	>0.05
Glycaemic control	FBS	25.62	27.54	50.39	34.23	< 0.005
	HbA_1C	0.53	0.88	1.41	0.60	< 0.005
	TC	25.15	8.57	36.25	9.90	< 0.005
	TG	20.33	10.34	43.77	22.16	< 0.005
	HDL	3.79	3.37	7.18	2.05	< 0.005
	LDL	21.62	9.54	28.35	8.07	< 0.005
	VLDL	3.25	1.80	6.43	3.59	< 0.005

DISCUSSION

The most accepted and unifying hypothesis to describe the etiology of the metabolic syndrome in insulin resistance. An early major contributor to the development of insulin resistance is an over abundance of circulating fatty acid. FFAs reduce insulin sensitivity in muscle by insulin mediated glucose uptake. Associated lipid abnormalities include reduction in HDL and an increased density of LDL. The enhanced secretion of interleukin 6 and tumor necrosis factors produced by adipocytes and macrophage result in more insulin resistance and lipolysis of adipose tissue [1].

The present study observed that lipid profile improved significantly in study group after giloy therapy for 3 months. Diabetes mellitus the most common endocrine disorder that affect more than 194 million people worldwide. If nothing is done to control this disease, the number will exceed 333 million by 2025 [9].

Glycogenesis and glycogenolysis process are regulated by 2 key enzymes: glycogen synthase and glycogen phosphorylase. It is reported that in diabetic the glycogen synthase activity was decrease whereas phosphorylase activity increase. The treatment with TC showed that increased glycogen synthase activity in the liver. TC decreases the blood sugar by increasing the glycogen storage in the liver [10]. Tinospora cardio folia also decreased hepatic glucose 6 phosphatase and serum acid phosphatises alkaline phosphatase and lactate dehydrogenase [11]. Grover *et al.;* reported the hypoglycaemic action of the aqueous extract of Tinospora cardifolia. The extract at a dose of 400 mg/kgm per day, exhibits a significant (70.37%) decrease in the plasma sugar level in mild diabetes [12].

Administration of the extract of Tinospora cordifolia root (2.5-5 gm/kgm body weight) for 6 weeks and resulted in a significant reduction in serum and tissue cholesterol, phospho lipids and free fatty acid in alloxan diabetic rats.[13] Alcoholic extract of the root of T.cordifolia administered at a dose of 100mg/kg orally to diabetic rats for 6 weeks normalized the antioxidant status of heart and brain. The effect of T.cordifolia root extract was better than glibenclamide (600µgm/kg) although insulin (6 units/kg) restored all the parameters to normal status [14, 15]. T.cordifolia has also been reported to elevate GSH levels, expression of gamma g-glutamyl cysteine ligase and Cu-Zn SOD genes. The herbs also exhibited strong free radical scavenging properties against reactive oxygen and nitrogen species as studied by electron paramagnetic resonance spectroscopy [16].

CONCLUSION

Metabolic syndrome major features include:- Central obesity, hypertriglyceridemia, low high – density lipoprotein cholesterol, hyperglycemia and hypertension. Giloy therapy had good glycemic control, both FBS and HbA_1c improved significantly in study group. This therapy also improved lipid profile significantly. So it can be used as an adjunct with diet & medicines in management of metabolic syndrome.

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