



TO STUDY THE EFFECT OF GINGER (*ZINGIBER OFFICINALE*) ON BIOCHEMICAL PARAMETERS IN DIABETICS.

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*Corresponding Author**ABSTRACT**

Diabetes mellitus (DM) commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. Symptoms of high blood sugar include frequent urination, increased thirst, and increased hunger. Aim of present study was to see the effect of Ginger (*Zingiber officinale*) on Lipid profile in patients of Diabetes mellitus. Selected patients were divided randomly in two groups each comprised treatment and served as the control group. GROUP I- These patients were taken conventional treatment and served as the control group. GROUP II- Patients besides conventional treatment were given *Zingiber officinale*(Ginger) powder and served as the study group. Lipid profile had shown a significant decrease in study group after Ginger powder supplementation. Ginger powder mainly used in Ayurvedic practice is beneficial for overall health, it is suitable for Diabetes mellitus and as an anti-inflammatory compound used in osteoarthritis or rheumatoid arthritis, so it should be advised as continued therapy in patients of Diabetes Mellitus.

KEYWORDS : Diabetes mellitus (DM), Reactive oxygen species (ROS), Lipid Profile.

INTRODUCTION

Diabetes mellitus (DM) commonly referred to as diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period.¹ The worldwide prevalence of diabetes has risen dramatically over the past two decades, from an estimated 30 million cases in 1985 to 382 million in 2013. Based on current trends, the International Diabetes Federation projects that 592 million individuals will have diabetes by the year 2035.²

DIABETIC DYSLIPIDEMIA:-

A characteristic pattern, termed "Diabetic dyslipidemia" consists of low high density lipoprotein (HDL), increased triglycerides, and postprandial lipemia. This pattern is most frequently seen in type 2 diabetes and may be treatable risk factor for the subsequent cardiovascular disease.

Ginger contains various potentially bioactive substances such as gingerols, shogaols, zingerone and paradol. It also includes volatile oils such as sesquiterpenes [β -bisabolene and (-)zingiberene], geranial, and neral. Among gingerols and shogaol the major pungent components in the rhizome are 6-gingerol and 6-shogaol.³ Thus, at treated cells with gingerol, insulin responsive glucose uptake has increased and improved diabetes.⁴ The antioxidant potency of ginger has been attributed to gingerols that prevent reactive oxygen species (ROS) production.⁵ More than 50 antioxidants have been isolated from ginger rhizome; these antioxidants include two groups of components related to gingerols and diarylheptanoids.⁶

MATERIAL AND METHODS

This study was conducted in the Department of Physiology, S.P. Medical College, Bikaner Patient were selected from the Diabetic clinic that is situated in the Diabetes Care and Research Centre of P.B.M. Hospital, Bikaner.

The study has been undertaken to observe the effect of Ginger in pre-diabetic and diabetic patients of middle age group 36-55 years. Ginger supplementation was given for 3 months and data was collected at before supplementation of ginger and after 3 months of ginger supplementation.

EXCLUSION CRITERIA:- Patients suffering from liver disease, arthritis, pulmonary tuberculosis, malabsorption, alcoholism, asthma, myocardial infarction, heart block disease and non-co-operative patients were excluded from the study.

METHOD

The selected patients were divided randomly into two groups each comprising of 50 patients.

Group I -In this group diabetic patients who were on conventional treatment were served as a control group.

Group II-In this group diabetic patients who were on conventional treatment along with supplementation of ginger powder and served as a study group.

Dried rhizomes of ginger (*Zingiber officinale*) was purchased from a local market in Bikaner. The ginger rhizomes was finely ground and then prepared as tablets containing 2 gram ginger powder in each tablet or it is taken orally directly without prepared in capsule.

Following parameters were recorded:

1. Estimation of serum triglyceride
2. Estimation of total cholesterol
3. Estimation of HDL-cholesterol
4. Estimation of VLDL Cholesterol and LDL Cholesterol

VLDL and LDL cholesterol were calculated by using Friedwald (1972) formula:-

$$VLDL - C \text{ (mg/dl)} = \text{Triglyceride} / 5$$

$$LDL - C \text{ (mg/dl)} = \text{Total cholesterol} - (\text{HDL} - C + \text{VLDL} - C)$$

RESULTS

Table 1: Comparison of mean value of lipid profile, pre and post test in the control group

Parameters (mg/dl)	Group I (Control group) (Mean Value \pm SD)		p-value
	Pre-test (0 month)	Post-test (3 month)	
TC	166.6 \pm 33.5	161.1 \pm 29.89	0.3879
TG	121.6 \pm 35.47	116.1 \pm 35.07	0.434
HDL	44.21 \pm 30.55	50.59 \pm 13.54	0.0203
LDL	100.7 \pm 28.63	95.10 \pm 28.88	0.3356
VLDL	19.28 \pm 6.018	14.70 \pm 5.699	0.0002

Table 1:- shows the comparison of mean value of lipid profile in pre(0month) and post test (3month) in control group (Group I):-

Mean total cholesterol at 0 month and 3 month was 166.6 \pm 33.5 mg/dl and 161 \pm 29.89 mg/dl respectively. The difference was statistically insignificant (p=0.3879).

Mean triglyceride at 0 month and 3 month was 121.6 \pm 35.47 mg/dl and 116.1 \pm 35.07 mg/dl respectively. The difference was statistically insignificant (P=0.434).

Mean HDL cholesterol at 0 month and 3 month was 44.21 \pm 30.55 mg/dl and 50.59 \pm 13.54 mg/dl respectively. The difference was statistically significant (p>0.0203).

Mean LDL cholesterol at 0 month and 3 month was 100.7 \pm 28 mg/dl and 95.10 \pm 28.88 mg/dl respectively. The difference was statistically insignificant (p=0.3356).

Mean VLDL cholesterol at 0 month and 3 month was 19.28±6.01 mg/dl and 14.70±5.69 mg/dl respectively. The difference was statistically highly significant ($p < 0.0002$).

Table 2: Comparison of mean value of lipid profile, pre and post test in the study group (Group II)

Parameters (mg/dl)	Group II (Study group) (Mean Value ±SD)		p-value
	Pre-test (0 month)	Post-test (0 month)	
TC	180.2±26.95	163.6±29.64	0.0041
TG	127.9±31.17	112.6±31.30	0.0157
HDL	48.71±10.87	56.39±10.37	0.0037
LDL	114.6±23.93	97.96±26.43	0.0014
VLDL	23.06±7.494	15.69±7.352	<0.0001

Table 2:-show comparison of mean value of lipid profile at pre (0 month) and post (3 month) in the study group (Group II):-

Mean total cholesterol at 0 month and 3 month was 180.2±26.95 mg/dl and 163.6±29.64 mg/dl respectively. The difference was statistically significant ($p < 0.0041$).

Mean triglyceride at 0 month and 3 month was 127.9±31.17 mg/dl and 112.6±31.30 mg/dl respectively. The difference was statistically significant ($p < 0.0157$).

Mean HDL cholesterol at 0 month and 3 month was 48.71±10.87 mg/dl and 56.39±10.37 mg/dl respectively. The difference was statistically significant ($P < 0.0037$).

Mean LDL cholesterol at 0 month and 3 month was 114.6±23.93 mg/dl and 97.96±26.43 mg/dl respectively. The difference was statistically significant ($p < 0.0014$).

Mean VLDL cholesterol at 0 month and 3 month was 23.06±7.49 mg/dl and 15.69±7.35 mg/dl respectively. The difference was statistically highly significant ($p < 0.0001$).

DISCUSSION

Diabetes is recognized as one of the leading causes of morbidity and mortality in the world, while about 2.5 to 7% of the world's population has been diagnosed with diabetes mellitus, it is still expected to increase in future.⁷ In spite of the fact that synthetic drugs such as insulin-like substances are the most important therapeutic agents known to medicine, researchers have been making efforts to find insulin-like substances from plant sources for the treatment of diabetes.⁸ Recent scientific investigation and clinical studies had confirmed the efficacy of some medicinal plants and herbal preparations in the improvement of normal glucose homeostasis.

Herbal therapies have been used in patients with insulin-dependent and noninsulin-dependent diabetes.⁹ The herbal drugs have been prescribed widely because of their effectiveness, fewer side effects and relatively low cost.¹⁰

In our study, after three month of treatment, ginger powder produce highly significant reduction of serum total cholesterol, triglyceride, LDL-cholesterol, VLDL-cholesterol. There was highly significant increase in HDL-cholesterol.

Elshater A.A.E. *et al.* (2009)¹¹ show that daily oral administration of ginger extract (4 mg/Kg) to STZ-diabetic rats resulted in reducing the plasma level of glucose, total cholesterol, LDL-C, and increasing HDL-C, comparing to control rats. This study correlates with our study by reducing plasma glucose level, total cholesterol, LDL-C, and increasing HDL-C comparing to control subjects. The hypocholesterolemic effects of ginger may be due to the inhibition of cellular cholesterol synthesis, since, ((E)-8 beta, 17-epoxyllabelled-12-ene-15, 16 dial) compound was isolated from ginger and interfered with cholesterol biosynthesis in liver homogenate in hypercholesterolemic mice causing its reduction.¹²

The hypolipidemic activities of ginger may be explained by Srinivasan and Sambaiah (1991)¹³ who reported that, ginger stimulates the conversion of cholesterol to bile acids, an important pathway of elimination of cholesterol from the body.

CONCLUSION

Our study reflects that ginger therapy had highly significant lipid profile ($P < 0.05$). Ginger therapy can be used as an adjunct with diet and drugs in managements of diabetes mellitus. Such studies should be further encouraged as medicinal herbs constitute the cornerstone of traditional medicinal practice worldwide. The Ginger therapy is relatively cheap, easily available and represent a great deal of untapped reservoir of drugs and the structural diversity of their component molecules makes a valuable source of novel lead compounds. It possess important phytochemical or nutraceutical property and can be used as an alternative in management of various diseases with diet and drugs.

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