

LDL LOWERING PROPERTIES OF RUTIN IN DIABETIC PATIENTS**MR.K.SATTANATHAN*, DR.C.K.DHANAPAL AND DR.R.MANAVALAN**

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Corresponding Author* ksknathan@rediffmail.comABSTRACT**

The objective of this study was to investigate the effect of Rutin supplementation Tablets in diabetic patients. This trial with 4 intervention periods within a gap of 15 days comprised 50 patients with type-II diabetes mellitus, 40-60 years old. These patients were supplemented with Rutin over the period of 60 days without altering their regular medications. Total Cholesterol (TCH), HDL, TGL, LDL and V-LDL were measured at baseline and after every 15 days i.e. on 15th, 30th, 45th & 60th days of Rutin supplementation. The same patients were stopped supplementing of Rutin for next 60 days and the investigation was carried out again at the end. HDL and TGL had showed a tendency of increase whereas LDL was considerably decreased. On the basis of these results it's evident that Rutin supplementation Tablets can increase the LDL cholesterol lowering activity.

KEY WORDS*Rutin, Cholesterol, LDL, TGL, HDL, HbA_{1C}.***INTRODUCTION**

DIABETES MELLITUS is a metabolic disorder. Insulin maintains the blood glucose level. Deficiency of Insulin leads to elevated blood sugar level.

Diabetes mellitus is frequently associated with hypertension, hyperlipidemia and diabetic neuropathy. DM has two types of complications: microvascular and macrovascular. One of the most frequently occurring microvascular complications is diabetic neuropathy (DN), of which the most common type is distal symmetrical neuropathy or polyneuropathy.

Most of the times Diabetes and hypertension co-exist. and the existence of both increases the risk of life-threatening cardiovascular events. It is the need of the hour for early and aggressive reduction of blood pressure to be

upto the level of <130/80 mmHg, in patients with diabetes. There are various classes of anti-hypertensive agents that are effective in reducing blood pressure in diabetic subjects and each shows evidence of accompanying reduction in cardiovascular risk.

Hyperlipidemia is an excess of fatty substances called lipids, largely cholesterol and triglycerides, in the blood. Hyperlipidemia can be of two types. One is hypercholesterolemia, in which there is a high level of cholesterol and the another one is hypertriglyceridemia, in which there is a high level of triglycerides, the most common form of fat. The fat-protein complexes in the blood are called lipoproteins. The best-known lipoproteins are LDL (low density lipoprotein) and HDL (high density lipoprotein).

Excess LDL cholesterol contributes to the blockage of arteries, which eventually leads to heart attack and is also known as the "bad" cholesterol. In contrast, the lower the level of HDL cholesterol, the greater the risk of coronary heart disease and is also known as the "good" cholesterol. Low HDL cholesterol levels are usually accompanied by an increase in blood triglyceride levels.

Diabetic neuropathy is also a common complication of diabetes. It causes damage to the nerves that arouse the sensations such as pain. Diabetes-related nerve damage can be painful, but it isn't severe pain in most cases. There are four types of diabetic neuropathy: peripheral, autonomic, proximal, and focal.

Flavonoids occur naturally in buckwheat, cherries, Prunes, rose hips and the whitish rind of citrus fruits and the core of green peppers. Citrus fruits and their rinds also are excellent sources of rutin. Grapefruit, Oranges, Lemons and Limes fill the bill.

Rutin is phenolic antioxidant and has been demonstrated to scavenge superoxide radicals. Rutin can chelate metal ions such as ferrous cations.

When Rutin supplementation Tablets was administered simultaneously with their regular medication over patients with type-II diabetes mellitus, the hypertension, total cholesterol and LDL were markedly attenuated whereas TGL and HDL has increased considerably.

RESEARCH DESIGN AND METHODS

This study was a randomized controlled implementation trial at Rajah Muthiah Medical College Hospital, Annamalai University, Annamalainagar. Fifty diabetic patients participated in this case study. Cases were chosen from the DIABETIC OP of Rajah Muthiah Medical College Hospital, Annamalai University, Annamalainagar, Tamilnadu. By simple randomized sampling.

On an average all of these fifty patients are of from rural area and their life styles and physical

activities were more or less similar to one another. The subjects consisted of 50 patients presenting with normal blood pressure, normal total cholesterol.

Detailed information on each patient's age, sex, type and duration of diabetes mellitus, mode of treatment degree of blood glucose, blood pressure, and lipids profile was recorded accordingly.

A baseline detailed and elaborate physical examinations were carried out and Total Cholesterol, High Density Lipoprotein Cholesterol (HDL), Triglycerides (TGL), Low Density Lipoprotein Cholesterol (LDL) and Very Low Density Lipoprotein Cholesterol (VLDL) levels measured.

All of these 50 patients were given Rutin supplementation Tablets in 500 mg caplets (RUTIN 500 mg, Natural Bioflavonoid, manufactured by *Nutraceutical Corp., USA* for 60 days to be taken once a day and test results were noted within every 15 days. The quality of diabetes control was classified according to the average glycosylated hemoglobin (HbA_{1c}).

All necessary data were retrieved from the patient records in the DIABETES OP of Rajah Muthiah Medical College Hospital, Annamalai University, Annamalainagar, Tamilnadu (India).

Blood Pressure was measured using a Standard Murcury Sphygomomanometer (ERKAMETER 3000, Wallmodal, Richard Kallmeyer, Nachforschung, Badtolz, Germany). Venous blood was collected after an overnight fast of at least 8 hours into Heparin Tubes. Total Cholesterol (TC), High Density Lipoprotein Cholesterol (HDL), Triglycerides (TGL), and Low Density Lipoprotein Cholesterol were analyzed with RA-50 Semiautomatic analyzer (Bayer, Leverkusen, Germany). Low Density lipoprotein (LDL) Cholesterol and very low density lipoprotein (VLDL) Cholesterol

were calculated as follows:

VLDL-C = triglycerides/5

LDL-C = Total Cholesterol – (HDL-C + VLDL-C)

Height and Weight was measured using portable vertical measuring board and household scale respectively. Patients were weighed wearing light cloths and without slippers. The Body Mass

Index (BMI) was measured as follows:-

Body Mass Index (BMI) = Weight in Kilograms/Square of height in meters

Electrolytes are positively and negatively charged molecules called ions that are found within the body's cells and extracellular fluids, including blood plasma. A test for electrolytes includes the measurement of sodium, potassium, chloride, and bicarbonate. Electrolyte concentrations are similar whether measured in serum or plasma. Values are expressed as mmol/L for sodium, potassium, chloride, and bicarbonate.

Electrolytes are substances that become ions in solution and acquire the capacity to conduct

electricity. The balance of the electrolytes in our bodies is essential for normal function of our cells and our organs. Common electrolytes include sodium, potassium, chloride, and bicarbonate. The functions and normal range values for these electrolytes are important, and if an electrolyte is at an extreme low or high, it can be fatal.

A Normal blood sodium level is 135 - 145 milliequivalents/liter (mEq/L), or in international units, 135 - 145 millimoles/liter (mmol/L).

The normal blood potassium level is 3.5 - 5.0 milliequivalents/liter (mEq/L), or in international units, 3.5 - 5.0 millimoles/liter (mmol/L). The normal serum range for chloride is 98 - 108 mmol/L.

RESULTS

Table 1 depicts Anthropometric Measurement i.e. Height, Weight & Body Mass Index at Baseline, Rutin Supplementation Tablets and Withdrawal of Rutin Supplementation Tablets.

Table 1
Anthropometric Measurement, Rutin Supplementation Tablets and Withdrawal of Rutin Supplementation Tablets

Parameter	Baseline	Rutin Supplementation Tablets			Withdrawal of Rutin Supplementation Tablets
	(day 0)	(day 30)	(day 60)	(day 90)	(day 120)
BP (mm Hg)					
Systolic	135 ± 6.3	133.2 ± 7.1	131 ± 7.5	131.6 ± 7.7	133.4 ± 7.2
Diastolic	87.5 ± 6.0	86.5 ± 5.0	85.6 ± 4.5	85.0 ± 4.0	86.0 ± 5.3
Height (Cms)	158.7 ± 2.5	158.7 ± 2.5	158.7 ± 2.5	158.7 ± 2.5	158.7 ± 2.5
Weight (Kgs.)	65 ± 5.4	64 ± 5.2	63.3 ± 5.1	62.8 ± 4.8	64.4 ± 5.2
BMI(Kg/m²)	25.81 ± 1.9	25.41 ± 1.8	25.13 ± 1.8	24.93 ± 1.7	25.57 ± 1.9

The inclusion criteria for diabetic patients were [mean ± standard deviation (SD)]

It can be conferred from the above table that the Systolic and diastolic had shown a tendency of decrease with rutin supplementation and withdrawal of rutin supplementation had brought back the level to the nearest of baseline and weight too had attenuated to some extent.

Table 2 depicts Serum Urea, Serum Creatinine and Electrolytes at Baseline, Rutin Supplementation Tablets and Withdrawal of Rutin Supplementation Tablets.

Table 2***Urea, Serum Creatinine, HbA_{1c} and Electrolytes with Rutin Supplementation Tablets and Withdrawal of Rutin Supplementation Tablets***

Parameter	Baseline	Rutin Supplementation Tablets	Withdrawal of Rutin Supplementation Tablets
	(day 0)	(day 60)	(day 120)
Serum Urea	24 ± 5	23 ± 4	23.5 ± 6
Serum Creatinine	0.8 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
HbA_{1c}	5.8 ± 0.4	5.2 ± 0.3	5.5 ± 0.2
Electrolytes			
Sodium (mEq/L)	139 ± 1.8	136.5 ± 2.01	138.4 ± 0.6
Potassium (mEq/L)	4.2 ± 0.09	3.98 ± 0.06	4.00 ± 0.7
Chloride (mEq/L)	101.5 ± 0.90	102.4 ± 1.23	101.00 ± 0.5

The inclusion criteria for diabetic patients were [mean ± standard deviation (SD)]

It can be conferred from the above data that Serum Urea had decreased to some extent whereas after withdrawal of rutin supplementation the same level was regained. But Serum Creatinine had attenuated mildly

Table 3 depicts the level of TC, TGL, HDL, LDL & VLDL right from the baseline and after every 15 days i.e. on 15th, 30th, 45th, & 60th Day of Rutin supplementation Tablets and

and remained the same even after stopping rutin supplementation.

Sodium and Potassium had decreased significantly and increased with the stoppage of rutin supplementation. Whereas Chloride had increased to some level and thereafter lowered with the stoppage of rutin supplementation.

the corresponding values within a gap of 15 days after withdrawal of Rutin supplementation Tablets i.e. on 75th, 90th, 105th, & 120th Day

Table-3
TC, TGL, HDL, LDL & VLDL at Baseline, Rutin Supplementation Tablets and withdrawal of Rutin Supplementation Tablets

Parameter (mg/dL)	Base-line	Rutin Supplementation Tablets					Withdrawal of Rutin Supplementation Tablets		
		Day 0	Day 15	Day 30	Day 45	Day 60	Day 75	Day 90	Day 105
TC	131.5	133.0	134.0	135.5	136.0	138	141.2	144.1	147.8
TGL	126.4	134.6	146.2	158.1	167.0	172.6	176.1	179.6	181.9
HDL	39.0	40.2	41.0	42.2	43.0	42.6	42.0	41.5	36.38
LDL	67.22	65.88	63.76	61.66	59.6	60.88	63.98	66.68	70.76
VLDL	25.28	26.92	29.24	31.64	33.4	34.52	35.22	35.92	36.24

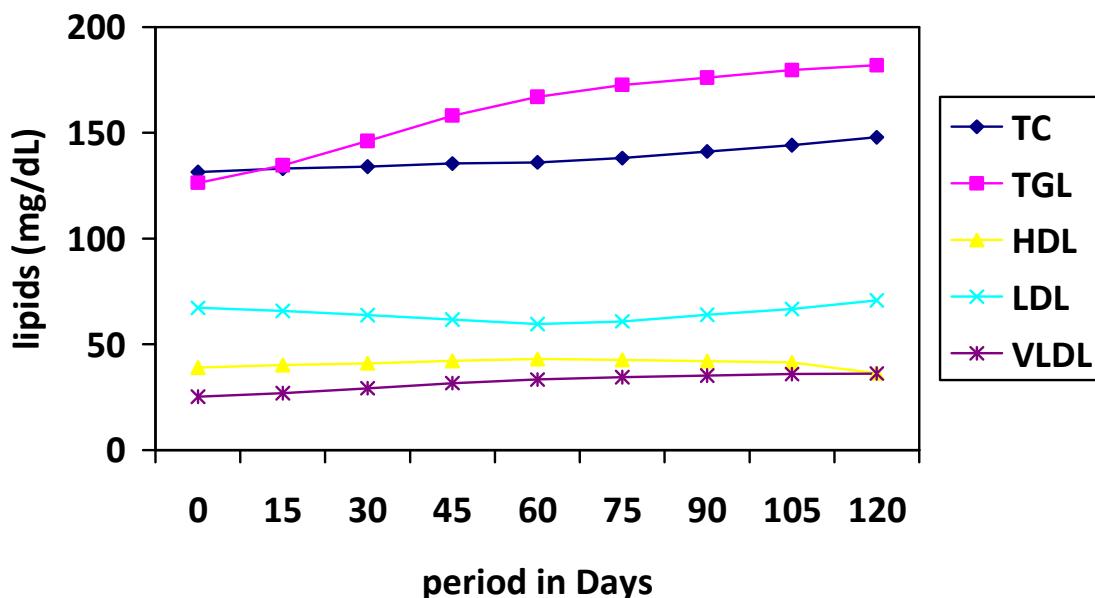


Figure 1
Chart depicting various levels of TC, TGL, HDL, LDL & VLDL

It can be concluded from the table-3 and chart that administration of Rutin supplementation Tablets had significantly increased the levels of TC, TGL, HDL & VLDL whereas LDL level was attenuated.

It is further noted that in most of the patients the level of TGL had increased significantly whereas approximately 5% of total sample showed an attenuated level of TGL.

On the similar line the LDL too had showed a tendency of decrease in most of the patients and on an average 5% of total patients had showed an increasing pattern.

CONCLUSION

We conducted a randomized and administered dose study to investigate the

efficacy of rutin supplementation in patients with type-II diabetes mellitus. Patients received rutin supplementation tablets of 500 mg for 60 days and results were noted within every 15 days. The treatment period was 60 days.

Oral administration of rutin supplementation tablets significantly decreased the levels of plasma LDL cholesterol and increased the level of LDL-cholesterol. In conclusion, the beneficial effect of rutin on lipids, lipoproteins could be due to its antioxidant property.

Rutin administration in animals had shown a declining tendency of TGL and LDL and the HDL had increased significantly. But the same administration of rutin in human beings is somehow different regarding TGL as it had

shown an increasing pattern in most of the patients.

Overall analysis shows that Rutin Supplementation had increased the levels of TGL in majority of the patients, which can be taken as its major drawback. And it had decreased the level of TGL in very small number of patients only.

In conclusion, rutin is a dietary supplement that helps remain healthy in a number of ways. Rutin is a good choice as a general supplement which reduces bad cholesterol i.e. LDL and increases the good cholesterol i.e. HDL. The only drawback is regarding TGL which goes on increasing with rutin supplementation.

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