IJFANS
International Journal of Food And Nutritional Sciences

Volume 2, Issue-1, Jan-Mar-2013 www.ijfans.com ISSN: 2320-7876

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

Official Journal of IIFANS

INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN 2320 –7876 *www.ijfans.com*
Vol.2, Iss.1, Jan-Mar 2013

Research Paper *Open Access*

HYPOGLYCEMIC EFFECT OF *MURRAYA KOENIGII* (CURRY LEAF) IN TYPE 2 DIABETES MELLITUS

L. Sucheta Soma Kirupa[1] and R. Kavitha
PG and Research Department of Home Science, Bharathidasan Govt. College for Women (Autonomous), Puducherry.

[1]Corresponding author:suchi11kiruba@gmail.com

ABSTRACT

Diabetes Mellitus a heterogeneous metabolic disorder is characterized by hyperglycemia due to defective insulin secretion, resistance to insulin action or both. Management of diabetes without any side effect is still a challenge to the medical community. Medicinal plants provide the useful source of oral hypoglycemic compounds for the development of pharmaceutical entities or as a dietary adjunct to existing therapies. *Murraya koenigii* (Curry leaves) is one such medicinal plant which is being explored for its hypoglycemic property. This study was undertaken to analyse the hypoglycemic effect of Curry Leaf Powder in patients with Type 2 diabetes. Methodology: Twenty male patients with Type 2 Diabetes in the age group of 51-62 years formed the samples for the study. 15 g of curry leaf powder was supplemented for a period of 30 days for the Diabetic Experimental Group (DEG) (n=10). The Fasting and Post Prandial Blood Glucose levels were recorded for both control and experimental before supplementation. The glucose level before lunch and 2 hrs after lunch was recorded on Day 0, Day 1, Day 10, Day 20 and Day 30 of the supplementation period. Result: A significant change in the Fasting and Post Prandial glucose levels in the DEG after the supplementation period was found. Also a significant decrease in both the pre-lunch and post-lunch glucose levels was noted. A significant difference in the Post Prandial blood glucose levels between the DCG and the DEG was also observed. In conclusion, it can be said that curry leaf powder had the property to decrease the blood glucose load and is the dietary adjunct in the management of Type 2 Diabetes.

Key words: Type 2 Diabetes, *Murraya Koenigii* (curry leaf), hypoglycemia.

INTRODUCTION

Diabetes Mellitus (DM) is a silent disease and is now recognized as one of the fastest growing threat to public health in almost all countries of the world. Around 150 million people suffer from diabetes in the world, of which about 35 million are Indians (Senthilkumar and Ehizilmuthu, 2007). Type 1 diabetes is the consequence of an autoimmune-mediated destruction of pancreatic β-cells, leading to insulin deficiency. Patients require insulin treatment for survival. Type 2 diabetes is characterized by insulin resistance and relative, rather than absolute insulin deficiency. Type 2 diabetes is the more common form of diabetes constituting 90% of the diabetic population (Rawi *et al*., 2011). Diabetes Mellitus can manifest due to resistance of peripheral receptors to insulin or increased endogenous glucose production by the liver (ADA, 2006) and is clinically characterized by hyperglycemia. Hyperglycemia is caused by inherited or acquired deficiency in production of insulin by the pancreas or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentration of glucose in the blood, which in turn damage many of the body systems, in particular the blood vessels and nerves (Ayodhya *et al*., 2010).

Management of diabetes without any side effect is still a challenge to the medical community. For treatment of diabetes, several drugs such as biguanides, sulfonylurea and thiazolidinediones are presently available to reduce hyperglycemia in Diabetes Mellitus. The use of these drugs is restricted by their pharmacokinetic properties, secondary

failure rates and accompanying side effects. Thus searching for a new class of compounds is essential to overcome diabetic problems (Rawi *et al*., 2011). Traditional medicinal plants with their various biological constituents have been used effectively to treat diabetes. *Murraya koenigii* (Curry leaves) a tropical to subtropical tree native to India, is one such medicinal plant which is being explored for its hypoglycemic property. The plant is highly valued for its leaves as an important ingredient in Indian cuisine. Colloquially it is termed as kari-pattha (Garg *et al*., 2012). Various parts of *Murraya koenigii* have been used in traditional or folk medicine for the treatment of rheumatism, traumatic injury and snake bite and it has been reported to have anti-diabetic, antioxidant, antimicrobial, anti-inflammatory, hepatoprotective and anti-hypercholesterolemic and anti-dysenteric activities. Hence the present study was undertaken to analyse the hypoglycemic effect of Curry Leaf Powder in patients with Type 2 diabetes.

METHODS AND MATERIALS

SAMPLE SELECTION

The study subjects were selected based on the following criteria: 50-65 years of age, male, those with Type 2 diabetes, taking only oral hypoglycemic drugs, taking regular food without any other herbal supplementation, non-smokers, non-alcoholics, no other history of chronic disease and those willing to participate in the study. Based on the selection criteria, 20 Type 2 Diabetic patients were purposively selected from the Community Health Center, General Hospital of Karikalampakkam, Puducherry. They were grouped into Diabetic Control Group (DCG n=10) and Diabetic Experimental Group (DEG n=10).

COLLECTION OF DATA

An interview schedule was used to collect General Information such as age, family income, type of diet consumed, physical activity involved and family history of diabetes. Clinical Information like Body Mass Index (BMI), duration of disease and diabetic symptoms experienced were also elicited. Biochemical parameters such as fasting and post prandial blood glucose were estimated using Glucose oxidase /Peroxidase (GOD/POD) method.

SUPPLEMENTATION WITH CURRY LEAF POWDER

Curry leaves were cleaned and dried at room temperature. It was then powdered using micro oven for 3 min. 100g of fresh curry leaves gave 40g of powder. The powder was prepared with utmost care and packed in zip-lock polythene packets of 15g each and distributed to the study subjects. The 15g powder provided 1.5 g of carbohydrate, 1.3 g of fiber, 1024.2 µg of β – Carotene, 94.29 mg of total chlorophyll and 17.58 mg of Vitamin C. The powders were freshly prepared once in three days and given to the Diabetic Experimental Group (DEG n=10) for a period of 30 days along with regular food and medication. They were asked to consume the powder entirely during lunch. The Diabetic Control Group (DCG n=10) did not receive any supplementation of curry leaf powder and were taking regular food and medication.

DETERMINATION OF HYPOGLYCEMIC EFFECT

The Fasting and Post Prandial Blood Glucose level of the DEG was taken before and after supplementation with curry leaf powder for 30 days. The same parameters were recorded for the DCG before and after the same period.

Pre lunch and post lunch blood glucose levels - The hypoglycemic effect of the curry leaf powder was evaluated by analyzing the Pre Lunch and Post Lunch glucose levels on Day 0, the day before starting supplementation; Day 1, the day of start of supplementation; Day 10, Day20 and Day 30 of the supplementation days. Pre Lunch refers to recording blood glucose before consuming food in the afternoon. Post Lunch refers to recording blood glucose 2 hours after consuming food in the afternoon.

RESULTS AND DISCUSSION

GENERAL INFORMATION

Table 1 gives the general information of the samples. The Income level of the samples reflects that 8 percent were drawing less than Rs. 5000 per month, 62 percent were earning between Rs.5000 - 10,000 per month, 19 percent between Rs. 11,000 - 15,000 per month and 11 percent between Rs.16, 000 - 20,000 per month. All the subjects were non-vegetarian eaters. The 2001 statistical report of the Govt. of Puducherry states that non-vegetarian diet was predominantly consumed by the people of Puducherry (http://pondi.stat.com). All the diabetic subjects had a family history of diabetes, which included the father, mother, grandfather and grandmother.

CLINICAL INFORMATION

The clinical details of the selected subjects are presented in the table 2. The mean age was 55.1years. It was found that 55 percent of the diabetic subjects were within the normal range of BMI (Body Mass Index) and 45 percent were in Grade I level of Obesity. As for the blood pressure of the diabetics, 40 percent were in the normal range and 60 percent were in the high normal range. These diabetics could become hypertensive, if diabetes is uncontrolled. The mean duration of disease of the diabetics was 7.7 years. With regard to the symptoms experienced, 45 percent of the subjects felt thirsty (polydypsia) and 60 percent had intense hunger (polyphagia), 20 percent had frequent urination (polyurea). Apart from these clinical symptoms of diabetes, the other

Table 1 General Information of the diabetic

VARIABLES	DIABETIC SUBJECTS (n=20)
Monthly Income(Rs.)	
>5000	1 (5%)
5000 - 10,000	12 (60%)
11,000 - 15,000	6 (30%)
16,000 - 20,000	1 (5%)
Type of Diet	
Vegetarian	-
Non-Vegetarian	20 (100%)
Family History Diabetes	
Father	9 (45%)
Mother	8 (40%)
Grand Father	7 (35%)
Grand Mother	11 (55%)
Coronary Heart Disease (CHD)	
Father	2 (10%)
Mother	4 (20%)
Grand Father	8 (40%)
Grand Mother	3 (15%)
Blood Pressure	
Father	2 (10%)
Mother	2 (10%)
Grand Father	7 (35%)
Grand Mother	5 (25%)

Table 2 Clinical Information of the Diabetics

VARIABLES	DIABETIC SUBJECTS (n=20)
Age (years)	55.1 ± 4.0
BMI (Kg/ m^2)	
Normal <25	11 (55%)
Grade I (25 - 29.9)	9 (45%)
Grade II (30 – 40)	-
Grade III >40	-
Recording of BP (mm Hg)	
Normal	8 (40%)
High normal	12 (60%)
Stage 1hypertension	-
Stage 2hypertension	-
Stage 3hypertension	-
Duration of Disease	
Diabetes	7.7 ± 2
BP	-
Diabetic Symptoms	
Thirsty(polydypsia)	9 (45%)
Intense Hunger (polyphagia)	12 (60%)
Frequent Urination (polyuria)	4 (20%)
Other Symptoms	
Morning Headaches	8 (40%)
Dry Mouth	2 (10%)
Nausea/ Vomiting	1 (5%)
Decreased Appetite	4 (20%)
Abdominal Pain	6 (30%)
Night Sweats	16 (80%)
Weakness	

symptoms experienced by the subjects were dry mouth (40 percent), nausea and vomiting (10 percent), decreased appetite (5 percent), abdominal pain (20 percent), night sweats (30 percent) and weakness (80 percent).

HYPOGLYCEMIC EFFECT OF CURRY LEAF POWDER

The DEG who consumed curry leaf powder showed significant reduction in the fasting ($p< 0.01$) and post prandial glucose levels ($p< 0.01$) after the same period. However, the Glucose levels of the DCG remained the same after the 30 day period. The samples of this group did not receive curry leaf powder supplementation. They consumed regular diet and medicines and hence no significant change can be expected in their glucose levels (Table 3, Figure 1 and Figure 2).

No significant change was observed in the Fasting Glucose levels between the Diabetic Control Group and the Diabetic Experimental Group. The Post Prandial Glucose Levels were found to be significantly different at $p<0.05$ between the two groups. The DEG who consumed curry leaf powder at 15 g per day were able to achieve better post prandial glucose control than those who did not consume (Table 4). Curry can be consumed regularly by the diabetic patients along with the regular diet and can be effectively used in the management and control of Diabetes. Thus

Table 3 Hypoglycemic Effect of Curry leaf Powder

Blood Glucose Levels (mg/dl)	Initial Mean ± S.D	Final Mean ± S.D	Difference	t value	p value
Fasting Blood Glucose					
DCG	182.8 ± 44.4	187 ± 51.1	+4.2	1.922	0.086
DEG	189.9 ± 54.2	150.4 ± 45.8	-39.5	4.105**	0.002
Post Prandial Blood Glucose					
DCG	274 ± 60	270.2 ± 48.4	-3.8	0.486	0.638
DEG	263.7 ± 44.5	218 ± 50.6	-45.7	6.922***	0.000

**Significant at $p < 0.01$ ***Significant at $p < 0.001$

Table 4 Comparison of Fasting and Post Prandial Glucose Levels between Diabetic Control Group and Diabetic Experimental Group

Blood Glucose Levels (mg/dl)	DCG	DEG	t value	p value
	Mean ± S.D	Mean ± S.D		
Fasting Blood Glucose	187 ± 51.1	150.4 ± 45.8	1.685	0.109
Post Prandial Blood Glucose	270.2 ± 48.4	218 ± 50.6	2.355*	0.030

*Significant at $p < 0.05$

Table 5 Pre Lunch and Post Lunch Mean Blood Glucose levels

Days	Blood Glucose Levels	
	Pre Lunch**	Post Lunch**
	Mean ± S.D	Mean ± S.D
Day 0	190.5 ± 51.4	265.5 ± 43.3
Day1	184.3 ± 56.7	268.5 ± 44.8
Day 10	177.5 ± 49.9	259.8 ± 39.3
Day 20	161.5 ± 50.8	232.7 ± 45.8
Day 30	153.5 ± 48.2	223.1 ± 47.0

**Significant at $p<0.01$

Figure 1: *Change in Fasting Mean Serum Blood Glucose Levels*

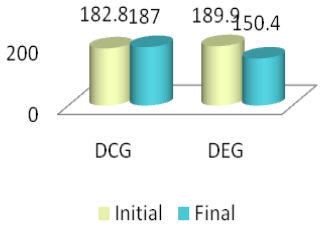


Figure 2: *Change in Post Prandial Mean Serum Blood Glucose Levels*

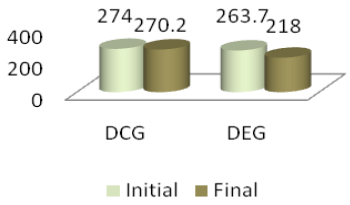


Figure 3: *Pre-lunch Mean Blood Glucose levels*

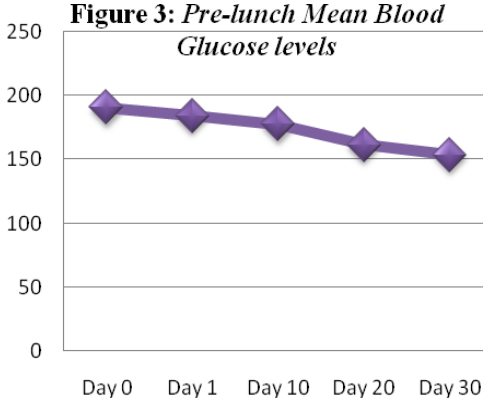
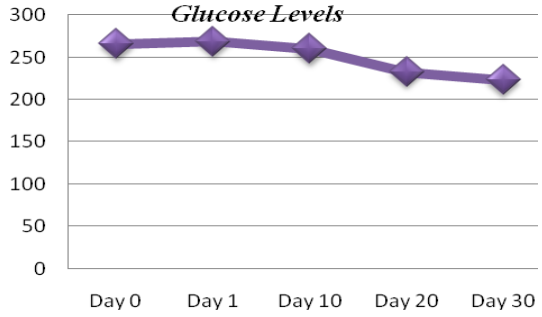


Figure 4: *Post-lunch Mean Blood Glucose Levels*



it can be said that curry leaves possessed hypoglycemic properties as reported in the studies conducted by Iyer *et al*, 1990; Keasri *et al*, 2005; Venuthan *et al*, 2005; Yadav *et al*, 2002 and Khan *et al*, 1995.

PRE LUNCH AND POST LUNCH BLOOD GLUCOSE LEVELS

This study further establishes that consuming curry leaves can be effective in achieving post lunch glycemic control. From Table 5 and Figures 3 and 4, a reduction in the Pre-lunch and Post-lunch glucose levels can be seen between Day 0 and Day 1, Day 10, Day 20 and Day 30. The values were significant at $p<0.01$. The cumulative hypoglycemic effect achieved due to the consumption of curry leaf powder by the experimental group has been clearly established.

CONCLUSION

The present study substantiates the hypoglycemic properties of curry leaf powder in controlling the fasting and post prandial blood glucose level among the diabetics. The blood glucose which elevates post lunch was found to significantly reduce, when food was consumed along with curry leaf powder. Curry leaves being easily available and cost effective can be regularly incorporated in the diet of the diabetics without side effects. It's proven medicinal properties, makes it a wholesome ingredient for regular consumption.

REFERENCES

- Senthilkumar and Ehizilmuthu 2007. Formulation, development and evaluation of metaformin hydrochloride sustained release tablets. International Journal of Pharma and Bio sciences. Vol2/issues 2/apr-jun2007.
- Rawi M Sayed, Iman M Mourad, Dawlat A Sayed 2011. Biochemical changes in experimental diabetes before and after treatment with mangifera indica and psidium guava extracts. International Journal of Pharmaceutical and Biomedical Sciences. 2(2), 29-41.
- American Diabetes Association (ADA) 2006. Diagnosis and classification of diabetes mellitus. Diabetes Care. 29 (suppl 1). S43-48.
- Ayodhya Singh, Singh Kusum, Saxena Anjali 2010. Hypoglycaemic activity of different extracts of various herbal plants. International Journal of Research in Ayurveda & Pharmacy. Volume 1. Issue 1. 212-224.
- Garg D, Aditya Muley, Nishtha Khare, Thankamani Marar 2012. Comparative Analysis of Phytochemical profile and antioxidant activity of some Indian culinary herbs. Research Journal of Pharmaceutical. Biological and Chemical Sciences. Volume3/issue 3. 845-854.

- http://pondi.stat.com
- Iyer U M, Mani U V 1990. Plant Food Hum. Nutri. 40(4). 275-282.
- Kesari A N, Gupta, R K, Watal G J 2005. Ethanopharmacol. 97(2). 247-251.
- Venuthan, M K, Girish Kumar V, Ravindra J P, Jayaprakash Narayana K 2005. Ind. J. Physio. Pharmacol. 49(2). 241-242.
- Yadav S, Vats V, Dhunnoo Y, Grover J K 2002. J.Thanopharmacol. 82(2-3). 111-116.
- Khan B A, Araham A, Leelamma S 1995. Indian Journal of Biochemistry and Biophysics. 32, 106-108.