Efficacy on curry leaves powder consumption on blood glucose and lipid profile among type ii diabetes patients with mild elevated lipid profile-experimental study

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ABSTRACT

Background: Diabetes is a chronic condition in that Type II diabetes (Formerly called as Non-Insulin Dependent) is the most prevalent, generally affecting adults, diabetes frequently reduces HDL (good) cholesterol levels while raising triglycerides and LDL (bad) cholesterol levels. Both of these factors raise the likelihood of heart disease and stroke. The Indian system of traditional medicine, Ayurveda, also uses curry leaf as a common treatment. Curry leaves can prevent several diseases, including type 2 diabetes and heart disease, because they are rich in antioxidants like beta-carotene,also rich in fibre and vitamin C. **Objectives:** To determine the effectiveness of curry leaves powder on reducing blood glucose and lipid profile among the clients with Type II diabetes with mild elevated lipid level in the experimental group. To compare the post-test level of blood glucose and lipid profile between the experimental and control group. **Methodology:** Research approach: quantitative approach, quasi experimental research design was used for 60 samples by Nonprobability purposive sampling technique. **Result:** on comparing the pre and post-test of blood glucose and lipid profile in relation to administering of curry leaves powder among Type II Diabetic Patients in experimental group, the percentage of reduction for fasting blood glucose is 5.72%, For Postprandial blood sugar is 6.39%, for total Cholesterol is 3.68%, for HDL the increased rate is 7.13%, for LDL the decreased percentage is 6.36%, and for Triglyceride the decrease percentage is 9.04%.

INTRODUCTION:

Non communicable diseases (NCDs), also known as chronic diseases, Long-lasting and caused by a confluence of genetic, physiological, environmental, and behavioural variables. The four primary categories of NCD are diabetes, cancer, chronic respiratory diseases (such chronic obstructive pulmonary disease and asthma), and cardiovascular disorders (including heart attacks and stroke) (1).

Diabetes is a chronic disease that occurs when the pancreas does not make enough insulin or when the body does not properly utilise the insulin that is produced. Insulin maintains the blood glucose level in the body. Hyperglycaemia, also known as elevated blood glucose or high blood sugar, is a common side effect of uncontrolled diabetes that, over time, can seriously harm many of the body's systems, especially the neurons and blood vessels. Diabetic mellitus is of two types they are Type I and Type II. Type II diabetes (Formerly called as Non-Insulin Dependent) is the most prevalent, generally affecting adults, and arises when the body develops insulin resistance or fails to produce enough insulin. Type II diabetes has increased substantially in countries of all income levels during the last three decades. Type 1 diabetes is a long-term condition in which the pancreas produces little or no insulin on its own. Access to inexpensive medication, particularly insulin, is crucial for those living with diabetes. A global agreement has been reached to halt the growth in diabetes and obesity by 2025.Around 422 million people worldwide, most of whom live in low- and middle-income nations, have diabetes, which is directly responsible for 1.5 million annual fatalities. Over the past few decades, diabetes has steadily increased in both incidence and prevalence..[2]

Global Burden of Disease, India ranks second after China in the global diabetes epidemic with 77 million

people with diabetes. Of these, 12.1 million are aged >65 years, which is estimated to increase to 27.5 million in the year 2045.[3]

American Heart Association (AHA) Trusted Source, States diabetes frequently reduces HDL (good) cholesterol levels while raising triglycerides and LDL (bad) cholesterol levels. Both of these factors raise the likelihood of heart disease and stroke. Diabetes dyslipidaemia is defined by high fasting and postprandial triglycerides, low HDL cholesterol, high LDL cholesterol, and a predominance of small dense LDL particles. These lipid alterations are the primary connection between diabetes and diabetic individuals' higher cardiovascular risk. Only a portion of the underlying pathophysiology is recognized. Changes in insulin-sensitive pathways, elevated free fatty acid concentrations, and low-grade inflammation all play a role in the overproduction and impaired metabolism of triglyceride-rich lipoproteins of intestinal and hepatic origin. The observed alterations in HDL and LDL are mostly a result of this. Although lifestyle changes and glycaemic management can improve the lipid profile, statin medication has the greatest impact on cardiovascular risk reduction.[4]. High blood glucose levels brought on by diabetes can damage your blood vessels as well as the nerves that regulate your heart and blood vessels. Heart disease may potentially result from this injury. Diabetes patients have a higher risk than non-diabetics of developing heart disease earlier in life.Individuals with diabetes are approximately twice as likely as adults without diabetes to get heart disease or stroke.[5] To reduce the CVD risk of T2DM patients, multifactorial intervention is needed. This strategy comprises cholesterol management, glycemic control, hypertension control, smoking cessation, weight loss, and increased physical activity. Lipid therapy treatment reduces the cardiovascular disease. The Lipid Association of India proposed structured treatment outcome based on the Indian patients' CVD risk [6] Diabetic is the terrible illness widespread around the world and is posing a severe threat to human health. Numerous chemical treatments are available to manage and treat diabetic individuals, however full recovery from diabetes has not yet been documented. In addition to side effects, pharmacological therapies are not always effective at preserving and averting complications from advanced diabetes.[7]

Diet has been acknowledged as the foundation for managing diabetes mellitus. The most popular dietary additives that improve the flavour and taste of food are spices. Additionally, spices have a number of positive physiologycal effects, including an anti-diabetic effect[8]. Diabetic patients and medical experts are increasingly looking for medicinal herbs with antihyperglycemic activity as a substitute treatment [9]. Treatment options for Diabetic Mellitus may include insulin therapy, long-term usage of oral hypoglycemic medications, dietary changes, and exercise. Plants have been an excellent source of medicine since the beginning of time. Researchers pay attention to the quest for plants with hypoglycemic properties. 45 of these plants and the medicines they produce that have been employed in the Indian traditional medical systems have been studied internationally.[10]

There are now numerous therapeutic approaches for diabetes mellitus. Among them, alternative medicine, such as Ayurveda, Homeopathy, Siddha, yoga, naturopathy, etc., plays a significant role in India. Herbal extracts from plant roots, leaves, petals, etc. are frequently utilized as a therapy method in Ayurveda. Ayurveda's potential in the management of diabetes is being researched. According to certain research, curry leaves can lower blood sugar levels.[11]

The chemical components of various carbazole alkaloids and other significant metabolites, including terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid from various parts of the M. Koenigii plant, have been credited with the medicinal properties of M. Koenigii.[12] Diabetes is going to have a tremendous adverse effect on health and economy of our nation so it is essential to implement measures to treat the diabetes and decrease the incidence of Diabetic complications, The researcher is interested to carry out this study in a rural neighbourhood where she could discover more individuals with diabetes. The local population can easily access and afford these curry leaves.

Ethical consideration; The Institutional Ethical Committee of Health Sciences under the Saveetha Institute of Medical and Technical Sciences approved a study (058/04/2021/IRB-HS/SIMATS dated 9 April 2021). The investigators explained the purpose of the study to the participants in their regional language and clarified any concerns. Written informed consent was obtained from the participants after assuring confidentiality.

Sample Size: The sample size was calculated by Sigma Plot 13 (Systat Software Inc., Palo Alto, CA).

The sample size was estimated assuming a 20% reduction of HDL with a 35% standard deviation,90% power, 5% significance level, and 20%as drop out; the sample size was rounded off to 30 in each for the control and experimental group.

MATERIAL AND METHODS

A Quasi experimental research design was used to assess the effectiveness of curry leaves powder among type II diabetes patients with mild elevated lipid profile. This study was conducted for the duration of one month from 23rd June 2022 till 23rd July 2022 in the selected rural area. After obtaining ethical clearance from the Institutional Ethical Committee (IEC) and a formal permission from both village presidents the main study was conducted. A total of 60 samples who fulfils and meets the inclusion Criteria was selected as samples by using Non probability purposive sampling technique. 30 samples were selected for experimental group and next 30 samples were selected for control group. Type II Diabetic Patients with in the age group of 40-65 years, Patients with type II diabetes with mild elevated in lipid profile, having fasting blood sugar in range between 140mg/dl -160mg/dl and Postprandial blood sugar range between 220mg/dl – 260mg/dl, and abnormalities in one of the lipid parameters, Total cholesterol range between 200mg/dl- 239mg/dl, Triglyceride range between 150-199mg/dl, High Density lipoprotein range from 40mg/dl and less than 40 mg/dl and Low Density lipoprotein range between 130 mg/dl – 159 mg/dl, Both male and female Type II diabetic patients, who were on oral hypoglycaemic agents, available during the time of data collection were included in the present study after getting the informed consent from the study participants. Diabetic patients who were in the treatment of insulin, who were on other alternative treatment, who had hypertension and other cardiac disease, who were having any other complications of diabetes mellitus were excluded. After recruiting the Type II Diabetic patients through non probability purposive sampling technique, all the 60 diabetic patients were randomly assigned to either the intervention group (Curry leaves powder consumption) or the placebo group by using lottery method.

Intervention Protocol: (Curry leaves powder)

For experimental group 12gm of curry leaves powder mixed with 10 ml of water was given half an hour

before breakfast, morning/ daily in person for 30 days, for the placebo group, routine care was followed. Post test was conducted on the next day after completing intervention period for both experimental and control group by the researcher. The experimental group were monitored during intervention for any untoward reaction; however, no adverse effect was reported throughout the study. The ethical principles were adhered to protect the rights of the samples and maintained confidentiality throughout the study.

Analysis: The data were analysed by descriptive and inferential statistical SPSS statistical package (IBM SPSS Statistics, Armonk, NY). The demographic and clinical variables were described as frequency and percentage. The effectiveness of intervention within the group was calculated by paired t test, and the effect of intervention between the experimental and control group was compared by un-paired t test.. The probability of p<.05 or less was taken as statistically significant.

RESULTS:

The total number of participants screened according to the inclusion criteria was 60and were allocated into the experimental group (n=30) and control group (n=30). The demographic and clinical variables were expressed as frequency and percentage. Out of 30 samples in the experimental group, 13(43.3%) were aged between 55 – 60 yeas, 19(63.3%) were male, 23(76.7%) were Hindus, 11(36.6%) had primary education, 16(53.3%) were moderate worker, 20(66.7%) had 4 – 5 members in their family at home, 17(56.7%) had a monthly income of <Rs.10,000, 30(100%) were non-vegetarian, 17(56.7%) used to take non-vegetarian diet once in a week, 24(80%) had not performed any type of exercise, 23(76.7%) had not performed any exercise, 16(53.3%) used curry leaves in their food for good growth in the hair, 19(63.3%) had a BMI in the range of 25.0 – 29.9, 19(63.3%) had the family history of DM and the illness for 4 – 5 years, 18(60%) were under treatment for 4 – 5 years, 20(66.7%) were regularly taking diabetic medications, 30(100%) were taking allopathic type of treatment, 15(50%) often check their blood glucose level once in 3 months and 30(100%) had not faced any complications of diabetes.

Effectiveness of curry leaves powder on reducing blood glucose and lipid profile among the Patients with Type II diabetes with mild elevated lipid profile in the experimental group The table -1 elicits that the

obtained "t" values for the Fasting blood glucose is 7.409,for Post prandial glucose is 8.595, for Total Cholesterol is 7.811, for HDL is 5.432,for LDL is 3.599 and for Triglyceride is 18.285, findings implies that there is a significant difference between pre test and post test in blood sugar level and lipid profile before and after intervention.

The mean difference score for fasting blood glucose is 5.86, for postprandial blood glucose is 9.20,for Total cholesterol is 7.63, for LDL is 7.63, and for triglyceride is 9.33 respectively from pre intervention to post intervention depicts the effectiveness of the intervention as the mean score decreased and for HDL mean score is 3.13 was found to be statistically significant at p<0.001

level which clearly shows that there was significant increase in the level of HDL after the administration of curry leaf powder among Experimental Group.

Comparison of post-test level of blood glucose and lipid profile between the experimental and control group.

The table -2 elicits that the obtained "t" values for the Fasting blood glucose is 2.648,for Post prandial glucose is 3.436, for Total Cholesterol is 2.063, for HDL is 3.264,for LDL is 2.023 and for Triglyceride is 2.119, findings implies that there is a significant difference between two group in post-test in the blood glucose and lipid profile after intervention to Experimental group.

Table:1

Effectiveness of curry leaves powder on reducing blood glucose and lipid profile among the Patients with Type II diabetes with mild elevated lipid profile in the experimental group N = 30

Variables	Pre-test	Post test	Mean Difference Score	Paired "t" Test and p- value	Percentage of reduction
	Mean ± S.D (mg/dl)	Mean ± S.D (mg/dl)			%
FBS	102.43±9.13	96.57±8.39*	5.86	t = 7.409 p = 0.0001 S*	5.72%
PPBS	144.03±10.55	134.83±10.57*	9.20	t = 8.595 p = 0.0001 S*	6.39%
Total Cholesterol	207.23±17.97	199.60±18.68*	7.63	t = 7.811 p = 0.0001 S*	3.68%
HDL	43.87±6.68	47.0±6.09*	3.13	t = 5.432 p =0.001 S*	7.13%
LDL	119.90±25.01	112.27±19.04*	7.63	t = 3.599 p = 0.0001	6.36%
Triglyceride	103.20±26.29	93.87±25.35*	9.33	t =18.285 p = 0.0001 S*	9.04%

*Significant at p<0.05

Table 2

Comparison of post test level of blood glucose and lipid profile among type2 diabetic clients in experimental group and control group N =30+30

| Variables	Experimental group Post test	Control group Post test	Mean Difference Score	Un Paired "t" Test and p- value
	Mean ± S.D (mg/dl)	Mean ± S.D (mg/dl)		
FBS	96.57±8.39	102.50±8.96	5.93	t = 2.648 p = 0.010 S*
PPBS	134.83±10.57	145.10±12.49	10.27s	t = 3.436 p = 0.0001 S*
Total Cholesterol	199.60±18.68	209.50±18.49	9.90	t =2.063 p = 0.044 S*
HDL	47.0±6.09	42.17±5.36	4.83	t = 3.264 p =0.002 S*
LDL	112.27±19.04	123.50±23.72	11.23	t = 2.023 p = 0.048
Triglyceride	93.87±25.35	107.90±25.96	14.03	t =2.119 p = 0.038 S*

*Significant at p<0.05
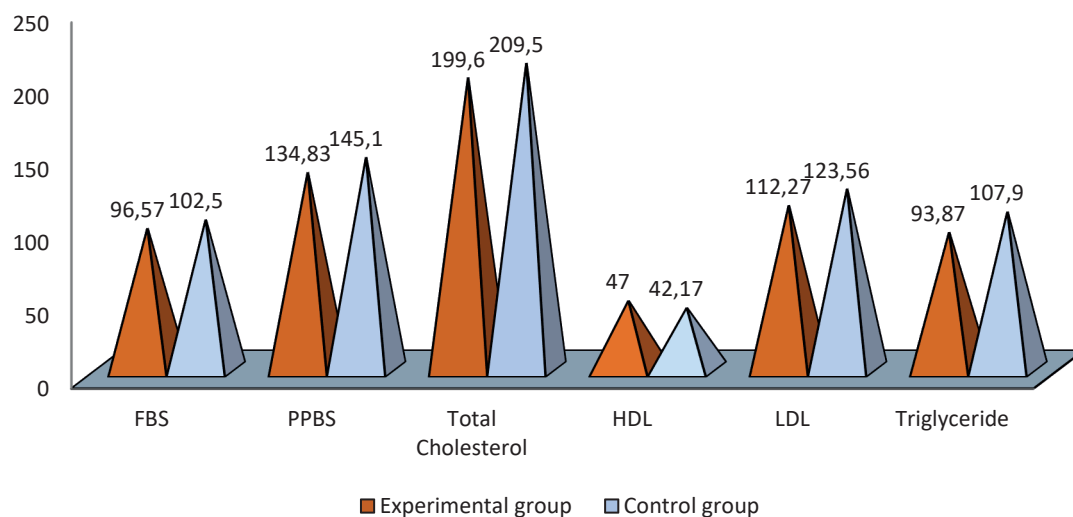
Fig:1 Comparison of post-test level of blood glucose and lipid profile among type 2 diabetes mellitus clients in experimental group and control group

The mean difference score for fasting blood glucose is 5.93, for postprandial blood glucose is 10.27,for Total cholesterol is 9.90, for LDL is 11.23, and for triglyceride is 14.03 respectively among two groups,from this the post intervention depicts the effectiveness of the intervention as the mean score decreased and for HDL mean score is 4.83 was found to be statistically significant at $p<0.001$ level which clearly shows that there was significant increase in the level of HDL after the administration of curry leaf powder among experimental group.

DISCUSSION:

The current study analysed that alternate therapy for reducing blood glucose and lipid profile was effective and proved the hypothesis of significant reduction in blood glucose and lipid profile after administration of curry leaves powder in experimental group, on comparing the pre and post test blood glucose and lipid profile in relation to curry leaves powder among Type II Diabetic Patients in experimental group, the obtained "t" values for the Fasting blood glucose is 7.409,for Post prandial glucose is 8.595, for Total Cholesterol is 7.811, for HDL is 5.432,for LDL is 3.599 and for Triglyceride is 18.285, findings implies that there is a significant difference between pre test and post test in blood glucose and lipid profile before and after intervention.The mean difference was found to be statistically significant at $p<0.001$ level which clearly shows that there was significant effect after the administration of curry leaf powder among Experimental Group. The study was also supported by Jad-

hav, Kunal & Dhudum, Basavant. (2019) revealed that the p value was > 0.05,stated that there was significant difference in the average fasting and post Prandial BSL at 5% level of significance. Effect of curry leaves powder was seen after administrating to client it reduced blood sugar level after specific time span. Curry leaves powder is helpful for the diabetic clients to reduce blood sugar level without any side effects. The present study was supported by PV LINCY (2019),. The obtained't' value for blood sugar level was 13.16 for the experimental group. Blood sugar levels measured in type 2 diabetes patients were greater than the table value according to the obtained "t" value. When type 2 diabetic clients received curry leaf powder, their blood sugar levels were markedly lower than those of the non-reciprocating consumers. Similar study conducted by Molly J et al.,(2022) on effect of curry leaves powder and slicing cucumber fruit on hyperlipidemia in the menopausal women. The treatment groups for curry leaf powder and cucumber, as well as TC, LDL-C, and TAG, saw significant reductions (p 0.05). Only the curry leaf powder treatment group's HDL-C level (46.19.2 mg/dl) increased considerably (p 0.05). (average 12 percent).Although the mean TC, LDL-C, and TAG readings in the control group were higher, the difference was not statistically significant. When the effectiveness of the test chemicals at the tested doses was compared, the HDL-C level in the curry leaf treatment group was statistically greater (p = 0.09). In menopausal women with hyperlipidemia, curry leaves and cucumber were beneficial in raising HDL-C and lowering LDL-C and TAG levels, suggesting a possi-

ble neutraceutical function in the treatment of CVD. The present study the mean score of experimental and control group was compared by unpaired t test and found to be significant difference in blood glucose and lipid profile between experimental and control group. The mean difference score for fasting blood glucose is 5.93, for postprandial blood glucose is 10.27,for Total cholesterol is 9.90, for LDL is 11.23, and for triglyceride is 14.03 respectively among two groups,from this the post intervention depicts the effectiveness of the intervention as the mean score decreased and for HDL mean score is 4.83 was found to be statistically significant at p<0.001 level which clearly shows that there was significant increase in the level of HDL after the administration of curry leaf powder among experimental group. Similar study was supported by K. N Gomathi (2016), On comparing the pre and post blood glucose level among Type II Diabetic Patients in the experimental group and control group had mean differences that, respectively, were 10.44% and 0.76%. According to the results, there is a substantial difference between the experimental group's pre- and post-prandial blood sugar levels. After 14 days of receiving 10 grammes of curry leaf powder, the experimental group's blood sugar levels significantly decreased, according to the study's findings. Similar study was supported by Joseph Ranjith, et al., (2015) on effect of curry leaves in the control of blood sugar among diabetic clients. Researcher has taken 43 Diabetic client and curry leaves powder 2.5gm morning and night daily was administered to the experiment group. There was a consistent decrease in mean blood sugar level from day 1(249.045) to day 15 (219.95) to day 30 (197.05) in the Interventional group. Whereas in control group the mean blood sugar remained almost same level on day 1(214.68), day 15(213.86) and day 30(210).

The present study limited to assess the blood glucose and lipid profile hence further study can be conducted to assess the hemoglobin level. Many study have explored that curry leaves is the richest source of iron by administration the curry leaves it increase the haemoglobin level.

CONCLUSION

Based on the finding of the current study it was evident that there was significant effect of curry leaves consumption that enhance the reduction of blood glucose,lipid profile among Type II diabetes with mild elevated lipid profile level. Therefore curry leaves powder can be used as an alternative treatment for Diabetes, Curry leaves are readily available in markets and simple to utilise. Consuming is less expensive and not dangerous. In order to achieve that goal Ayurvedic treatments are becoming popular among people as in contrast to allopathic medicine. a client with diabetes received greater backing in this research. Some patients with diabetes also curry leaves' impact on blood sugar levels has been mentioned.

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