

Impact of Pranayama and Amla, an approach towards the control of Diabetes mellitus

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Abstract: Progress in understanding the metabolic staging of diabetes over the past few years have led to significant advances in regimen for treatment of this devastating disease. The most challenging goal in the management of patients of diabetes mellitus is to achieve blood glucose level as close to normal as possible. Psychological stress worsens glycaemic control and increases oxidative stress in Type 2 DM patients. The practice of Pranayama, along with consumption of amla reduces psychological stress and improves glycemic control in diabetic individuals, thereby preventing its progression to complications. *Emblica officinalis* (Amla) are widely used in the Indian system of medicine and believed to increase defense against diseases. Objective of present investigation was to study anti-diabetic activity of fresh fruit *Emblica officinalis* as well as impact of pranayama over diabetes. This study was conducted in Acharya Nagarjuna University and Guntur city. Selected 60 diabetic patients and were divided into control and experimental groups with 30 each. The experimental group was instructed with Pranayama techniques like-Anuloma -Viloma, Bhramari, Bhastrika, Ujjayi, Kapalbhathi, Nadi Sodhana, Shitali Pranayama, Digra Pranayama, At the same time they were given an amla every day. The duration of the study was six months. The results showed significant decrease in metabolic parameters and anthropometric results.

Key Words: Diabetes mellitus, Hypoglycemia, Pranayama, metabolic parameters, Anthropometric measurements.

Introduction

Diabetes is a metabolic disorder characterized by chronic hyperglycemia with disturbances of carbohydrates, fat and protein metabolism resulting from in insulin secretion, insulin action both. Diabetes mellitus (DM) is common endocrine disorder affecting more than 150 million people worldwide and this number is likely to increase to 300 million by the year 2025, out of which more than one-fifth are Indians. According to the International Diabetes Federation, India has been declared as the diabetes capital of the world. Diabetes is a metabolic disorder characterized by chronic hyperglycemia with disturbances of carbohydrates fat and protein metabolism resulting from in insulin secretion, insulin action both. The incidence of type 2 diabetes is also increasing with the increase in age, physical inactivity and sedentary lifestyle (1).

Diabetes is a disease in which the body does not produce or properly use insulin. Insulin is a hormone that is needed to convert sugar, starches and other into energy needed for daily life. There are many medications and insulin injections available to control diabetes, but it can be cured by pranayama. Pranayama is the breathing process or the control of the motion of inhalation, exhalation and the retention of vital energy.

Pranayama breathing techniques are not only effective in the control of diabetes, but also cure the disease as well (9). Pranayama can control diabetes by reducing the blood sugar levels. It also reduces the blood pressure, weight, the rate of progression to the complications as well. The symptoms related to diabetes are also can be reduced to a great extent.

Diabetes is a disease in which the body does not produce or properly use insulin (17). Insulin is a hormone that is needed to convert sugar. The postulated risk factors predisposing the diabetes are age, sex, race and genetics which cannot be controlled or modified, whereas the factors such as obesity, hypertension, exercise habits and stress can be modified or controlled to reduce the risk of diabetes (8).

Diabetes mellitus is one of the most burdensome chronic diseases that is increasing in epidemic proportion throughout the world. Deaths attributed to diet related non communicable disease in India is projected to increase from 31.6 to 43.3 of all deaths by 2020 (20). The global prevalence of type 2 Diabetes mellitus will be more than double from 13.5 million in 1995 to 300 million by 2025 (18).

Emblica officinalis (EO) enjoys a hallowed position in Ayurveda—an Indian indigenous system of medicine. EO primarily contains tannins, alkaloids, phenolic compounds, amino acids and carbohydrates. It is rich in chromium, which makes it very beneficial for diabetes. It has a therapeutic value in diabetes (10). It is also known to stimulate the isolated group of cells that secrete the hormone insulin. This decreases the blood sugar. Amla contains many nutrients, it is abundant with vitamin C and is beneficial for our body no matter in what form it is eaten. It contains many minerals and vitamins like calcium, Phosphorous, iron, carotene and vitamin B complex (7). It is also a powerful antioxidant, immunomodulator, hypoglycemic, hypolipidemic, hypertensive, antacid. Amla fruit is acrid, cool refrigerant diuretic, laxative, antipyretic vitamin C. 100gms of amla contains about 700mg of vitamin C, which is 30 times the amount found in orange. In addition to vitamin C it too contains calcium, iron, protein, sugar, phosphorous, carbohydrates gallic and tannic acids etc (11). In view of the present study was planned to see the effect of amla an approach towards the control of diabetes mellitus. Gooseberry contains chromium. It has a therapeutic value in diabetics. Indian Gooseberry or Amla stimulate the isolated group of cells that secrete the hormone insulin. Thus it reduces blood sugar in diabetic patient (3).

There are several types of Pranayama mentioned in Hatha Yoga. One of the basic preparations for pranayama is Nadi shodana pranayama alternate nostril breathing. This type of pranayama can cure diabetes as alternate nostril breathing has calming effect on nervous system reduces stress levels and their helps in diabetes treatment (1). It has been found that Bhastrika and bhramari pranayama can help in curing diabetes. So the Investigators were interested to study the specific role of pranayama on diabetes patients.

Diabetes cure by pranayama in the following way.

- Pranayama controls the motion of inhalation, exhalation and the reflection of vital energy.
- Pranayama can cure diabetes by reducing blood sugar levels.
- It also reduces the blood pressure, weight the rate of progression to the complications and the severity of the complications as well.

Pranayama also works on the possible mechanisms are

1. Glucagon secretion enhanced by stress. Pranayama effectively reduce stress. These reducing glucagons and possibly improving insulin action (15).
2. Weight reduction by pranayama is a well accepted mechanism (13).
3. Muscular relaxation development and improved blood supply to muscle might enhance insulin receptor expression on muscle and their reducing blood sugar (4).
4. Blood pressure plays a great role in development of diabetes and related complications, which is proven to be benefited by pranayama. The same holds true for increased cholesterol levels (2).
5. Pranayama reduces adrenaline, non adrenaline and cortisol in blood which are termed as stress hormones. This is likely mechanism of improvement in insulin action (16).
6. Many yogic postures do produce stretch on the pancreas which is likely to stimulate the pancreatic function (12).

Materials and Methods:

The present study was conducted in Acharya Nagarjuna University and Guntur city for 6 months. We selected 60 uncomplicated type 2 diabetic subjects in the age group of >40 years with diabetes duration of 1-10 years. They were divided into test group and control groups with 30 patients in each group. The test group was taught pranayama for one hour every day by yoga expert. Both test and control groups were prescribed medicines and diet. The subjects were under physician's control till the end of study period. The basal FBS, PPBS, HBA1C, total cholesterol, TGS, HDL, LDL, VLDL, Serum creatinine, blood urea and anthropometric measurements were measured and repeated after 6 months of study. The recorded parameters were compared and statistically analyzed.

Table: Name and duration of Pranayama

S.No	Name of the Pranayama	Duration
1.	Anuloma-Viloma	5-10 mins per day
2.	Bhramari	5-10 mins per day
3.	Bhastrika	3-5 mins per day
4.	Ujjayi	5-10 mins per day
5.	Kapalbhati	5-7 mins per day
6.	Nadi Sodhana	5-10 mins per day
7.	Shitali	3-5 mins per day
8.	Digra	3-5 mins per day

Results:

Table 1: Metabolic parameters

S.No	Parameter	Experimental Group		Control group	
		Initial	Final	Initial	Final
1	FBS	178.2 ±34.51	154.0 ±31.77	177.5 ± 27.64	166.3 ±30.40
2	PPBS	269.8 ±44.97	246.13 ±46.93	291.5 ± 37.7	265.93±39.56
3	HBA1C	8.19 ±0.73	7.94 ±0.68	8.41 ± 0.57	8.06 ± 0.65
4	Triglycerides	126.6 ±18.28	117 ±20.67	164.7 ± 42.55	143.7 ±40.22
5	HDL	34.37 ±3.54	38.5 ±3.47	34.03 ± 4.62	37.4 ±4.46
6	LDL	155.97 ±25.17	143.1 ±24.85	131.13± 39.93	112.16 ±39.3
7	VLDL	25.0 ±3.61	23.0 ±4.20	32.76 ± 8.38	28.43 ±7.89
8	T.Cholesterol	215.2 ±23.59	204.63 ±22.94	198.03± 40.39	178 ±39.57
9	S.Creatinine	1.19 ±0.23	1.05 ±0.18	1.10 ± 0.23	0.96 ±0.22
10	Urea	39.23 ±5.21	32.2 ±4.70	38.6 ± 5.21	36.1 ±5.31

Table 1 shows that there was significant decrease in FBS, PPBS and HbA1c of test group. Similar significant change in triglycerides and LDL of test group and significant increase in HDL of test group was seen. There was no significant change in all the parameters of the control group. There was significant decrease in the levels of cholesterol, creatinine and urea of the test group also.

Table 2: Anthropometric measurements

S.No	Parameter	Experimental Group		Control group	
		Initial	Final	Initial	Final
1	Weight	73.3 ± 4.63	70.1 ± 4.37	62.33 ± 8.63	61.63 ± 8.51
2	Waist	77.8 ± 4.35	75.0 ± 4.41	88.5 ± 5.50	87.23 ± 5.18
3	Hip	91.0 ± 5.19	87.8 ± 5.32	98.8 ± 6.23	97.53 ± 6.08
4	W/H Ratio	0.851 ± 0.05	0.855 ± 0.05	0.89 ± 0.02	0.89 ± 0.27
5	BMI	25.13 ± 2.11	25.07 ± 2.10	24.83 ± 2.05	24.06 ± 2.14

Table 2 indicates a reduction in the weight, BMI and waist- hip ratio in test group. Such a change in the control group was not found.

Discussion

In the present study there was significant decrease in FBS, PPBS values in test group who underwent the 6 months pranayama practice as well as consumption of amla. There was significant decrease in the total cholesterol, triglycerides and LDL levels. The improvement in the lipid profile after pranayama could be due to increased hepatic lipase and lipoprotein lipase at cellular level, which affects the metabolism of lipoprotein and thus increase uptake of triglycerides by adipose tissues (6). There was no significant change in HDL levels in the control group. There was significant decrease in weight, BMI and waist-hip ratio. Similar findings were observed by (14). Also there was decrease in the HbA1c %. Finally in the present study it is concluded that there was significant difference in the Biochemical parameters of FBS, PPBS, HBAIC, Total cholesterol, TGS, and LDL levels of test group. But there was no significant difference in the control group.

It was very interesting that almost same anti diabetic effect was observed by chlorpropamide which is known to produce its effect by stimulating the release of endogenous insulin (19). This finding supports the earlier reports of phyllanthus species which were found to involve in regeneration and rejuvenation of β cells leading to an increased insulin production and secretion (5) This decreases the blood sugar.

The possible mechanisms of actions of pranayama in decreasing the blood sugar are besides intake of amla are -a) Direct rejuvenation / regeneration of cells of pancreas due to abdominal breathing, which may increase utilization and metabolism of glucose in peripheral tissues, liver and adipose tissues through enzymatic process. b.) muscular relaxation, development and improved blood supply to muscles might enhance insulin receptor expression on muscles causing increased glucose uptake by muscles and thus reducing blood sugar.

From the results, it is clear that supplementation of amla also showed a favorable impact on the FBS, PPBS, HbA1C, TC, triglycerides and lipid profile of the subjects. This could be due to the nutrient and phytochemical composition of amla. The fruit amla is the richest source of vitamin-c, containing more than 20 times that of orange. The gallotannins in the fruit preserve the vitamins under all conditions. It is believed that what gold is to minerals, Amla is to the herbs. The edible fruit tissue contains protein concentration, ascorbic acid, minerals, aminoacids, phyllembin and curcuminoids which has direct effect on glucose metabolism. Thus amla may be used as a supportive therapy for diabetes.

Addition to all the above effects, following pranayama and consuming amla, many patients reported a feeling of well-being, more relaxed and satisfied and a sense of relief from anxiety. Thereby concluding that there are significant benefits of pranayama practices and consuming amla on metabolic parameters and anthropometric measurements in type-2 diabetic patients.

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