

Effect Of Alternative Therapy On Cardiorespiratory And Sensory Parameters Of Chronic Type 2 Diabetes Mellitus Patients

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Abstracts: Background: The incidence of diabetes mellitus is increasing every year throughout the world. Yogic exercises with diet therapy can be an easy way of management of diabetes to maintain blood sugar level and prevent various degenerative changes in different systems to remain healthy. Methods: Fifty two known chronic type 2 diabetic patients were managed through yogic exercises and diet therapy for 150 days. Physiological parameters were studied in all subjects. Results: Diastolic blood pressure, positive breath holding time, pain threshold and tactile discrimination showed changes within 15 to 30 days of regime. There was reduction in body weight and respiratory rate. The rise was observed in 40 mm of mercury endurance test and positive breath holding time. Both pain threshold and tactile discrimination showed increase of sensitivities. Conclusion: Improved physiological parameters indicate that yogic exercise, meditation and diet control regularly can manage type 2 diabetes in a natural way avoiding the side effects of oral hypoglycemic medications. Patients should continue the therapy to control the disease life time for better health without oral hypoglycemic medication. [Pandya A et al NJIRM 2012; 3(3) : 20-23]

Key words: Type 2 diabetes mellitus, cardio respiratory parameters, sensory neural functions, nature cure.

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Introduction: The prevalence of diabetes type 2 is rising rapidly especially in the urban population because of increasing obesity and reduced physical activity. Due to chronic course of disease and complexities, diabetics nowadays turn to alleviate complications to optimize their health through use of complementary therapies.^{1,2}

Diabetes mellitus type 2 is a clinical condition, characterized by hyperglycemia due to insufficient or inefficient (incompetent) insulin leading to glycosuria. An important feature of diabetes mellitus is that the body cells are starved of glucose despite its very high concentration around.¹

Over eating coupled with under activity leads to obesity and type 2 diabetes.¹ Obesity acts as a diabetogenic factor in genetically predisposed individuals, by increasing the resistance to the action of insulin which is due to decrease in insulin receptors over target cells. An epidemiological study has reported that 75 percent of diabetics are obese and they can control the disease by diet therapy and exercise.³

Yoga is an old, traditional, Indian psychological, physical and spiritual exercise regimen for its role

in the management of several chronic diseases.^{4,9,10} Yoga is a simple and economical therapeutic modality, a beneficial adjuvant for type 2 diabetes⁵ in association with diet therapy. Objective of the study was to find effectiveness of natural therapy in controlling diabetes mellitus without medications and to observe reversal of degenerative neuropathy.

Material and Methods: Camp for rehabilitations of diabetic patients was organized by Shri Aurobindo Ashram, Vadodara. The study was carried out by authors at Government Medical College, Baroda with permission from ethical committee. Among those who attended the camp, 107 patients were diagnosed with chronic type 2 diabetes mellitus since more than five years within the age range of 40 to 60 years and were on oral hypoglycemic drugs in different form of preparations as prescribed by their physician. The study was conducted on all the patients with their consent. At the end, data of only 52 was analyzed as they were regular and followed the treatment regime strictly and rest of the patients were excluded from the study.

Selected subjects were given natural treatment in the form of different yogic exercises and diet

therapy. During the treatment, patients were instructed strictly to discontinue oral hypoglycemic drug. However; they were allowed to perform their routine light work yet restricted from heavy laborious work. The yoga and diet therapy together continued up to 15 days. From 16th day onwards up to 30th day, all the subjects were doing yogic exercises and meditation but gradually put on their regular conventional food and work was restricted. From 31st day onwards study was followed up to 150 days in the same subjects to see its long term effect.

Every morning, patients were coming to camp site for yogic exercises, meditation and dietary instructions. Treatment given consist of (a) meditation for half an hour (6.00 to 6.30 a.m.), (b) walking bare footed on green grass with regulated deep breathing for half an hour (6.30 to 7.00 a.m.), (c) yoga asanas e.g. munduk, vajrasana, paschimotanasana, etc and sunbath with body and mind relaxation for one hour (7.00 to 8.00 a.m.), (d) breakfast of lemon juice, fruits or fruit juice, wheat grass juice and (e) lunch of leafy fresh vegetables, carrots, cucumber, coconut, alpha-alpha, sprouted cereals and legumes. Food items for lunch and supper were supplied, weighing different items according to minimum patients' caloric requirements and instructing about its timings so that they can continue their routine duties regularly. (f) Snacks consisted of fresh tomato juice, coconut water or seasonal fruit juice without any preservative in it. (g) Supper mainly consisted of any one type of fresh seasonal fruit.

All the eating items were given in raw form only (uncooked) for first 15 days. The average daily intake of the diet consisted of 600 Calories – 20 grams proteins, 100 grams carbohydrates and 15 grams fat. It was rich in carotene and ascorbic acid. Food was totally free from external salt and sugar. The subjects were restricted for table salt and sugar for 15 days, at home as well as at job campus. After 15 days, patients were gradually switched on to their routine conventional food however the yoga asanas were continued up to 30 days.

All the subjects were known cases of chronic diabetes mellitus (type 2), yet blood sugar level

was estimated but is not mentioned in this paper. In all subjects some physiological parameters – body weight, respiratory rate, positive and negative breath holding time, 40 millimeter mercury endurance test, pulse rate, arterial blood pressure (by sphygmomanometer), tactile discrimination (by compass aesthesiometer) and pain threshold (by algometer) on the fixed part of the body were studied in the morning hours to avoid diurnal variation. Results of collected data were statistically analyzed. The standard deviation and standard error were calculated. The significant values were expressed in terms of 'P' value by applying student's unpaired 't' test.

Result: The results suggested significant role of yoga and diet therapy in controlling type 2 diabetes, even in patients with pre-existing complications. Most of symptoms related to the studied parameters subsided during the course of program.

Body weight of the patients decreased up to 15 days and then by 150 days came back to original weight. There was insignificant fall in respiratory rate but no definite trend found in negative breath holding time. The positive breath holding time was increased up to 30 days then again on 150 days came back to original level. On 15th day the increase of 40 mm of mercury endurance capacity was significant ($p < 0.05$) when compared to that of first day. After 15 days this endurance capacity slightly decreased up to 150th day, however, still this value was higher in comparison to that of first day value.

There was insignificant fall in pulse rate during treatment and there after it remained steady. No definite changes in systolic arterial blood pressure has been found but significant drop in diastolic blood pressure has observed. Both pain threshold and tactile discrimination showed increase of sensitivities up to 30 days ($p < 0.05$). There after there was no change. All participants assigned to yoga and diet intervention completed the program without complication and expressed high satisfaction as they found good change in status of their type 2 diabetes

Table – 1. Shows mean and S.D. (\pm) values of Body weight, Respiratory rate, Breath holding time (BHT) and 40 mm. Hg. endurance test during different day(s) (* P < 0.05)

		No Of Days								
		1	8	15	30	45	55	65	75-100	125-150
Weight (Kg.)	Mean	61.83	60.06	59.21	63.22	62.60	56.18	53.34	65.77	62.87
	S.D	± 12.13	± 12.06	± 11.84	± 13.39	± 16.13	± 6.54	± 6.41	± 6.26	± 14.01
Respiratory rate/min.	Mean	15.0	16.4	15.9	15.0	14.8	14.7	14.4	14.2	13.6
	S.D.	± 2.3	± 2.2	± 1.8	± 2.4	± 1.3	± 0.8	± 1.2	± 1.5	± 1.0
Positive BHT (Sec)	Mean	42.5	37.8	49.9	58.6	55.8	49.7	47.3	43.5	40.1
	S.D.	± 22.8	± 12.7	± 42.4	± 55.6	± 46.4	± 14.2	± 16.8	± 11.8	± 15.2
Negative BHT (Sec)	Mean	29.5	26.9	29.8	29.9	28.4	26.2	26.8	27.6	28.9
	S.D.	± 10.7	± 7.7	± 12.9	± 11.3	± 9.4	± 6.8	± 8.5	± 5.6	± 10.4
40mmHg endurance test (Sec)	Mean	28.5	37.2	41.1*	36.2	37.3	38.4	38.1	37.9	36.9
	S.D.	± 8.2	± 12.0	± 22.1	± 25.8	± 16.8	± 16.4	± 16.0	± 8.3	± 19.6

Table- 2. Shows mean and S.D. (\pm) values of Pulse rate, Blood pressures, Tactile discrimination and Pain threshold at different day(s) (* P < 0.05)

		No Of Days						
		1	8	15	30	45-65	75-100	125-150
Pulse rate / min.	Mean	72.0	71.4	71.6	70.8	70.3	69.0	70.0
	S.D.	± 4.2	± 3.7	± 4.4	± 3.2	± 4.0	± 4.1	± 3.1
Systolic BP (mm of Hg)	Mean	117.5	113.1	116.0	112.0	119.6	118.8	118.2
	S.D.	± 10.9	± 14.4	± 10.0	± 11.4	± 14.2	± 14.6	± 12.2
Diastolic BP (mm of Hg)	Mean	80.0	73.1	74.6	69.1	76.4	74.0	72.2
	S.D.	± 7.2	± 6.4	± 6.4	± 7.4	± 7.4	± 4.0	± 7.3
Tactile discrimination (mm)	Mean	16.4	12.7	10.5	09.1*	08.0	07.0	07.6
	S.D.	± 2.1	± 2.4	± 1.8	± 2.0	± 1.4	± 0.8	± 1.6
Pain threshold (lb)	Mean	20.8	17.2	15.6	16.8*	14.1	14.0	14.6
	S.D.	± 5.5	± 3.2	± 3.5	± 3.8	± 3.7	± 2.4	± 3.1

Discussion: Combined practice of several asanas has shown considerable impact in cardio-respiratory functions.^{7, 8} These effects might be due to specific rehabilitative effects of yogic practices on different vital organs improving their microcirculation and their functional efficiency.

The present study shows that the combined therapy of yoga and diet has a tremendous effect on respiratory efficiency, cardiovascular parameters and sensory neural functions by decreasing oxidative stress and improving antioxidant status.⁴ In our study we have found that yoga improves respiratory functions which are seen by decrease in respiratory rate and increase in positive breath holding time and 40 millimeter mercury endurance test. There

was fall in pulse rate during treatment and thereafter it remained at lower level. No change in systolic blood pressure but reduction in diastolic blood pressure signifying the minimization in peripheral resistance, which may be due to fall in serum cholesterol and triglycerides. Body weight has reduced during treatment but with introduction of conventional food they have gained the body weight. It is well known fact that any kind of regular exercise results in increase in vagal tone, which in turn improves cardio respiratory functions. The same has been observed in some studies.^{6,9,10,11,12} There were increased in sensitivities of tactile discrimination and pain threshold which may be due to loss of fat deposition beneath the skin or due to facilitation in regeneration of peripheral nerves

and more growth of different kind of sensory receptors over the cells.

It also controls further progress of neuropathy as blood sugar remains within normal limit. However, after discontinuing the natural treatment there was a tendency to come back to the original status. Hence, the diabetic patients should continue the natural yogic exercises and diet therapy regularly throughout life to keep the diabetes mellitus under control.

Conclusion: Yogic exercises in association with diet therapy have therapeutic preventive and protective effect on type 2 diabetes.⁵ Our findings suggest that type 2 diabetes may benefit from natural treatments' ability to improve their quality of life. It also improves sensory neural functions by some regenerative changes in peripheral nerves or overall increase in number of sensory receptors.

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