Proceeding of XII Annual Scientific Meeting
Presidential Address :

YOGA AND DIABETES

Dr. B. K. Sahay*

I consider it a privilege and honour to be elected as President of the "Research Society for study of Diabetes in India". I thank all the members of this society for reposing confidence in me.

It is proper that I should be delivering this presidential address at Hyderabad in this hall dedicated to the memory of Prof. S. Venkateshwara Rao himself, a Diabetologist, my old Teacher and Chief who initiated me into the field of diabetes about sixteen years back and encouraged me to pursue it. I remember having presented my l st paper "Microangiopathy in Diabetes", in the 1969 A.P.I. Conference at Hyderabad. Since then we have been doing lot of work in this field and have presented our data from time to time. I am also doubly pleased to have Prof. B. K. Naik in the audience, under whom 1 had my postgraduate training, who has been a constant source of encouragement and guidance to me.

Today 1 have chosen to speak on the subject of YOGA and DIABETES for my presedential address. We have been involved in the study of Diabetes during the last four years at the Vemana Yoga Research Institute, Secunderabad and I will be sharing with you all, our experience in this sphere. These studies are all collaborative work with Dr. K. J. R. Murthy, Dr. P. S. Raju, Dr. Madhavi, Sunitha, and Sri Bhaskara Charya (Biochem). Many of my patients used to pose me a question about the usefulness of Yoga in the treatment of Diabetes from time to time and I did not have an authentic answer for them. This prompted me to carry out these studies.

We all know that Yogis enjoyed good health and have longer life span (many of over 100 years) in contrast to the short life span in the general population (around 35 years). Infection used to take a heavy toll of lives and so possibly Yogis got protection from infections and also from CVD & CHD.

Does Yoga cure Diabetes? The claim of the Yoga exponents is that Yoga cures diabetes. Perhaps they meant control of diabetes among the obese NIDDNI who would respond to Diet and Exercise.

The results of studies carried by others like Mr. Divakar, Mr. Shambekar, Mohammed and our own preliminary studies showed that there was some beneficial ef1'ect of Yoga in controlling Diabetes. All these studies were done on small number of patients, over small periods of time and just relied on Blood Sugar estimations to asses the result.

So when we designed our studies, we planned them in such a manner to answer two main questions :

i. Does Yoga play a role in control of Diabetes'?

ii. If it has a role, what is the mechanism of its action?

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*Addl. Prof. of Medicine, OMC, Hyderabad.

Possible Mechanism of Its Action "Our Postulations"

1. Simple Exercise Effect.

2. Inculcating Discipline in Life-Diet.

3. Cuts Down Stress & Strain- "Shavasana"

4. Change in Biochemical Profile-Lactate, Pyruvate, Adrenaline, Nor Adrenaline etc.

5. Changes in Hormonal Profile : On Insulin kinetics and other Counter Regulatory Hormones-Glucagon, Growth Hormone, Corticosteroids.

We studied normal volunteers and diabetic patients from different angles to find out an answer to these questions. Our studies in diabetic patients were done in a phased manner.

I. Thirty five (Females 7 -I- 28 Males) diabetic subjects were studied in detail to assess the effect of Pranayama. Among these four patients were IDDM and were on Insulin and among others two were on Insulin and 24 on. oral drugs. Five cases dropped out during the studies.

After preliminary evaluation of the patient a suitable diet was prescribed. Baseline data were drawn after one week. The fasting and Post lunch BSL were estimated at periodic intervals (Astoor and King method).

Five patients voluntered to undergo GTT at monthly intervals. Serum samples were also collected for I.R.I. estimation by the Elisa technique.

All patients practised Pranayama Rechaka Puraka (slow breathing in and breathing out), Surya Chandra bedha (rapid and shallow breathing) and Kumbhka (breath holding) with Shavasana at the end of exercise. These exercises were done for 1/2 hour. On the day of blood sampling exercises were not performed. (Table I)

Results of this Study

i. All the patients studied developed a feeling of well being within a week.

ii. A reduction of dosage of oral drugs as well as Insulin was needed in 17 subjects during the study.

iii. There was a significant fall in the fasting and post lunch BSL levels in 26 NIDDM subjects as well as the 4 IDDIVI subjects. (Table I1)

iv. An analysis of the GTT and IRI estimations in 5 NIDDM subjects showed a fall in blood glucose levels at all points but the difference was not significant. An analysis of the I/G ratio in these subjects showed a significant fall in the fasting state and the I/G ratios were uniform after pranayama.

Then we directed our studies to assess the effect of individual Yogic practices in controlling diabetes. The aim is to identify a few Yogic practices which will be specifically useful in controlling diabetes.

Methods of Study

Sixteen known NIDDM patients were selected for the study. Their ages varied from 32-56 years The patients were put on a suitable diet and were allowed to continue their drugs if they were already on treatment. After a week they underwent a standard GTT as recommended by W.H.O. These values were taken as control values.

Patients were randomly allotted to different groups and they performed Yogic practices of that group for 45 minutes each day. Two relaxation practises were common for all the groups.

The diabetic status of the patients was assessed before and after Yogasanas by post lunch urine examination twice weekly and post lunch BSL on days 14 & 28. In addition GTT and serum Insulin levels were repeated after one month of Yoga practice. (1'able III a) Results and Discussion

Post glucose blood sugar values and GTT repeated at the end of one month in each group showed a significant fall with group D Yoga Asanas only.

Thus our studies reveal that optimum control of diabetes can be achieved by practising Dhanurasana and Ardha Matsyendra Asana (Group D Asanas) while Halasana, Vajrasana, (Group B Asanas) and Naukasana, Bhujanga Asana (Group A) are not effective, whereas Yoga Mudra and Shalabasana may worsen the condition. In the next phase we studied the effect of Ardha Ma:tyendrasana and Dhanurasana on a fresh set of 5 & 5 patients respectively for a period of two months. Analysis of our results showed that both the fasting and post lunch BSL value showed a significant drop in five patients who where advised Dhanurasana while the six patients who practised Ardha Mathsyandrasana did not show a significant fall suggesting that the beneficial effect obtained with a combination of these two asanas was with Dhanurasana.

Acute Experiments in Diabetic Patients

These were planned to study the beneficial effect of Yoga on exercise tolerance. Three Diabetic patients were tested on a treadmill to fix the quantum of exercise. The studies were done in the beginning and repeated after one month of practice of Yoga. The different biochemical parameters were assessed before and after the tread mill exercise.

The BSL levels came down after the exercise. But an interesting observation was in the blood lactates. The blood lactate levels rose after the exercise by three fold and came down after one hour. There was a rise in the urinary excretion of lactates by almost four times the basal level which explained the fall in the blood lactates after one hour. When the experiment was repeated after these subjects had practised Yoga for one month some interesting observations were made. The rise in blood lactates in response to exercise was minimal and it dropped down to less than the baseline value at the end of one hour. But the urinary lactate levels showed an insignificant rise compared to the four fold rise in the pre-Yoga test, suggesting a possibility that the lactates are being metabolized through an alternate pathway. (Table IIIb)

This might also explain the improvement in the exercise tolerance as well as the feeling of well being which most patients develop after practising Yoga even before their diabetes status improves.

We have also in our ongoing studies planned to assess other biochemical parameters to find answers to some of the questions we posed to ourselves and to prove our "hypotheses" as to the possible mechanisms by which Yoga controls diabetes.

Ladies and Gentlemen, I hope my presedential address will evoke your interest in this field and stimulate more systematic work in this area in different centers so that we fathom the unexplored depths in this ancient science of ours.

Thanking You,

Table I

Yogaasans of Different Groups

Group - A	Naukasana	Bhujangasana
Group - B	Halasana	Vajrasana
Group - C	Yogamudra	Shalabasana
Group - D	Dhanurasana	Ardha Matsyendrasana

Common for all groups : Shavasana & Makarasana

Table II

Fasting BSL under different groups at the beginning and end of the study.

	No. of Subject		Before	After		P. Value
Group - A	9	X	116.78	98.78	L	0.01 X
		SE	13.81	9.33		
Group - B	8	X	135.58	121.50	7	0.1
		SE	21.63	15.68		
Group - C	9	X	94.56	108.22	7	0.1
		SE	14.81	10.92		
Group - D	10	X	168.20	120.80	L	0.01
		SE	19.27	9.20		

Table III (a)
Blood sugar Values before and after Yoga Asana

Group	No. of Pts.	Post Glucoses BSL Values (GTT Before and at the end of one month)				Post Lunch BSL on 28 days.		
		Before	After					
A	9 X	223.56	207.0	7	0.05	164.50	L	0.01x
	SE	14.63	17.83			15.30		
B	8 X	271.88	226.38	7	0.05	187.29	L	0.02 x
	SE	36.29	24.53			38.04		
C	9 X	217.78	237.98	7	0.01	149.13	7	0.05 x
	SE	24.82	13.73			16.65		
D	10 X	322.0	269.60	L	0.05 x	194.00	L	0.01 x
	SE	40.31	31.04			19.63		

* BSL values were estimated in venous whole blood (King & Astoor method). 6

Table III (b)

Acute Experiment Diabetic Patients-(3 Nos.)

		After one month Yoga			Before Yoga Training		
		Before	After	After 1 hr.	Before	After	After 1 hr.
Blood Sugar	X	152.23	150.0	143.67	160.67	129.67	120.33
	± 1 SD	104.51	117.89	87.31	96.42	49.24	44.79
	P	--	--	--	--	--	--
Blood Pyruvate	X	2.23	2.56	1.71	2.19	2.91	1.79
	± 1 SD	0.73	0.04	0.46	0.93	0.77	1.11
	P	--	--	--	--	--	--
Blood Lactate	X	19.13	23.54	9.94	8.47	25.15	12.15
	± 1 SD	4.83	2.27	1.48	2.00	9.21	1.38
	P	L 0.05	--	--	--	--	--
Urine Lactate	X	7.52	11.91	11.30	4.04	44.73	38.79
	± 1 SD	3.29	11.60	6.07	3.62	73.86	60.03
	P	--	--	--	--	--	--
		F	PL (before)	F	PL	After Yoga	28 days
Dhanurasana	5 X	104.50	261.5	41.75	103.00	L	0.01
	SE	13.82	90.12	18.08	30.55		
Ardhamatsyendra Asana	X	140.87	280.12	126.40	205.4	7	0.05
	SE	63.85	86.83	28.48	67.76		