

# **The Therapeutic Effect of Yoga on Management of Diabetes Mellitus and Occupational Stress - A Classical Approach**

**Logeshwari .K<sup>1</sup> & S. Jeladharan Nair.<sup>2</sup>**

1. Yoga Instructor / Counselor- Sri Krishna College of Engineering and Technology
2. Founder / Director - Sukrutham Heritage Foundation Trust- Coimbatore, E-Mail : logeshwariyoga@gmail.com

## **ABSTRACT**

The research paper entitled, “ The Therapeutic Effect of Yoga on Management of Diabetes Mellitus and Occupational stress” conducted under the strict supervision & guidance of Dr. Jeladharan. S, Founder/ Director, Sukrutham Heritage Foundation, Coimbatore, Counselor Trainer PSGR Krishnammal College for women, Tamilnadu. To achieve this purpose, employees suffering Diabetes Mellitus between the age group 35-55 were selected randomly from ELGI Company, Coimbatore. A two three months long practical session were conducted from 18<sup>th</sup> September to 18<sup>th</sup> November, 2016. The Subjects selected were assigned to two groups viz., Experimental with 11 members and control with 10 members. The Experimental group was subjected to an experimental treatment in which a set of twenty two yogic practices were performed on six days per week between 5.30 am to 6.30am at Satguru Yoga Vidyalayam.

A pre-post experimental-control test design was followed. The initial and final readings were taken for both the groups by testing FBS, PPBS, Lipid Profile, B.P. and the scores of the questionnaire also noted. A Paired “t” test was employed in the study to analyse the significance of the result statistically. After Yoga therapy, the experimental group showed a significant reduction in Blood Glucose level with p-value 0.046\* for FBS and 0.028\* for PPBS. This depicts that the regular practice of the selected yogic techniques helped to bring down Blood glucose level and improve the activity level in the experimental subjects.

**Key Words:** Yogic practices, Blood Glucose, Questionnaires.

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## **Introduction**

Health is like a live wire. At the moment we feel it, the sensation is energizing, the absence it is a state when the body and mind are dull and slow. Good health results from right diet, adequate exercise and a mind which is stress free. The dramatic changes in our life style, sedentary way of working, wrong dietary habits, lack of exercise, smoking and alcoholism leading to many psychological and psychosomatic problems.

- Diabetes Mellitus is a disease which has plagued man for centuries though its incidence at

present is higher than it has ever been. It is a so-called metabolic disease - a condition in which the body cannot properly use sugar & starches from diet due to insufficient production of the hormone insulin, in pancreas. As a result, sugar accumulates in blood and tissues and this causes defects in various parts of the body.

India is having largest number of diabetic patients in the world. We are genetically prone to diabetes, but the situation can be averted only by lifestyle intervention & dietary habits. According to W.H.O

estimates, by 2025, total 300 million of the worldwide population will be affected by diabetes. For every 21 seconds, someone is diagnosed with diabetes, an estimation given by American Diabetes Association

- Stress is the by product of dramatic changes that have taken place in work & life over the last decade.
- In people with Diabetes, stress can alter Blood glucose levels in two ways:

First, people under stress may not take good care of themselves and may drink more alcohol or exercise less. They may forget or not have time to check their glucose levels or plan good meals. Second, stress hormones may also alter blood glucose levels directly.

Yoga in itself is a therapy and life style. It changes the nature from the root so as not to fall prey to the unnecessary demands of the body and mind, thereby healing ourselves with our own medication inherent in the body.

- The selected yogic practices lower the level of blood sugar by:
  - Rejuvenating the pancreas,
  - Reduction of stress,
  - Reduction of overweight.

#### **Objectives of the study :**

- To find out the impact of selected yogic practices on blood sugar level of Diabetes Mellitus patients between the age 35-55.
- To find out the effect of yoga on work stress level of patients of Diabetes Mellitus.
- To find out the effect of yoga on the Cholesterol level of Diabetes patients.

#### **Hypotheses:**

In order to study the problem scientifically, the following Null Hypotheses were set:

- There is no significant difference between pre and post blood sugar level.
- There is no significant change in pre and post work stress level.
- There is no significant change in pre and post Cholesterol & BP levels.

#### **Materials and Methods:**

There were 21 volunteers with Diabetes Mellitus out of which 18 were taking medication, and the remainder were on diet control alone. Subjects were allocated to Experimental and Control groups and they were comparatively new to yogic practices. The Control group continued with normal medication only. The practical session utilized a standard sequence of selected Asanas, Pranayamas and Relaxation Techniques.

#### **Parameters**

1. Blood glucose : FBS & PPBS
2. Lipid Profile : Serum Cholesterol, Triglycerides, HDL & LDL.
3. Blood Pressure
4. Occupational Stress Scale : The scale consists of 46 items, each to be rated on a 5 points scale. Out of the 46 items 28 are true keyed and the rest 18 are false keyed. The total scores were divided into 3 categories viz, Low, Moderate and High.
  - Body weight in kilogram measured by Body Salter Analyser also used as a body parameter for the study.

#### **Yogic Interventions**

Swastikasana, vajrasana, suptavajrasana, Tadasana I & II, Trikonasana, Parsvakonasana, Parsvasthanasana, Prasarithapadothanasana, Janusirasasana, pascimotthanasana, Purvasthanasana, Pavanamuktasana, Bhujangasana, Dhanurasana, Makarasana, marichasana III, Bharadwajasana, Viparitarani, Ujjayee Pranayama, Anuloma & Viloma Pranayama, Bhastrika Pranayama, Yoga Nidra Relaxation techniques.

**Results**

The final result shows an over all improvement in Blood sugar, Cholesterol , blood pressure and work stress level. Tables I & II show that the fasting and post prandial blood glucose level decreased considerably in the Experimental group, but there is no significant change in the control group. Corresponding changes can observe in Lipid profile also (table III & IV). Some of the patients in the Experimental group were thinking to reduce their dose of tablets, since their blood glucose level fell markedly following the initiation of yoga therapy. Questionnaire results before and after the practice indicated that all the patients in the Experimental group reduced their work stress level, the majority felt better, less anxious, and more in control of themselves.

Therefore, in general the result can analyse as follows:

- As far as Fasting Blood Sugar is concerned, 7 out of 11 subjects showed a reduction in Fasting blood glucose.
- The Post prandial blood sugar was also found reduced in 9 subjects out of 11.
- Total cholesterol & triglycerides reduced considerably in 7 subjects, and 9 were reduced their LDL cholesterol.
- Work stress score shows a noticeable reduction. 8 out of 11 found to decrease their stress level in work place.
- Blood pressure was normalised in almost all the subjects.

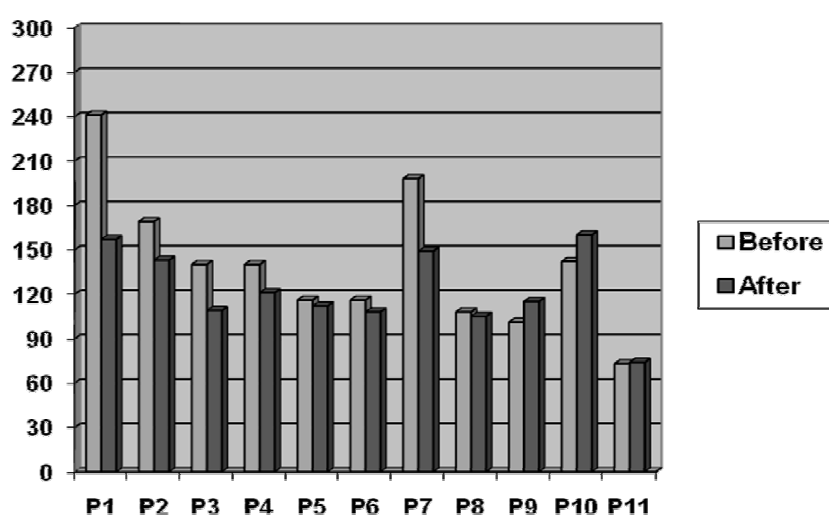
**Table-I: Blood Sugar Readings of E.G.:**

SL.NO.	NAME OF THE PATIENT	FBS		PPBS	
		BEFORE	AFTER	BEFORE	AFTER
1	Mr.N.Shashidharan	241	157	367	190
2	Mr.M.Vimal	169	143	273	189
3	Mr.K.Vasantha Kumar	140	109	286	205
4	Mrs.K.Baby shari	140	121	134	176
5	Mr.A. Sumesh	116	112	151	155
6	Mr.N.Ayyappan	116	108	205	123
7	Mr.M.Srinivasan	198	149	245	240
8	Mr.Jeraldraj	108	105	135	108
9	Mr.D.Ramkumar	101	115	215	209
10	Mr.B.Deepan	142	160	206	200
11	Mr.S.Prasad	73	74	133	119

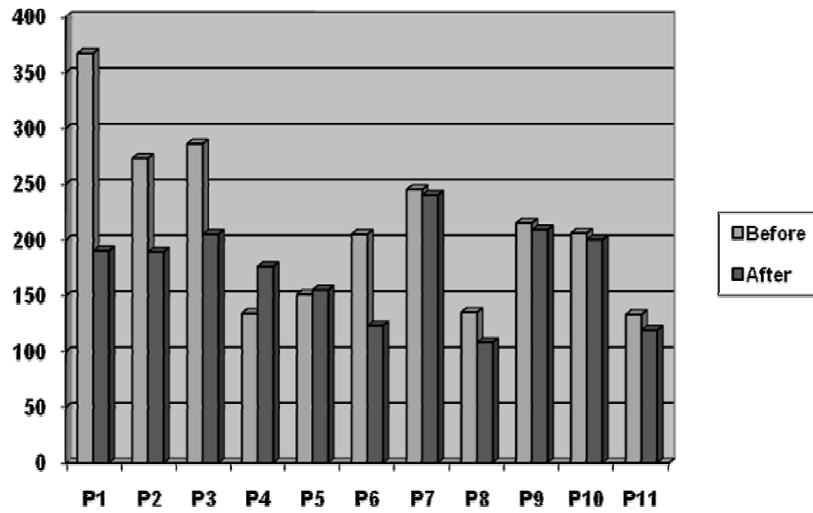
**Table:II Blood Sugar Readings of C.G :**

SL.NO.	NAME OF THE PATIENT	FBS		PPBS	
		BEFORE	AFTER	BEFORE	AFTER
1	Mr.M.B. Ashok Kumar	219	205	221	328
2	Mr.S. Suresh	98	129	155	209
3	Mr.C.Narayanan	114	116	209	218
4	Mr.K. Vivek	150	124.9	227	231
5	Mrs.Reeta	142	145	187	202
6	Dr.K.S.Jayaraj	121	108	156	152
7	Dr.Aruna	152	131	265	228
8	Mr.Jayanthi	140	165	168	218
9	Dr.Krishna	135	165	256	270
10	Dr.Siva	125	133	165	192

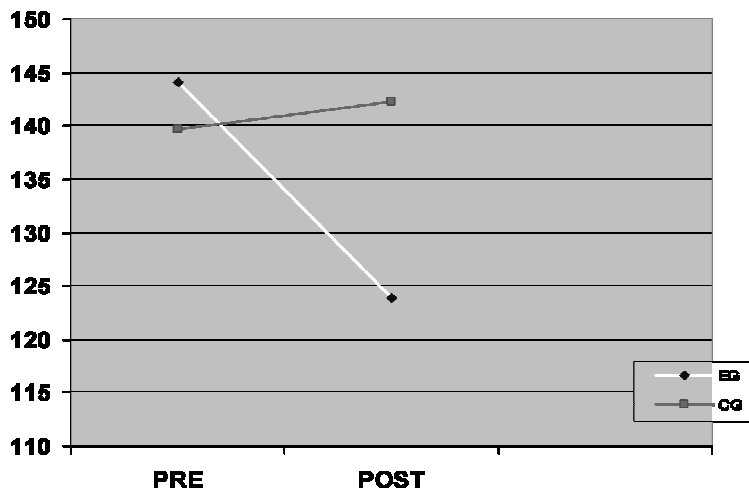
**FBS result of EG before and after the Yogic Practices**



## PPBS result of EG before and after the Yogic Practices



## INTERACTION EFFECT OF GROUP X YOGA ON FBS



### INTERACTION EFFECT OF GROUP X YOGA ON PPBS

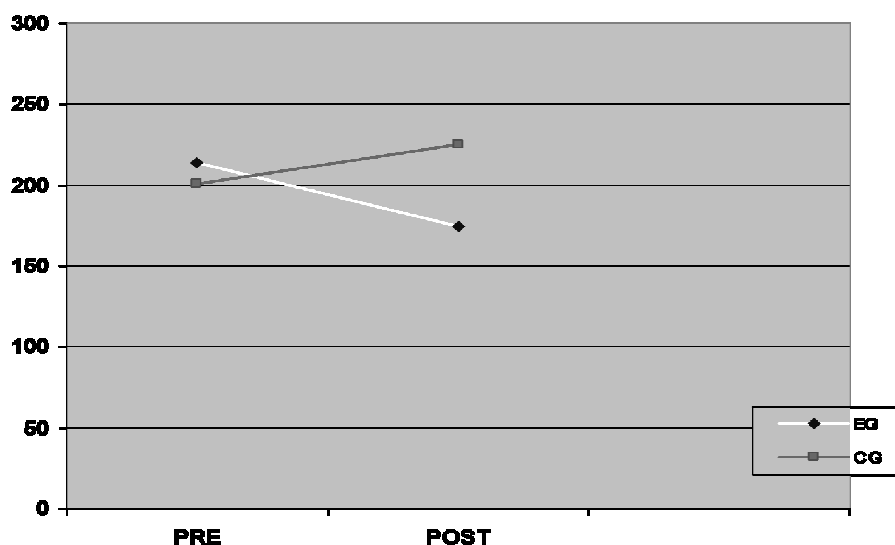


Table: III LIPID PROFILE – E.G.:

SL. NO	NAME OF THE PATIENT	BEFORE				AFTER			
		TC	TG	HDL	LDL	TC	TG	HDL	LDL
1	Mr.N.Shashidhar	168	164	35	102	171	148	33	110
2	Mr.M.Vimal	200	158	37	131.40	180	125	35.5	119.50
3	Mr.K.Vasantha kumar	198	72	40	137	188	195	36	117
4	Mrs.Baby shari	197	83	45	132	194	92	45	129
5	Mr.A.Sumesh	237	163	42	162.40	251	224	45.5	160.70
6	Mr.N.Ayyappan	266	237	29	189.60	238	234	42	149
7	Mr.M.Srinivasan	151	159	38	80	153	116	35	98
8	Mr.Jerald raj	144	141	43	71	112	172	42.3	35.3
9	Mr.D.RamKumar	197	84	45	132	178	73	42	120
10	Mr.B.Deeban	210	120	50	136	200	100	45	135
11	Mr.S.Prasad	215	126	42	145	203	121	40	136

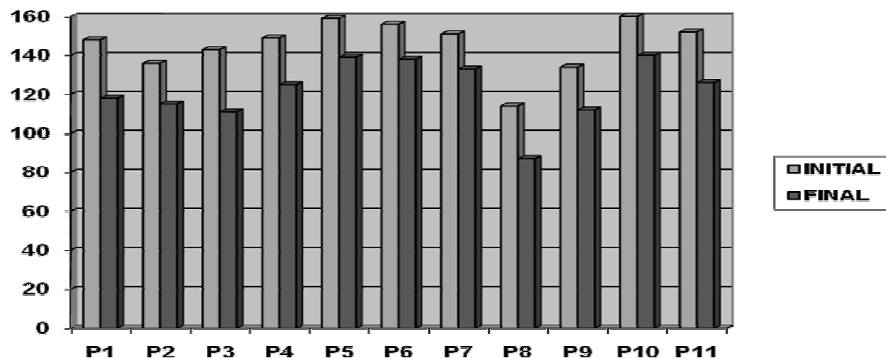
**Table:IV LIPID PROFILE – C.G.**

SL. NO.	NAME OF THE PATIENT	BEFORE				AFTER			
		TC	TG	HDL	LDL	TC	TG	HDL	LDL
1	Mr.M.B. Ashok Kumar	242	277	30	113	209	307	29	116
2	Mr.S. Suresh	232	197	41	156	230	201	34	133
3	Mr.C.Narayanan	201	135	36	108	200	149	30	125
4	Mr.K. Vivek	168	141	36	102	191.2	302.6	44.6	132.7
5	Mrs.Reeta	225	126	54	146	185	107	56	108
6	Dr.K.S.Jayaraj	149	138	39	82	152	111	42	64
7	Dr.Aruna	167	145	39	99	177	136	35	115
8	Mr.Jayanthi	208	140	49	131	197	159	45	121
9	Dr.Krishna	240	177	57	148	245	176	49	168
10	Dr.Siva	139	169	30	76	132	158	43	58

**Scores of Questionnaire-E.G.:**

SL.NO	NAME OF THE PATIENT	INITIAL		FINAL	
		SCORES	STATUS	SCORES	STATUS
1	Mr.N.Shashidharan	148	Moderate	118	Low
2	Mr.M. Vimal	136	Moderate	115	Low
3	Mr.K. Vasanth	143	Moderate	111	Low
4	Mrs.K.Babyshari	149	Moderate	125	Low
5	Mr.A. Sumesh	159	High	139	Moderate
6	Mr.N.Ayyappan	156	High	138	Low
7	Mr.M.Srinivasan	151	Moderate	133	Moderate
8	Mr.Jeraldraj	114	Low	87	Low
9	Mr.D.Ramkumar	134	Moderate	112	Low
10	Mr.B.Deepan	160	High	140	Moderate
11	Mr.S.Prasad	152	Moderate	126	Moderate

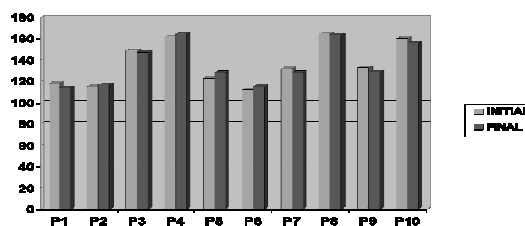
### QUESTIONNAIRE SCORE- EG



### Scores of Questionnaire-C.G :

SL.NO	NAME OF THE PATIENT	INITIAL		FINAL	
		SCORES	STATUS	SCORES	STATUS
1	Mr.M.B.Ashok Kumar	118	Low	114	Low
2	Mr.S.Suresh	115	Low	117	Low
3	Mr.C.Narayanan	149	Moderate	147	Moderate
4	Mr.K.Vivek	162	High	165	High
5	Mrs.Reeta	123	Moderate	128	Moderate
6	Dr.K.S.Jayaraj	112	Low	115	Low
7	Dr.Aruna	132	Moderate	128	Moderate
8	Mr.Jayanthi	165	High	164	High
9	Dr.Krishnan	133	Moderate	129	Moderate
10	Dr.Siva	160	High	156	High

### QUESTIONNAIRE SCORE- CG





## STATISTICAL ANALYSIS

### Statistical analysis:

A Paired “t” test was applied for each parameters and found out the value for each group viz, Experimental and Control. The result of “t” test are as follows:

**Blood Sugar:** On this variable, the FBS shown statistically significant reduction with p-value 0.046\* and PPBS with p-value 0.028\* which were <0.05 level of significance. This indicate that the significant change in Blood glucose level is due to Yoga therapy. Therefore, the Null hypothesis- there is no significant difference between the pre and post Blood sugar level of Diabetes Mellitus patients is rejected.

**Lipid Profile:** The Lipid Profile result after Yoga therapy indicates a reduction in Total cholesterol and LDL with p-values 0.0158\* and 0.04389\* respectively which were < 0.05 level of significance. Hence the reduction in TC and LDL is statistically significant.

**Blood Pressure:** After Yoga therapy, the Systolic BP gained a highly significant p-value ie., 0.000319 and “t” value=5.9609. Similarly in the case of Diastolic BP, p=0.000188 and “t”=5.7403 which showed a highly significant result. So the p<0.05 shows a significant level.

**Questionnaire:** The p-value  $7.68 \times 10^{-9}$  obtained for the scores of the questionnaire for experimental group is <0.05 level of significance. This indicates that the positive change in the experimental group after Yogic intervention,

### Result of Statistical Analysis of E.G.:

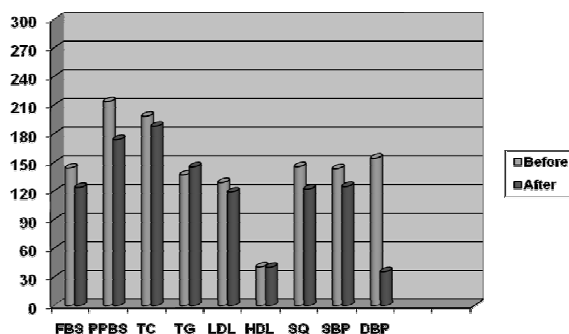
S. NO	PARAMETERS	MEAN		S.D		p-VALUE	t-STAT	Sig.
		PRE	POST	PRE	POST			
1	FBS	144.090	123.818	46.161	27.345	0.0462	8.860	S
2	PPBS	213.636	174	75.067	42.481	0.0286	2.156	S
3	TC	198.455	188	35.506	37.852	0.0158	2.497	S
4	TG	137	145.455	47.651	54.067	0.2853	0.587	NS
5	LDL	128.946	119.046	34.168	32.889	0.0439	1.892	S
6	HDL	40.545	40.118	5.681	4.513	0.3911	0.284	NS
7	QUESTIONNAIRE	145.636	122.182	13.471	15.892	$7.68 \times 10^{-9}$	16.337	HS
8	SBP	143.455	124.909	12.429	5.957	0.000139	5.961	HS
9	DBP	154.473	35.491	5.573	4.839	0.000188	5.740	HS

**Result of Statistical Analysis of C.G.:**

SL.NO	PARAMETERS	MEAN		S.D		p-VALUE	t-STAT	Sig.
		PRE	POST	PRE	POST			
1	FBS	139.6	142.19	32.555	28.927	0.352	0.392	NS
2	PPBS	200.9	224.8	40.802	47.116	0.043	1.931	NS
3	TC	197.1	191.82	38.128	33.508	0.201	0.878	NS
4	TG	164.5	180.66	45.309	71.122	0.184	0.946	NS
5	LDL	116.1	114.07	28.014	32.444	0.391	0.285	NS
6	HDL	41.1	40.76	9.362	8.643	0.044	0.154	NS
7	QUESTIONNAIRE	136.9	136.3	420.989	400.9	0.302	1.434	NS
8	SBP	139.2	142	6.941	7.364	0.025	2.264	S
9	DBP	90.2	87	7.511	78.4	0.093	1.434	NS

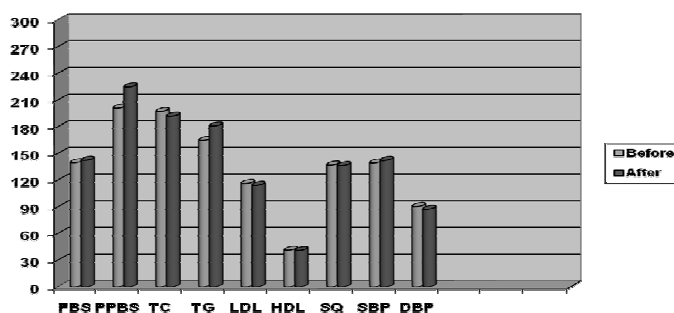
**Mean Values of Different Variables - Experimental Group:**

**Mean Values of Different Variables - Experimental Group**



**Mean Values of Different Variables - Control Group:**

**Mean Values of Different Variables - Control Group**



### **Discussion:**

The present study reveal that the concerned variables of Diabetes Mellitus have been rationalized in terms of the hypotheses that the Experimental group will out perform the control group due to three months of yogic interventions. The results could best depicted that, there is significant reduction in Fasting & Post Prandial Blood Sugar at 0.05\* level of significance. As per the Lipid profile results of the patients before and after the practice, it is known that there is notable reduction in total cholesterol with  $p=0.0158$  and LDL with  $p=0.04389$  which is  $< 0.05$  level of significance. Triglycerides level also showed slight reduction in experimental group. In the case of Blood Pressure both Systolic and Diastolic BP gained a far better p-values ie,  $0.000139^*$  and  $0.000188^*$  respectively. In the same way the Experimental group gained a significant reduction in work stress level ( $p= 7.68 \times 10^{-9}$ ).

- Compared to experimental group, the control group does not shown any significant changes after the study. Hence, the two way interaction between Group X Yoga reveals that the Experimental group has been benefited more in terms of various variables are concerned. The rationale for the yogic treatment could be offered in the following manner. The Yoga therapy can use as an aid to improve glucose homeostasis in Diabetes patients.
- Yogic practices attain steadiness of body and mind , a feeling of lightness, suppleness and psychophysical poise. The Asanas tones up the muscles, helps in removing the disease and purifies the internal and external organs. Asanas like Janusirsasana, Pascimottanasana, Marichasana, Ardhamatsyendrasana etc. stimulate and tones up the pancreas, strengthening the

abdominal muscles and improving the digestive system.

- The Pranayamas are extremely beneficial to the proper functioning of blood and circulatory system as it brings oxygen and energy to every cell, cleans the organism and expels the toxins. For example, Bhstrika Pranayama removes the excess phlegm, cleanses the nerve channels, purify the blood stream, regenerates the liver, spleen and pancreas. The relaxation techniques like Yoganidra found to be best for relaxation and rest. It wards off fatigue, increase mental repose, tones up nervous system and highly beneficial for those who suffer from sleeplessness and head ache.
- It is evident from the above results that all the 11 patients responded to the treatment positively. But the variation of the rate of success could be depended on the regularity of the practice, dietary change and the chronisity of the disease. Thus we can say that Yoga therapy is fully fruitful for those who adhere to the regular practice . The disease responds to the therapy with encouraging results.

### **Conclusion**

The result obtained from the present study can be concluded as below:

- Regular practice of selected yogic techniques can work as a therapeutic tool for the treatment of Diabetes Mellitus by bringing down the elevated blood glucose level.
- It also helps to reduce the work stress level and to maintain normal cholesterol level.
- The practice of yoga offers improvement of over all health and a relaxed out look of life by making the mind peaceful and happy.

- Selected Yogic Practices administered in a more controlled set up under strict vigilance can yield better results.

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