Academic Sports Scholar
Vol. 3 | Issue. 4 | April 2014 **ISSN : 2277-3665**

ORIGINAL ARTICLE

EFFECT OF SELECTED YOGA ASANAS ON BLOOD SUGAR LIPID PROFILE AND BLOOD PRESSURE PARAMETERS AMONG TYPE 2 DIABETES MELLITUS PATIENTS

M. Udhaya Kumar and R. Kalidasan

[1]Ph.D. Research scholar, Dept. of Physical Education & Yoga Centre, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India.
[2]Asst. Prof. (SS) Dept. of Physical Education & Yoga Centre, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India.

Abstract:

The purpose of the study was to find out the effect of selected yoga asanas practices on fasting blood sugar, post prandial blood sugar, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), systolic blood pressure and diastolic blood pressure among type 2 diabetes mellitus patients. To achieve the purpose of the study thirty male type 2 diabetes mellitus patients in the age-group of 35-60 years with diabetes of 1-10 years duration were selected from Vishwa Aysush Kendram, Therapeutic yoga centre, Salem. Patients of nephropathy, retinopathy (proliferative) and coronary artery disease or any other complications of diabetes were excluded. A series of blood glucose, lipid profile, and blood pressure tests was carried out on each participant. Fasting blood sugar and post prandial blood sugar was assessed by Glucose oxidase method – peroxidase. The high density lipoprotein assessed by phosphotungstate method, low density lipoprotein (LDL), very low density lipoprotein assessed by Friedewald-Levy-Fredrickson formula & blood pressure was assessed by blood pressure monitor .The subjects were randomly assigned into two groups of fifteen each, such as experimental and control groups. The experimental group participated in the yoga asanas training for period of three month, six days per week, one session per day and each session lasted 50 minutes in the morning session. The control group maintained their daily routine activities and no special training was given. The subjects of the two groups were tested on selected variables prior and immediately after the training period. The collected data were analyzed statistically through dependent 't' test and analysis of covariance (ANCOVA) to find out the significance difference, if any between the groups. The 0.05 level of confidence was fixed to test the level of significance difference, if any between groups. The results of the study showed that there was significant level differences exist between yoga asanas training group and control group. And also yoga asanas training group showed significant decrease on level of fasting blood sugar, post prandial blood sugar, low density lipoprotein (LDL), very low density lipoprotein (VLDL), systolic blood pressure & diastolic blood pressure and barring high density lipoprotein (HDL), where significant increase was observed when compared to control group.

KEYWORDS:

Yoga asanas training, Diabetes, Blood sugar, Lipid profile, Blood pressure.

INTRODUCTION

Diabetes is a chronic metabolic disorder that occurs when the human body is not able to produce

Please cite this Article as : M. Udhaya Kumar and R. Kalidasan , EFFECT OF SELECTED YOGA ASANAS ON BLOOD SUGAR LIPID PROFILE AND BLOOD PRESSURE PARAMETERS AMONG TYPE 2 DIABETES MELLITUS PATIENTS : Academic Sports Scholar (April ; 2014)

enough of the hormone insulin or because cells do not respond to the insulin that is produced. Diabetes mellitus which has both Greek and Latin roots. Diabetes comes from a Greek word that means to siphon (drain off), Mellitus comes from a Latin word that means sweet like honey. Type-2 diabetes is a lifelong (chronic) disorder in which there are high levels of sugar (glucose) in the blood, once fat, liver and muscle cells do not respond correctly to insulin. This is called insulin resistance. The international diabetes federation (IDF) estimate the total number diabetes patients further set to raise to 69.9 million by the year 2025 Mohan et al (2007). Observed that over 30 million have now been diagnosed with diabetes in India. The CPR (Crude prevalence rate) in the urban areas of India is thought to be 9 per cent. In rural areas, the prevalence is approximately 3 per cent of the total population. The population of India is now more than 1000 million, his data helps to set an idea of the scale of the problem. The estimate of the actual number of diabetics in India is around 40 million. This means that India actually has the highest number of diabetics of any one country in the entire world, at the point of time IGT (Impaired Glucose Tolerance) is also a mounting problem in India. The prevalence of IGT is thought to be around 8.7 per cent in urban areas and 7.9 per cent in rural areas, although this estimate may be too high. It is thought that around 35 per cent of IGT sufferers go on to develop type 2diabetes, so India is genuinely facing a healthcare crisis. In India, the type of diabetes differs considerably from that in the Western world. All types of diabetes should be treated under a close collaboration between patients and healthcare providers in order to prevent long-term complications such as damage to the eyes, kidney, feet and heart. People with diabetes must be treated to avoid early death. As more and more people develop diabetes, they've started turning to complementary and alternative therapies, such as yoga, to treat the disorder, but not all those therapies work. Yoga asanas practices are Indian method of exercise, which are practiced over thousands of years. It is the greatest gift given to us by our ancestors. Yoga is cost effective medicine, which has no-side effects. It is a discipline which has a direct impact on physical and mental health of a person, it is also used for therapeutic purpose also, like diabetes. In the past Manider et al (2013), Shantakumari et al (2013), Vaishali et al (2012), Thankur et al (2011), Bhunia et al (2010), Malhotra et al (2010), and Singh et al (2001) have done studies using yoga practices for managing type-2 diabetes. The purpose of the study was to find out the effect of selected yoga asanas practices on fasting blood sugar, post prandial blood sugar, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), systolic blood pressure and diastolic blood pressure among type 2 diabetes mellitus patients.

OBJECTIVE

The objective of this study was to see the effect of selected yoga asanas among type 2 diabetes mellitus patients and its impact on fasting blood sugar, post prandial blood sugar, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), systolic blood pressure and diastolic blood pressure variables respectively.

METHODOLOGY

The study was conducted in the Vishwa Aysush Kendram, Therapeutic Yoga Centre, Fairlands, Salem district, Tamilnadu, India. Thirty male type 2 diabetes mellitus patients in the age-group of 35-60 years with diabetes of 1-10 years duration were selected from Vishwa Aysush Kendram, Therapeutic Yoga Centre, Salem. Patients of nephropathy, retinopathy (proliferative) and coronary artery disease or any other complications of diabetes were excluded. The patients were divided into two groups of fifteen patients each. Group-1 act as control group and continued with the conventional medicines while group-2, practised yoga along with the conventional medicines an informed written consent was taken from all the patients after the procedure was explained to them. A qualified physician examined the subjects medically and declared that they were fit for the study. Group-2 patients were taught yoga-asanas, by one of the investigator who is yoga instructor from leading yoga institution Kaivalyadhama S.M.Y.M.Samiti, Lonavla, Pune District, Maharashtra State, India. The experimental treatment was administrated for period of twelve weeks, six days per week, one session per day and each session lasted 50 minutes in the morning session. The pre and post test was conducted, before and after experimental treatment for both the groups. The standard testing protocol was used to collect data from the reputed clinical laboratory located at Salem such as Fasting blood sugar and post prandial blood sugar was assessed by Glucose oxidase method – peroxidase. The high density lipoprotein assessed by phosphotungstate method, low density lipoprotein (LDL), very low density lipoprotein assessed by Friedewald-Levy-Fredrickson formula & blood pressure was assessed by blood pressure monitor. The various asanas, along with total duration is tabulated below.

TABLE – 1
Yoga asanas practice schedule

Selected Yoga asanas practices	
Warm-up	50 minutes
Tadasana – I, II & III	
Konasana – I, II & III (twist)	
Padahastasna – I & II	
Piraiyasana (30°) or (Dynamic)	
Yoga mudra – (padamaasana, vajarasana & shukasana)	
Janu shirasana	
Vakarasana – (I, II & III)	
Ushtrasana – (backward in kneel down)	
Crocodile variation – (I,II,III,IV,V & VI)	
Pawana muktasana	
Uttana padasana	
Navukkasana	
Bhujangasana	
Salabhasana (ardha & poorana)	
Dhanurasana	
Shantiasana (shavasana)	

TABLE – II
Descriptive analysis of selected blood glucose, lipid profile and blood pressure variables among control and experimental groups

S.No	Variables	Group	Pre-test Mean	SD (±)	Post –test Mean	SD (±)	Adjusted post test Mean	't' test
1	Fasting Blood Sugar	CG	307.13	19.87	307.53	21.03	299.98	0.14
		YTG	309.46	19.33	287.93	19.93	316.61	5.07*
2	Post prandial Blood Sugar	CG	348.60	42.99	350.60	41.26	352.56	1.24
		YTG	354.00	51.19	316.40	37.15	314.43	4.60*
3	High Density Lipoprotein (HDL)	CG	36.20	3.29	36.40	4.96	36.49	0.16
		YTG	36.66	3.22	39.93	1.03	39.83	4.66*
4	Low Density Lipoprotein (LDL)	CG	132.26	17.31	130.40	30.13	130.20	0.18
		YTG	133.80	18.56	111.60	8.89	111.79	3.92*
5	Very Low Density Lipoprotein (VLDL)	CG	44.26	12.65	43.13	7.53	43.48	0.57
		YTG	45.80	10.40	36.80	5.64	36.45	4.65*
6	Systolic Blood pressure	CG	123.26	0.88	122.40	1.35	122.38	1.99
		YTG	123.66	0.97	119.86	0.91	119.88	10.71*
7	Diastolic Blood pressure	CG	79.06	0.79	78.60	0.63	78.58	1.97
		YTG	78.93	0.59	76.86	0.83	76.87	8.32*

CG= Control group YTG= Yoga asana training group *significant at 0.05 level of confidence

The tables-II shows the pre, post and adjusted post means, standard deviations and 't' ratio on selected blood glucose & lipid profile and blood pressure variables were numerical presented. 't' value of pre and post tests data reveals yogic training group showed significant difference in all selected variables, however difference in control group was not observed. The analysis of covariance on selected variables of yoga asanas training and control groups is presented in table –III.

TABLE – III
Computation of analysis of covariance on selected blood glucose, lipid profile and blood pressure variables among type 2 diabetes mellitus patients

S.No	variables	Test	Sum of variance	Sum of squares	df	Mean square	F ratio
1	Fasting Blood Sugar	Pre-test	Between the group	40.83	1	40.83	0.10
			Within the group	10767.46	28	384.55	
		Post-test	Between the group	2881.20	1	2881.20	6.86*
			Within the group	11758.66	28	419.95	
		Adjusted means	Between the sets	1665.09	1	1665.09	9.95*
			Within the sets	4515.02	27	167.22	
2	Post prandial Blood Sugar	Pre-test	Between the group	218.70	1	218.700	0.09
			Within the group	62569.60	28	2234.629	
		Post-test	Between the group	8772.30	1	8772.30	5.69*
			Within the group	43163.20	28	1541.54	
		Adjusted means	Between the sets	10869.53	1	10869.53	29.56*
			Within the sets	9925.20	27	367.60	
3	High Density Lipoprotein (HDL)	Pre-test	Between the group	1.63	1	1.63	0.15
			Within the group	297.73	28	10.63	
		Post-test	Between the group	93.63	1	93.63	7.27*
			Within the group	360.53	28	12.87	
		Adjusted means	Between the sets	83.27	1	83.27	7.25*
			Within the sets	310.15	27	11.48	
4	Low Density Lipoprotein (LDL)	Pre-test	Between the group	17.63	1	17.63	0.05
			Within the group	9019.33	28	322.11	
		Post-test	Between the group	2650.80	1	2650.80	5.37*
			Within the group	13817.20	28	493.47	
		Adjusted means	Between the sets	2538.46	1	2538.46	5.17*
			Within the sets	13249.50	27	490.72	
5	Very Low Density Lipoprotein	Pre-test	Between the group	17.63	1	17.63	0.13
			Within the group	3759.33	28	134.26	
		Post-test	Between the group	300.83	1	300.83	6.78*
			Within the group	1242.13	28	44.36	
		Adjusted means	Between the sets	368.66	1	368.66	21.10*
			Within the sets	471.69	27	17.47	
6	Systolic Blood pressure	Pre-test	Between the group	1.20	1	1.20	1.38
			Within the group	24.26	28	0.86	
		Post-test	Between the group	48.13	1	48.13	36.10*
			Within the group	37.33	28	1.33	
		Adjusted means	Between the sets	44.52	1	44.52	32.38*
			Within the sets	37.12	27	1.37	
7	Diastolic Blood pressure	Pre-test	Between the group	0.13	1	0.13	0.26
			Within the group	13.86	28	0.49	
		Post-test	Between the group	22.53	1	22.53	41.14*
			Within the group	15.33	28	0.54	
		Adjusted means	Between the sets	21.76	1	21.76	39.26*
			Within the sets	14.96	27	0.55	

*Significant at 0.05level of confidences
(The table values required for significance at 0.05 level of confidence for 1 & 28 and 1 & 27 are 4.20 and 4.21 respectively).

The table III shows that obtained F-ratio of pre test data of 0.10, 0.09, 0.15, 0.05, 0.13, 1.38 and 0.26 was of fasting blood sugar, post prandial blood sugar, high density lipoprotein, low density lipoprotein, very low density lipoprotein and systolic blood pressure & diastolic blood pressure which are lesser then the table value 4.20 for the degree of freedom 1 and 28 required for significance at 0.05 level of confidence. The result of the study indicates that there was no significant level difference among control and experimental groups on all selected variables.

The table III indicates that obtained F-ratio of post test data of 6.86, 5.69, 7.27, 5.37, 6.78, 36.10 and 41.14 was of fasting blood sugar, post prandial blood sugar, high density lipoprotein, low density lipoprotein, very low density lipoprotein and systolic blood pressure & diastolic blood pressure which are higher than the table value 4.20 for the degree of freedom 1 and 28 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant level difference among control and experimental groups on all selected variables.

The table III reveals that obtained F-ratio of adjusted post test means data of 9.95, 29.56, 7.25, 5.17, 21.10, 32.38 and 39.26 was fasting blood sugar, post prandial blood sugar, high density lipoprotein, low density lipoprotein, very low density lipoprotein and systolic blood pressure & diastolic blood pressure which are higher than the table value 4.21 for the degree of freedom 1 and 27 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant level difference among control and experimental groups on all selected variables.

DISCUSSION OF FINDINGS

The results of the study indicate that the experimental group which underwent Yoga asanas training had showed significant decrease in the selected variables namely Fasting Blood Sugar, Post prandial Blood Sugar, Low Density Lipoprotein (LDL), Very Low Density Lipoprotein (VLDL), Systolic Blood pressure & Diastolic Blood pressure and significant increase was observed on High Density Lipoprotein (HDL), when compared to the control group. The control groups did not show significant level differences in any of the selected variables. These findings confirm the earlier findings (Tenzin et al., 2010; Jain et al., 1993; Singh et al., 2004; Sahay, 2007). The findings were found to be consistent with the previous results of a study conducted by (Dang et al., 1999; Malhotra et al., 2004) in which it shows a significant decrease in low density lipoprotein (LDL), and very low density lipoprotein (VLDL) with a significant increase in high density lipoprotein (HDL) level from its initial value after twelve weeks of yoga asanas practices in experimental group while showing insignificant decrease in control group. Various yoga asanas may be directly rejuvenating cells of pancreas as a result of which there may be increase in utilization and metabolism of glucose in the peripheral tissues, liver and adipose tissues through enzymatic process (Rugmini et al., 1976; Kyizom et al., 2010). The past research results also indicates that systolic and diastolic blood pressure significantly decreased, (Habibi et al., 2013; Singh et al., 2004).

CONCLUSIONS

From the analysis of data, the following conclusions were drawn.

1.The type 2 diabetes mellitus patients of experimental group showed significant decrease in fasting blood sugar, post prandial blood sugar, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) and systolic blood pressure & diastolic blood pressure and at same time high density lipoprotein (HDL) showed significant increase.
2.The type 2 diabetes patients of control group did not show significant level difference in any of selected variables.

REFERENCES

1.Bhunia, S. (2010). Can physical exercise, yoga, diet control and naturopathic treatment prevent progression of diabetes mellitus?, Indian Journal of Physiology and Pharmacology, V: 54, I: 1, P 92-94.
2.Dang K K., & Sahay B. K. (1999). Yoga and Meditation, Medicine Update, Volume 9, Part 1 Chapters 57 and 58, p 502 – 506, 507-512. The association of Physicians of India Ed M.M. Singh. APICON, The Association of Physician of India conference, New Delhi.

3.Habibi, N., Mohammad Marandi, S., Hemati Farsani, Z., Yazdani, B., Firozeh, M., Noruozi, P., (2013).The influence of yoga- on risk profiles programs in women withdiabetes typeII, Advances in Environmental Biology, V: 7, I: 4,P:550-555.
4.Jain Suresh C., Alka Uppal, Bhatnagar S.O.D. and Talukdar B. (1993). A Study of Response Pattern of Non-insulin Dependent Diabetics to Yoga Therapy. Diabetic Research and Clinical Practice. 69 – 74.
5.Koshti (1972). "Electrophoretic pattern of serum proteins in diabetes mellitus as influenced by physical exercises (Yogasanas), Journal of the Mysore Medical Assoc. 36; p. 64.
6.Kyizom Tenzin, Singh Savita, Singh, K.P., Tandon O.P., & Kumar Rahul., (2010). Effect of pranayama & yoga asana on cognitive brain functions in type 2 diabetes P3 event releated evoked potential (ERP). Indian Journal Med Res.131, pp 636-640.
7.Malhotra AS , Harinath K, Pal K, Prasad R, Kumar R, Kain TC. (2004). Effects of hatha yoga and omkar meditation on cardiorespiratory performance, psychological profile and melatonin secretion. Journal Altern Complement Med; 10(2): 261-8.
8.Malhotra, V., Singh, S., Singh, K.P., Gupta, P., Sharma, S.B., Madhu, S.V., Tandon, O.P. (2002). Study of yoga asanas in assessment of pulmonary function in NIDDM patients, Indian Journal of Physiology and Pharmacology, V: 46, I: 3,P:313-320.
9.Malhotra, V., Singh, S., Tandon, O.P., Madhu, S.V., Prasad, A., Sharma, S.B. (2002) Effect of Yoga asanas on nerve conduction in Type 2 diabetes, Indian Journal of Physiology and Pharmacology, V: 46, I: 3, P: 298-306.
10.Malhotra, V. , Singh, S., Sharma, S.B., Gupta, P., Prasad, A., Tandon, O.P., Madhu, S.V., Jai Ganga, R. , (2010) The status of NIDDM patients after yoga asanas: Assessment of important parameters, Journal of Clinical and Diagnostic Research, V: 4, I: 3, P: 2652-2667.
11.Maninder, B., Seema, D., Shema, N., (2013) Influence of pranayamas and yoga-asanas on blood glucose,lipid profile and hba1c in type 2 diabetes, International Journal of Pharma and Bio Sciences, V- 4, Issue 1, , PP B169-B172.
12.Mohan, V. sandeep, S. deepa, R. shah, B. & Varghese, C. (2007). Epidemiology of type 2 diabetes: Indian scenario, Indian journal Med Res 125, P : 217-230.
13.Park K. (2005). Park' s Textbook of Preventive and Social Med. 18th edition. Banarsidas Banot Publishers, Jabalpur India; 311-15.
14.Richter, E.A., Schneider, S.H. (1981). "Diabetes and exercise", American Journal of Medicine". 70:201-209.
15.Rugmini PS, Sinha RN. (1976). The effect of yoga therapy in diabetes mellitus. VishwayatanYogashram. 175-89.
16.Sahay, BK. (2007). Role of yoga in diabetes. J Assoc Physicians India. 55: 121-6.
17.Santhakumari, R., Reddy, I.Y., Reddy, C.S.K., Archana, R. (2013) Study of cognition in type 2 diabetes with yoga asana and pranayama, Research Journal of Pharmaceutical, Biological and Chemical Sciences,V-4, Issue 2, PP 1637-1641.
18.Sicree R, Shaw J, Zimmet P. (2006). Diabetes and impaired glucose tolerance. In: Gan D, editor. Diabetes Atlas. International Diabetes federation. 3rd ed. Belgium International diabetes federation; p. 15-103.
19.Singh Savita, Tenzin Kyizom, K.P.Singh, O.P. Tandon and S V Madhu (2008). Influence of pranayama and yoga asanas on serum insulin, Blood glucose and lipid profile in type 2 diabetes. Indian journal of clinical Biochemistry. 23(4) 365-368.
20.Singh, S., Malhotra, V., Singh, K.P., Madhu, S.V., Tandon, O.P. (2004) Role of Yoga in modifying certain cardiovascular functions in type 2 diabetic patients, Journal of Association of Physicians of India, V: 52, , P: 203-206.
21.Singh, S., Malhotra, V., Singh, K.P., Sharma, S.B., Madhu, S.V., Tandon, O.P. (2001) A preliminary report on the role of yoga asanas on oxidative stress in non-insulin dependent diabetes mellitus, Indian Journal of Clinical Biochemistry, V: 16, I: 2, P: 216-220.
22.Thakur, G., Nair, R., Ganguly, P., Tomar, A. (2011) Naturopathy and yoga as conventional treatment for type-II diabetes mellitus patients, Biochemical and Cellular Archives, 11(2), October, 377-380.
23.Tulpule, T.H. (1977)"Yogic exercises and diabetes Mellitus (Madhumeh), Journal of Diab. Assoc. India. Vol. 17.
24.Vaishali, K., Kumar, K.V. , Adhikari, P., UnniKrishnan, B., (2012) Effects of yoga-based program on glycosylated hemoglobin level serum lipid profile in community dwelling elderly subjects with chronic type 2 diabetes mellitus - A randomized controlled trial, Physical and Occupational Therapy in Geriatrics, :30,1:22-30.
25.Welcome to the Global Diabetes Community. (n.d.). Diabetes UK, UK Diabetes Resource, Diabetes Symptoms, Diabetes Diet, Gestational Diabetes. Retrieved March 20, 2014, from

http://www.diabetes.co.uk
26.Wild S, Roglic G, Green A, Sicree R, King H. (2004) Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. Diabetes care. 27; 1047-53.
27.Yang, K. , Bernardo, L.M. , Sereika, S.M. , Conroy, M.B., Balk, J., Burke, L.E. , (2011) Utilization of 3-month yoga program for adults at high risk for type 2 diabetes: A pilot study, Evidence-based Complementary and Alternative Medicine, Volume 2011, Article number:257891.